



# DEPARTMENT OF VETERAN AFFAIRS PORTLAND

Portland, Maine

Project No. 10022  
September 1, 2010



## **PROJECT DIRECTORY**

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<b>PROJECT</b>	<b>PORTLAND DEPARTMENT OF VETERANS AFFAIRS 144 FORE STREET PORTLAND, ME 04101</b>
<b>OWNER</b>	<b>JACKRABBIT LLC 44 OAK STREET PORTLAND, ME 04101 207-772-7647</b>
<b>ARCHITECT LANDSCAPE ARCHITECT CIVIL ENGINEER STRUCTURAL ENGINEER</b>	<b>SMRT, INC. 144 FORE STREET PO BOX 618 PORTLAND, ME 04104 207-772-3846 CONTACT: TIM MCDONALD</b>
<b>CONSTRUCTION MANAGER</b>	<b>LEDGEWOOD CONSTRUCTION 27 MAIN STREET SOUTH PORTLAND, ME 04106 207-767-1866 CONTACT: CHRIS MORIN</b>
<b>MECHANICAL DESIGN-BUILDER</b>	<b>TITAN MECHANICAL PO BOX 3927 PORTLAND, ME 04104 207-878-5223 CONTACT: JOHN NOLAN</b>
<b>ELECTRICAL DESIGN-BUILDER</b>	<b>BH MILLIKEN ELECTRICAL CONTRACTORS 175 ANDERSON STREET PORTLAND, ME 04101 207-879-1877 CONTACT: RICK GARDINER</b>



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**Supplementary Conditions to General Conditions of the Contract for Construction,  
AIA Document A201 – 2007**

Portland Department of Veterans Affairs  
144 Fore Street  
Portland Maine

SMRT Project 10022  
August 9, 2010

The Contract Documents include by reference, AIA Document A201 – 2007. This document modifies the original as noted.

1. Add: “**§ 1.2.4** All indications or notations which apply to one of a number of similar situations, materials or processes shall be deemed to apply to all such situations, materials or processes wherever they appear in the Work, except where a contrary result is clearly indicated by the Contract Documents. Where no explicit quality or standards for materials or workmanship are established for work, such work is to be of good quality for the intended use and consistent with the quality of the surrounding work and of the construction of the Project generally.”
2. 2.2.5. Add: “The Owner shall provide Construction Documents for Owner and code official use.”
3. Add: “**§ 2.2.6** The Owner shall communicate all instructions to the Contractor through the Architect.”
4. 3.1.1. Add: ““Contractor” and “Construction Manager” shall have equal meaning and may be used interchangeably in this Contract.”
5. 3.2.2, Insert after second sentence: “The Contractor shall not proceed with any work not clearly and consistently defined in sufficient detail in the Contract Documents, but shall request additional instructions from the Architect. If the Contractor proceeds with such work without obtaining further instructions, he shall correct the incorrect work at his own expense.”
6. Add: “**§ 3.3.4** The Contractor shall coordinate and supervise the work performed by Subcontractors so that the work is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the work. The Contractor and all Subcontractors shall, at all times, afford each other trade, and the Owner’s other contractors, every reasonable opportunity for the installation of work and the storage of materials.”
7. Add: “**§ 3.3.5** The Contractor shall coordinate the submission of questions regarding the Construction Documents to the Architect and the application of responses to the Work. Questions submitted for response shall reference found information within the Contract Documents relating to the question being posed, and shall show due diligence on the Contractor's part in anticipating issues sufficiently to permit a reasonable time for response prior to affecting the Project Schedule.”
8. 3.5. Revise first paragraph to be numbered: “**§ 3.5.1**” and delete last sentence: “If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.”

9. Add: “**§ 3.5.2** The Contractor shall be responsible for determining that all materials furnished for the Work of this Contract meet all requirements of the Contract Documents. To the extent a material being used is not a material specified in the Contract Documents, the Architect may require the Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the reasonable opinion of the Architect, would lead to a reasonable certainty that any material used, or proposed to be used, in the Work meets the requirements of the Contract Documents. All such data shall be furnished at the Contractor's expense. This provision shall not require the Contractor to pay for periodic testing of different batches of the same material in this regard, unless such testing is specifically required by the Contract Documents to be performed at the Contractor's expense.”
10. Add: “**§ 3.5.3** In all cases in which a manufacturer's name, trade name or other proprietary designation is used in connection with materials or articles to be furnished under this Contract, whether or not the phrase "or equal" is used after such name, the Contractor shall furnish the product of the named manufacturer(s) without substitution, unless a written request for a substitute has been submitted by the Contractor and approved in writing by the Architect as provided in subparagraph 3.5.4.”
11. Add: “**§ 3.5.4** If the Contractor proposes to use a material which, while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, the Contractor shall inform the Architect in writing of the nature of such deviations at the time the material is submitted for approval, and shall request written approval of the deviation from the requirements of the Contract Documents.”
12. Add: “**§ 3.5.5**. In requesting approval of deviation or substitutions, the Contractor shall provide evidence that the proposed substitution or deviation will provide a quality of result at least equal to that otherwise attainable. If, in the opinion of the Architect, the evidence presented by the Contractor does not provide a sufficient basis for such reasonable certainty, the Architect shall reject such substitution or deviation without further investigation.”
13. Add: **§ 3.5.6** The Contract Documents are intended to produce a building of consistent character and quality of design. All components of the building including visible items of mechanical and electrical equipment have been selected to have a coordinated design in relation to the overall appearance of the building. The Architect shall judge the design and appearance of proposed substitutes on the basis of their suitability in relation to the overall design of the Project, as well as for their intrinsic merits. The Architect will not approve proposed substitutes which, in the Architects opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the project. In order to permit coordinated design of color and finishes the Contractor shall furnish the substituted material in any color, finish, texture, or pattern which would have been available from the manufacturer originally specified, at no additional cost to the Owner.”
14. Add: **§ 3.5.7** Any additional cost, loss, or damage arising from the substitution of any material or any method for those originally specified shall be borne by the Contractor, notwithstanding approval or acceptance of such substitution by the Owner or the Architect, unless such substitution was made at the written request or direction of the Owner or the Architect.”

15. Add: **§ 3.5.8** The warranty provided in this paragraph 3.5 shall be in addition to and not in limitation of any other warranty required by the Contract Documents or otherwise prescribed by law.”
16. 3.12.5. Add: “ In the absence of an approved submittal schedule, the Contractor shall coordinate the sequence and timing of submittals to permit sequential and timely review, and shall not unreasonably demand the return of multiple submittals within the stipulated review period.”
17. Add: **“§ 3.13.2** The Contractor shall maintain clear access for use by any emergency vehicle at all times. Maintain clear paths of egress from building exits at all times. Remove snow and ice as necessary to maintain said clear access for emergency vehicles and said clear paths of egress in areas limited to the Contractor's use.”
18. 4.2.7, fifth sentence. Delete: “, unless otherwise specifically stated by the Architect,”
19. 6.1.4. Add: “This provision shall not be construed as relieving the Contractor of the sole responsibility for the care and protection of the work, or the restoration of any damaged work except such as may be caused by agents or employees of the Owner not party to this Contract.”
20. 7.3.3. Add: “As used in this paragraph, "Cost" shall mean the estimated or actual net increase or decrease in cost to the Contractor, Subcontractor or Sub-subcontractor for performing the work covered by the change, including actual payments for materials, equipment rentals, expendable items, wages and associated benefits to workmen and to supervisors employed full time at the site, insurance, bonds and other provable direct costs, but not including any administrative, accounting or expediting costs, or other indirect or overhead costs, or any wages or benefits of supervisory personnel not assigned full time to the site, or any amount for profit to the Contractor, Subcontractor or Sub-subcontractor.

"Percentage", as used in this paragraph, shall mean an allowance to be added to the "cost" in lieu of overhead and profit and of any other expense which is not included in the cost of the Work covered by the change, as defined above. Percentage for a Contractor shall be 15% of any net increase or decrease of Cost of any Work performed by his own forces and 10% for Work performed by any Subcontractors. Percentage for a Subcontractor shall be such percentage allowances for overhead and profit as are set forth in the Subcontract between such Subcontractor and the Contractor, but not more than as provided herein for the Contractor.

If the Owner elects to determine the cost of the Work as provided in method 7.3.3.2 using unit prices stated in the Contract Documents or subsequently agreed upon. Notwithstanding the inclusion of unit prices in the Contract Documents, it shall be the Owner's option to require the Cost of any given change to be determined by one of the other methods stated in 7.3.3.”

21. 7.3.10. Add: “Prior to payments for a change in the Work, the change shall be recorded by the execution of an appropriate Change Order.”
22. Add: **“§ 8.2.4** The Contractor shall submit a Progress Schedule showing for each class of work included in the Schedule of Values, the percentage completion to be obtained and the total dollar value of work to be completed as of the last of each month until Substantial Completion.“
23. Add: **“§ 8.2.5** The Progress Schedule shall be based on an orderly progression of the Work, allowing adequate time for each operation, including adequate time for submission and review of

submittals, and leading to a reasonable certainty of Substantial Completion by the date established in the Agreement. The Progress Schedule will be reviewed by the Architect for compliance with the requirements of this Article and will be accepted by the Architect or returned to the Contractor for revision and resubmittal. “

24. Add: “**§ 8.2.6** If in any Application for Payment the total value of the completed Work in place, as certified by the Architect, is less than 90% of the total value of the Work in place scheduled to be complete in the Progress Schedule, the Owner may, at the Owner's option, require the Contractor to accelerate the progress of the Work without cost to the Owner by increasing the work force or hours of work, or by other reasonable means approved by the Architect.”
25. Add: “**§ 8.2.7** If the Architect has determined that the Contractor should be permitted to extend the time for completion as provided in Paragraph 8.3, the calendar dates in the Progress Schedule shall be adjusted accordingly to retain their same relationship to the adjusted date of Substantial Completion, and the dollar value of Work to be completed as of the first of the month to the best of the Architect's knowledge.”
26. 8.3.1. Delete: “and arbitration”.
27. 9.3.1, first sentence. Delete: “if required under Section 9.2,”.
28. 9.3.1.1. Add: “when such Construction Change Directives have set forth an adjustment to the Contract Sum.”
29. Add: “**§ 9.3.4** Each Application for Payment or periodic estimate requesting payment shall be accompanied by (a) a waiver of liens from each Subcontractor or (b) a certificate from each Subcontractor stating that the Subcontractor has been paid all amounts due the Subcontractor on the basis of the previous periodic payment to the Contractor, or else stating the amount not so paid and the reason for the discrepancy. In the event of any such discrepancy, the Contractor shall furnish the Contractor's own written explanation to the Owner through the Architect. Such waiver or certificate shall be in a form acceptable to the Owner. "Release of Liens" are required of the Contractor, Subcontractors, and major material suppliers as shown on the Schedule of Values provided by the General Contractor.”
30. 9.5.1. Add: “**.8** a lien or attachment is filed contrary to subparagraph 9.3.3; or **.9** failure of subcontractors to comply with mandatory requirements for maintaining record drawings. The Contractor shall check record drawings each month. Written confirmation that the record drawings are current may be required by the Architect before approval of the Contractor's monthly payment requisition.”
31. Add: “**§ 9.5.2** Materials and/or equipment delivered and suitably stored at the site or at some other location, may not be included within an application for payment unless, in the judgment of the Architect, the following requirements are met:
  - .1** An associated approved submittal has been approved.
  - .2** The Contractor can and will adequately protect the materials and/or equipment until they are incorporated in the work.
  - .3** Documentation is submitted to the Architect which clearly establishes that materials and/or equipment stored at some other location are for use in this project.
  - .4** The Contractor will pay storage charges and related expenses.
  - .5** The storage facility off-site is insured against loss.”

- .6 Documentation is submitted giving the Owner free title and access to the materials and/or equipment stored at some other location per 9.3.2.”
32. 9.8.1. Add: “and only minor items that can be corrected or completed without any material interference with the Owner's use of the Work remain to be corrected or completed.: and only minor items that can be corrected or completed without any material interference with the Owner's use of the Work remain to be corrected or completed.”
33. 9.10.1, first sentence. Delete: “and on the basis of the Architect’s on-site visits and inspections, “
34. 10.2.8. Revise to read: “The Contractor shall provide and maintain in good operating condition suitable and adequate fire protection equipment and services, and shall comply with all reasonable recommendations regarding fire protection made by the representatives of the fire insurance company carrying insurance on the work or by the local fire chief or fire marshal. The area within the site limits shall be kept orderly and clean, and all combustible rubbish shall be promptly removed from the site.”
35. Add: “**§ 10.2.9** The Contractor shall be responsible for protecting all existing pipe lines, conduits, poles, wiring and other utilities that in any way interfere with the work, whether or not they are specifically shown on the drawings. He shall notify the proper authorities and see that all items to be maintained are protected, supported, or relocated as necessary to adjust them to the new work. Any damage to active utilities shall be corrected by the Contractor at no cost to the Owner.”
36. Add: “**§ 10.2.10** The Contractor shall at all times protect excavations, trenches, buildings and materials from rain water, ground water, and from water of any other origin and shall remove promptly any accumulation of water. He shall provide and operate all pumps, piping and other equipment necessary to achieve this end. The Contractor shall also remove any snow or ice that might cause damage or delay.”
37. Add: “**§ 10.2.11** During the progress of the work and at all times prior to the date of Substantial Completion or Occupancy of the Work by the Owner, whichever is earlier, the contractor shall provide temporary heat, ventilation, and enclosure, adequate to prevent damage to completed work or work in progress, or to materials stored on the premises. The permanent heating and ventilation systems may be used for these purposes only if and as specifically provided for in the Contract Documents.”
38. Add: “**§ 10.2.12** The Contractor shall take all reasonable precautions to prevent loss or damage caused by vandalism, theft, burglary, pilferage, or unexplained disappearance of property of the Owner, whether or not forming part of the Work, located within those areas of the Project to which the Contractor has access.”
39. 10.4. Add: “The Contractor shall provide to the Owner and the Architect the names, addresses and telephone numbers of members of the Contractor's organization to be called in the event of an out-of-hours emergency at the project site.”
40. 11.3.3. Add: “to the extent covered and paid by insurance”
41. 11.3.7, first sentence. Add before sentence: “Except with respect to workers’ compensatory and auto liability insurance,”

42. 12.2.1. Revise last sentence to read: "Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, compensation for the Architect's services and expenses made necessary thereby, and any cost, loss or damages to the Owner resulting from such failure or defect, shall be at the Contractor's expense."
43. 13.5.4. Revise to read: "The Contractor shall obtain and deliver promptly to the Architect any occupancy permit and any certificates of final inspection of any part of the Contractor's work and operating permits for any mechanical apparatus, such as elevators, escalators, boilers, air compressors, etc., which may be required by law to permit full use and occupancy of the premises by the Owner. Receipt of such permits or certificates by the Architect shall be a condition precedent to Substantial Completion of the Work."
44. 13.5.5. Revise to read: "Not Used."
45. Add: "**§ 13.7 SEVERABILITY**  
The invalidity of any covenant, restriction, condition, limitation or any other part of provision of the Contract Documents shall not impair or affect in any manner the validity, enforceability, or effect of the remainder of the Contract Documents."
46. 15.1.5.2. Add: "Data shall include weather conditions for a period of time not less than eight years. Claims relating to adverse weather shall evaluate a period of not less than four months and shall take into account unusually mild weather conditions during the same period."
47. Add: "**§ 15.3.4** The parties agree to include a similar mediation provision in all Agreements with independent contractors, sub-contractors, consultants, suppliers retained for the Project and to require the same to include a similar mediation provision in all agreements with subcontractors, sub-consultants, suppliers or fabricators so retained, thereby providing for mediation as the primary method for dispute resolution between the parties to those agreements."
48. 15.4. Revise to read: "Not Used."

END OF SUPPLEMENTAL CONDITIONS

SECTION 011000

SUMMARY

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Type of the Contract.
3. Work phases.
4. Work under other contracts.
5. Owner-furnished products.
6. Use of premises.
7. Owner's occupancy requirements.
8. Work restrictions.
9. Specification formats and conventions.

- B. Related Sections include the following:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Department of Veterans Affairs - Portland
- B. Project Location: 144 Fore Street  
Portland, Maine
- C. Owner: Jackrabbit, LLC  
44 Oak Street  
Portland, ME 04101
- D. Architect: SMRT, Inc.  
144 Fore Street  
Portland, Maine 04104
- E. Construction Manager At Risk: Ledgewood Construction

27 Main Street  
South Portland, Maine 04106

F. The Work consists of the following:

1. The Work consists of the renovation of a 10,000 square foot portion of the existing "144 Fore Street". The existing building will be fully refitted to provide medical offices for the Owner's tenant. The Work will include all labor, materials, and equipment to:
  - a. Reconfigure existing structure to provide a new floor, new exterior openings, new rooftop equipment.
  - b. Replace existing roof with new.
  - c. Reconstruct exterior facades to provide new openings and finish materials.
  - d. Replace existing mechanical systems with new.
  - e. Replace existing electrical systems with new.
  - f. Modify existing sprinkler systems to accommodate new uses and new wall configurations.
  - g. Replace existing fire alarm systems with new.
  - h. Replace interior finishes throughout.
  - i. Modify and improve existing site lighting.
  - j. Modify, improve and expand existing site pavements.
2. The existing buildings are primarily constructed of bearing and non-bearing concrete masonry, structural steel columns and roof frames, and metal roof deck. Exterior finishes are painted concrete masonry.
3. The renovated building is one end of a series of structures erected as warehouse space. Existing utilities to other occupants generally enter the structure through the area of this project. Existing utilities are to be maintained to other parts of the building, except as described.
4. Mechanical systems will be replaced utilizing new gas fired boiler and gas fired roof top air handler with DX cooling. VAV units with hot water reheat will provide zone control. Energy use will be reduced by economizer operation when outside air is temperate. 100% exhaust will be provided in the lobby, in one exam room, and in toilet rooms/utility rooms. Gas fired humidification will be provided for up to 35% winter interior relative humidity.
5. Plumbing systems will generally be replaced, salvaging only a portion of plumbing underground. All new plumbing fixtures will be installed. Existing systems serving adjacent tenants/property are to remain in service.
6. Existing fire protection systems will be salvaged to the degree possible, utilizing mains and some valving. The developed space will be fully protected. Existing systems serving adjacent tenants/properties are to remain in service.
7. Electrical systems will be completely reconstructed and a new transformer placed. New electrical systems will include power, lighting, emergency/backup power generation. Uninterruptible power requirements will be provided by the tenant. Existing system serving adjacent tenants/properties are to remain in service.



8. The Work will include communications systems raceway and cable installation. Network electronics will be furnished and installed by the tenant, connecting to cables/racks installed as a part of the Work. Telephony will be integral to network electronics.
9. Existing fire alarm systems will be replaced with new.
10. An intrusion detection system will be provided to include perimeter opening detection and interior corridor motion detectors. Occupant "panic" alarms will also be provided within each patient service space.
11. Door hardware will be operated by a card reader system at specific doors, with programmable access by individual and with access logging. This system shall be capable of communicating with the existing tenant control system.

#### 1.4 TYPE OF CONTRACT

- A. Project will be constructed under a single prime contract and in a single phase.
- B. Bid Packages: The project will be bid in two document packages:
  1. Demolition
  2. General Construction

#### 1.5 WORK UNDER OTHER CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Concurrent Work: Owner will award separate contracts for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

##### **1. Landscaping. SI-1**

- C. Owner will work cooperatively with the Contractor to coordinate the delivery date for Owner-provided products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.

#### 1.6 USE OF PREMISES

- A. General: Contractor shall have full use of premises for construction operations for the Project site during construction period. Contractor's use of premises for the Project site is limited only by Owner's right to perform work on portions of Project, and by the Owner's right to occupy /lease other portions of the existing facility.

- B. Parking on site is limited to those parking spaces designated for use by the future tenant. The contractor shall arrange for lay-down space or parking in excess of this off-site.

1.7 PERMIT REQUIREMENTS

- A. The project is subject to the requirements of the City of Portland Minor Site Plan Review Approval. All conditions of the permit shall be adhered to by the Contractor at all times. Contractor proposed changes from approvals granted in the permit are the responsibility of the Contractor, and modifications shall not be sought without prior written approval from the Owner.
- B. The cost of all work related to compliance with permit requirements is incidental to the Contract.

1.8 OWNER'S OCCUPANCY REQUIREMENTS

- A. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
- B. It is not the Owner's intent is to occupy portions of the project prior to substantial completion of the entire project.

1.9 WORK RESTRICTIONS

- A. On-site working hours will normally be 7:00 AM to 3:30 PM. Arrangements for working outside of normal hours must be made in advance by obtaining permission from the Construction Manager.
- B. Existing Utility Interruptions: Do not interrupt utilities serving areas of the building partially occupied by Owner or the Owner's tenants unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Architect and Owner not less than five days in advance of proposed utility interruptions. Adjust schedule of interruption as reasonably requested by the Owner.

1.10 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 34-division format and CSI/CSC's "MasterFormat" numbering system.
  - 1. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.

- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
  2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
    - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.11 MISCELLANEOUS PROVISIONS

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 011000**



**SECTION 011050**

**EXISTING SITE INFORMATION AVAILABLE**

1.1 INFORMATION AVAILABLE

- A. This information is available as identified in Instructions to Bidders.
1. Existing site information as described herein is not a part of the Contract for Construction and is provided for convenience only.

1.2 SURVEY

- A. Description:
1. A site survey update was undertaken by the Owner. The site survey is available.
    - a. Survey: "Boundary Survey, 144 Fore and Hancock Street, Portland, Cumberland County, State of Maine for record owner Jackrabbit Limited Liability Co., Lewis & Wasina, Inc., 5/18/2010".

1.3 USE OF DATA

1. These studies and reports were undertaken by the Owner for use in permitting, design, and preparing the site for the project. These studies are not a part of the Contract Documents, and are made available as information only without effect upon the Contract.
2. No warrant is given that these studies and reports have recorded all existing conditions, or that subsurface conditions will be consistent with the borings made. Contractors are required to make their own interpretations of the on-site conditions prior to the work, may visit the site, and with authorization perform additional excavations or borings to satisfy themselves as to on-site conditions.
3. The Owner, and the Owner's consulting Architects and Engineers will not be responsible for any deduction, interpretation, or conclusion made by the Contractor in regards to on-site conditions, and no claim for additional cost or time will be entertained on the basis of the Contractor's deductions, interpretations, or conclusions made of the reports made available to him.

**END OF SECTION 011050**



**SECTION 011110**

**APPLICABLE CODES**

**PART 1 - GENERAL**

1.1 General

- A. Design and Construction shall be in compliance with all current codes, regulations and standards as they apply to a detention facility, the facility location and type of construction.
- B. Other Codes – where agencies having jurisdiction require codes in addition to those identified within this section it shall be the responsibility of Architect of Record/ Engineer of Record to design the facility in accordance to these codes.
- C. Codes, regulations and standards governing the design and construction of the facility include but not necessarily limited to the following:
  - 1. International Building Code, 2003, as amended by the City of Portland, Buildings and Building Regulations, Chapter 6 Section 2.
  - 2. NFPA Fire Codes adopted by the State of Maine ([www.maine.gov/dps/fmo/laws/rules.html](http://www.maine.gov/dps/fmo/laws/rules.html)) including:
    - i. NFPA 1, Uniform Fire Code, 2006.
    - ii. Life Safety Code, NFPA 101, 2006.
    - iii. Fire Sprinkler Code NFPA 13, 2007.
    - iv. Standard for Portable Fire Extinguishers, NFPA 10, 2007.
    - v. National Fire Alarm Code, NFPA 72, 2007
  - 3. State of Maine Internal Plumbing Code, Chapter 4, 2005 (International Association of Plumbing and Mechanical Officials Uniform Plumbing Code, 2000 edition).
  - 4. International Mechanical Code, 2003.
  - 5. Maine DOE Energy Code, ASHRAE 90.1 2004 or 2003 IECC and ASHRAE Standard 62-2001.
  - 6. National Electric Code, 2008, and NFPA 70 as amended by the Electrician’s Examining Board
  - 7. OSHA Standards  
([www.osha.gov/pls/oshaweb/owasrch.search\\_form?p\\_doc\\_type=STANDARDS&p\\_toc\\_level=1&p\\_keyvalue=Construction](http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=1&p_keyvalue=Construction),  
[www.osha.gov/pls/oshaweb/owasrch.search\\_form?p\\_doc\\_type=STANDARDS&p\\_toc\\_level=1&p\\_keyvalue=1910](http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=1&p_keyvalue=1910))
  - 8. Department of Justice, ADA Standards for Accessible Design, 1991, revised 1994, 28 CFR Part 36.
- D. Other Regulations  
Construction and Renovations must be in accordance with US Environmental Protection Agency (EPA), State environmental regulations, and local planning, zoning and conservation regulations and ordinances

**PART 2 – PRODUCTS – Not Used**

**PART 3 – EXECUTION – Not Used**

**END OF SECTION 011110**



SECTION 011140

PROJECT COORDINATION DRAWINGS

**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.
- B. This section contains general information that applies to all work performed under the Contract and is inherently made a part of each specification section.

1.2 PROJECT COORDINATION AND COORDINATION DRAWINGS

- A. Coordination: Be fully responsible for coordination of all trades, coordinating construction sequences and schedules, and coordinating the actual installed location and interface of all work. Engineering drawings are diagrammatic by nature, permitting trade contractors flexibility to fit components in coordination with other trade contractors. Coordination Drawings are the method and record of that coordination effort. Coordinate the locations and routing of pipe, ductwork, conduit, and other systems, utilities, services, equipment and work with respect to structural members, architectural finishes, headroom conditions, door swings, door and window openings, shafts and chases, and other features of the project.
- B. Sequencing and Scheduling of the Work: Plan ahead and anticipate later work. Schedule, deliver and install items of work in the optimum sequence to ensure the complete and correct interface of all work, and to avoid cutting and patching. Ensure that all blocking, anchors, sleeves, inserts, clips, brackets, braces, hangers, bolts, supports, conduits, pipes and other items are correctly located in sequence and prior to completing, enclosing or concealing work.
- C. Coordinate Modifications to the Work: Fully and completely coordinate all modifications to the work including without limitation: 1) changes which affect Contract Price, 2) changes which do not affect Contract Price, 3) substitutions, 4) Contractor's selection when given optional choices, and 5) other modifications and changes. Coordinate and provide all other work required to implement the modification at no subsequent additional cost to the Owner by claim.
- D. Coordination Drawings: Before materials are fabricated or the work begun, the General Contractor shall supervise and direct the creation of complete Coordination Drawings showing the complete three dimensional coordination and integration of all work of this project, including, but not limited to, structural, architectural, fire protection, HVAC, plumbing and electrical disciplines.
  - 1. Intent: Coordination Drawings are intended to assist the General Contractor during construction, to avoid and prevent conflicts and to verify that adequate equipment movement paths are available for both installation and future equipment repair or replacement. Do not attempt to use Coordination Drawings to substitute for "shop drawings", "record drawings", or any other required submittal. Coordination Drawings are to be produced to show all components fit within the space available, with

irreconcilable conflicts identified for A/E assistance in finding resolution.

2. Structural Steel Penetrations: The Contract Drawings may not show all steel penetrations required, since trade contractors have some flexibility and control over final locations and routing. The actual number, size, and locations of structural steel penetrations cannot be determined until Coordination Drawings are complete. The Contractor shall complete and verify Coordination Drawings prior to ordering steel fabrication. The Contractor shall be solely responsible for all remedial work, additional steel penetrations, field made steel penetrations, and all costs associated with additional steel penetrations required.
3. Base Drawings: The General contractor shall prepare from the A/E CAD drawings a set of composite electronic CAD drawings of building coordination drawing "base sheets" showing all architectural and structural work, including, without limitation, miscellaneous metal framing and supports located in ceiling spaces, room layouts, special graphic highlighting of fire-rated and smoke partitions and assemblies and ceiling layout.
  - a. CAD files: Refer to Division 1 Section: "Submittals" for availability of CAD files from the Architect.
  - b. Scale: Unless otherwise approved or directed by the Architect, provide minimum 1/8 inch scale base plotted sheets, except provide minimum 1/4 inch scale at congested areas, shafts and at drawn sections.
  - c. Structural Steel Penetrations: Show all holes and penetrations required through steel beams to accommodate piping, ductwork and other Mechanical or Electrical work.
4. HVAC: The General Contractor shall circulate the coordination drawing base drawings to the HVAC subcontractor and require the HVAC subcontractor to accurately and neatly show the actual size, height, elevation and location of all HVAC equipment and work, including, without limitation, ductwork, grilles, registers, diffusers, smoke dampers, fire dampers, HVAC related piping, HVAC related valves, HVAC related vents, chimneys, breaching and HVAC related access doors and panels. The HVAC subcontractor shall remedy apparent conflicts where possible, suggest alternate solutions if remedy is not obvious, coordinate solutions with the General Contractor, provide indication of the HVAC subcontractor's review and acceptance, and return the Coordination Drawings to the General Contractor.
5. Plumbing: The General Contractor shall circulate the Coordination Drawings to the plumbing subcontractor and require the plumbing subcontractor to accurately and neatly show the actual size, elevation, slope and location of all plumbing equipment and work including, without limitation, piping, plumbing vents, valves and plumbing related access doors and panels. The plumbing subcontractor shall remedy apparent conflicts where possible, suggest alternate solutions if remedy is not available by adjusting plumbing components, coordinate solutions with the General Contractor, provide indication of the plumbing subcontractor's review and acceptance, and return the Coordination Drawings to the General Contractor.
6. Fire Protection: The General Contractor shall circulate the Coordination Drawings to the fire protection subcontractor and require the fire protection subcontractor to accurately and neatly show the actual size and location of all fire protection equipment and work including, without limitation, sprinkler piping, sprinkler valves, sprinkler heads, drain locations and related access doors and panels. The fire protection subcontractor shall

remedy apparent conflicts where possible, suggest alternate solutions if remedy is not available by adjusting fire protection components, coordinate solutions with the General Contractor, provide indication of the fire protection subcontractor's review and acceptance, and return the Coordination Drawings to the General Contractor.

7. Electrical: The General Contractor shall circulate the Coordination Drawings to the electrical subcontractor and require the electrical subcontractor to accurately and neatly show the actual size and location of all electrical equipment and work including, without limitation, electrical panelboards, major conduits, racks of branch conduit, feeders, light fixtures, other significant electrical systems, and electrical related access doors and panels. The electrical subcontractor shall remedy apparent conflicts where possible, suggest alternate solutions if remedy is not available by adjusting electrical, coordinate solutions with the General Contractor, provide indication of the electrical subcontractor's review and acceptance, and return the Coordination Drawings to the General Contractor.
8. Other Subcontractors: The General Contractor shall circulate the Coordination Drawings to other subcontractors whose work might conflict with other work and require these subcontractors to accurately and neatly show the actual size and location of all their equipment and work, including special access doors and panels. These subcontractors shall remedy apparent conflicts where possible, suggest alternate solutions if remedy is not available by adjusting their trade components, coordinate solutions with the General Contractor, provide indication of the subcontractor's review and acceptance, and return the Coordination Drawings to the General Contractor.
9. General Contractor Review and Submission: The General Contractor shall carefully review, modify and approve the Coordination Drawings in cooperation with the subcontractors to assure that conflicts, if any, are resolved before work in the field is begun and to ensure that the location of work exposed to view is as indicated and as approved by the Architect. Submittal to the Architect shall include highlighting of any adjustments recommended which affect the design, and of any conflicts not resolved by the construction team. The General Contractor shall stamp, sign and submit the coordination drawings to the Architect for review, in compliance with Section 01330.
10. Architect Notification and Authorization Required: If at any time during the coordination process, the General Contractor cannot resolve a conflict without changing ceiling heights, wall locations, or other indicated relationships and dimensions, the General Contractor shall immediately notify the Architect and request instructions. The General Contractor shall not move or adjust any dimension, location or relationship indicated on the Contract Documents without first having received the Architect's written authorization.
11. General Contractor's Responsibilities: As part of the General Contractor's responsibility to coordinate and conduct the work, the General Contractor shall be solely responsible for commencing, diligently pursuing and completing the coordination drawing process prior to the start of installation. The General Contractor and each subcontractor shall provide ongoing coordination services throughout the project and shall resolve conflicts prior to installation. The General Contractor shall be solely responsible for subsequently required modifications to make components fit, defects in the installation resulting from the lack of coordination, and delays resulting from missed coordination prior to installation. The Architect's review of coordination drawings shall not relieve the General Contractor or its subcontractors from their responsibility for coordinating the fit of all work performed

under the contract.

**1.02 RELATED SECTIONS**

- A. Division 21 – Fire Suppression: For fire protection requirements.
- B. Division 22 - Plumbing.
- C. Division 23 - Mechanical: For HVAC
- D. Division 26 - Electrical: For electrical requirements.

**1.03 SUBMITTALS**

- A. General: Submit in accordance with Division 1 Section: “Submittals”.
- B. Shop Drawings: Submit copies of all Coordination Drawings with all subcontractor’s signatures and stamps.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 011140**

SECTION 012300

ALTERNATES

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other work of the Contract.
- C. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.
- D. Alternate pricing shall be held firm for 90 days following Notice to Proceed.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

3.1 SCHEDULE OF ALTERNATES

A. **Alternate No. 1 – Added Metal Shingle Siding**

1. Base Bid: Provide exterior wall systems as shown in drawings, stopping improvements near structural grid 8.
2. Alternate No. 1: In place of wall type W3 on the building exterior north wall, provide the following:
  - a. Wall Type W-Alt.:
    - 1) Metal Shingles
    - 2) Moisture Barrier
    - 3) Exterior Plywood
    - 4) 7/8" Cold Form Furring
    - 5) Existing Exterior Wall Construction (12" block)
    - 6) 1" gap
    - 7) 2-1/2" Division 9 Studs at 16" on center braced to back-up wall at 8' o.c.
    - 8) 3" Spray-Applied Foam Insulation
    - 9) Vapor Barrier
    - 10) 5/8" Gypsum Board

**END OF SECTION 012300**

SECTION 012600

CONTRACT MODIFICATION PROCEDURES

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
  - 1. Division 1 Section "Allowances" for procedural requirements for handling and processing allowances as applicable.
  - 2. Division 1 Section "Alternates" for procedural requirements for handling and processing alternate items as applicable.
  - 3. Division 1 Section "Unit Prices" for procedural requirements for handling and processing unit priced items as applicable.
  - 4. Division 1 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time as a proposal request. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Proposal Requests issued by Architect are issued only as information necessary to describe a change being considered. They are not a direction to modify the Contract or to proceed with the work as described. Do not consider them instructions either to stop work in progress or to execute the proposed change. Upon receipt, consider the schedule implications of the proposed change and immediately advise the Architect of any coordination necessary between proposed work and work in-progress. If the Owner selects to proceed with the work prior to execution of a Change Order, a written authorization will be issued.

2. Within time specified in Proposal Request (20 days if not specified) after receipt of Proposal Request, submit a Contractor Proposal estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
  - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - c. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  
- B. Contractor-Initiated Proposals/Claims: If an Architect issued document or if latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a proposal for a change to Architect.
  1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  4. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  5. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
  
- C. Proposal Request Form: SMRT form. The form used is a combined Supplemental Instruction/ Proposal Request Form. Proceed as indicated on form. One form is used for both needs in order that the two may be tracked together.
  1. If a Supplemental Instruction has an impact on project cost or project schedule, proceed as for a Proposal Request.
  
- D. Sub-Contractor Expenses and Profit: Sub-contractor costs permitted to be charged against a change shall be limited to those items specifically attributable to the change including actual payments for materials, equipment rentals, expendable items, wages and benefits to workmen and supervisors, insurance, bonds, and other probable direct costs, but not including any administrative, accounting, or other indirect or overhead costs, or any wages or benefits of supervisory personnel not assigned full time to the site. Supervisory personnel time shall not exceed 10% of the summed time of those being supervised. Sub-contractor overhead and profit and any other expense not included as a cost identified above shall be limited to 10% of any net increase or decrease of the cost for work performed by any firms own forces, and shall be limited to 10% of any net increase or decrease of the cost for work performed by any sub-sub-contractor.



1.5 ALLOWANCES (AS APPLICABLE)

- A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
  - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
  - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
  - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
  - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
  
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of written authorization for work to proceed. Owner will reject claims submitted later than 21 days after such authorization.
  - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
  - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CHANGE ORDER PROCEDURES

- A. Upon Owner's approval of a Contractor Proposal, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. A Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Proceed with work as directed when authorized by a Construction Change Directive.
  - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
  
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  
- C. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 012600**

SECTION 012900

PAYMENT PROCEDURES

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
  - 1. Division 1 Section "Unit Prices" for administrative requirements governing use of unit prices as applicable.
  - 2. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 3. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule, Submittals Schedule, and reports.

1.3 DEFINITIONS

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

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified and paid for by Owner.
  - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for progress payment review meetings shall be the same for each month, and shall coincide with semi-monthly site meetings to permit review of the work in-place. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets or Contractor's computerized form as approved by the Owner as form for Applications

for Payment, modified to additionally provide a certification signature for the Construction Manager.

- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.
1. Entries shall match data on the Schedule of Values and Construction Schedule. Use updated schedules if revisions were made.
  2. Include amounts of Change Orders issued before last day of construction period covered by application.
- E. Preliminary Application: Not less than two days prior to each monthly progress meeting, submit 2 draft copies of the Payment Application for review and for comparison against the progress of the Work apparent on-site. The Architect will review the application against work in place and advise of necessary corrections necessary for the final application.
1. Plan submission of Material Location Reports to coincide with draft Payment Application submissions.
  2. Plan submission of updated Project Schedules to coincide with draft Payment Application submissions.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.
  2. When an application shows completion of an item, submit final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Waiver Delays: Submit each Application for Payment with Contractor's waiver of mechanic's lien for the construction period preceding the current application.
    - a. Submit final Application for Payment with or preceded by final waivers from every entity on the list of subcontractors, principal suppliers and fabricators. Submit the list for Owner's approval.
  5. Waiver Forms: Submit waivers of lien on forms acceptable to the Owner.
  6. As soon as each subcontract agreement between the Contractor and a subcontractor is executed please notify the Construction Manager Advisor of the name of each subcontractor. Maintain a complete list of all subcontractors on the project and distribute to the Architect and Construction Manager.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of Values.
  3. Proposed Preliminary Construction Schedule
  4. Products list.
  5. Submittals Schedule (preliminary if not final).
  6. List of Contractor's staff assignments.
  7. Copy of building permit.
  8. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.

9. Certificates of insurance and insurance policies.
  10. Performance and payment bonds.
  11. Data needed to acquire Owner's insurance.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707, "Consent of Surety to Final Payment."
  7. Lien waivers from lower tier suppliers and subcontractors.
  8. Evidence that claims have been settled.
  9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 012900**



SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. Administrative and supervisory personnel.
  - 2. Project meetings.
  - 3. Requests for Interpretation (RFIs).
- B. The contractor shall participate in coordination requirements.
- C. Related Sections include the following:
  - 1. Division 01 Section "Summary" for a description of the Work of the contract.
  - 2. Division 01 Section "Project Coordination Drawings" for preparing and submitting coordination drawings.
  - 3. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
  - 4. Division 01 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 5. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

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

1.4 COORDINATION

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

- B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
  4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
  2. Preparation of the Schedule of Values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Pre-installation conferences.
  7. Project closeout activities.
  8. Commissioning, startup and adjustment of systems.
  9. Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

## 1.5 SUBMITTALS

- A. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list mailing and e mail addresses and telephone numbers, including cell phone, home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.



1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work. Include special personnel required for coordination of operations with other contractors.

1.7 PROJECT MEETINGS

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

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

- B. Pre-construction Conference: Schedule a pre-construction conference before starting construction, at a time convenient to Owner, Construction Manager, and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

- a. Tentative construction schedule.
- b. Phasing.
- c. Critical work sequencing and long-lead items.
- d. Designation of key personnel and their duties.
- e. Procedures for processing field decisions and Change Orders.
- f. Procedures for RFIs.
- g. Procedures for testing and inspecting.
- h. Procedures for processing Applications for Payment.
- i. Distribution of the Contract Documents.
- j. Submittal procedures.
- k. Preparation of Record Documents.
- l. Use of the premises.
- m. Work restrictions.
- n. Owner's occupancy requirements.
- o. Responsibility for temporary facilities and controls.
- p. Construction waste management and recycling.
- q. Parking availability.
- r. Office, work, and storage areas.
- s. Equipment deliveries and priorities.

- t. First aid.
  - u. Security.
  - v. Progress cleaning.
  - w. Working hours.
3. Minutes: Contractor will record and distribute meeting minutes.
- C. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Construction Manager of scheduled meeting dates.
  - 2. Pre-installation conferences shall be required for the following areas of the project at a minimum:
    - a. Demolition
    - b. Site work: Earthwork, installation of utilities, site paving and concrete, work off-site.
    - c. Underground utilities within the building
    - d. Concrete slabs: on-grade and elevated, moisture barriers.
    - e. Roofing
    - f. Metal Siding
    - g. HVAC Systems and Controls.
    - h. Electronics cabling, terminations, and racks.
  - 3. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. The Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Review of mockups.
    - i. Possible conflicts.
    - j. Compatibility problems.
    - k. Time schedules.
    - l. Weather limitations.

- m. Manufacturer's written recommendations.
  - n. Warranty requirements.
  - o. Compatibility of materials.
  - p. Acceptability of substrates.
  - q. Temporary facilities and controls.
  - r. Space and access limitations.
  - s. Regulations of authorities having jurisdiction.
  - t. Testing and inspecting requirements.
  - u. Installation procedures.
  - v. Coordination with other work.
  - w. Required performance results.
  - x. Protection of adjacent work.
  - y. Protection of construction and personnel.
- 4. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 5. Reporting: General Contractor shall record and distribute minutes of the meeting to each party present and to parties who should have been present.
  - 6. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings on a biweekly basis, or at intervals as agreed among all parties. Coordinate dates of meetings with preparation of payment requests.
- 1. Attendees: In addition to representatives of Owner, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: An updated Construction Schedule shall be presented by the Contractor reviewing progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Status of submittals.
      - 4) Deliveries.
      - 5) Off-site fabrication.

- 6) Access.
  - 7) Site utilization.
  - 8) Temporary facilities and controls.
  - 9) Work hours.
  - 10) Hazards and risks.
  - 11) Progress cleaning.
  - 12) Quality and work standards.
  - 13) Status of correction of deficient items.
  - 14) Field observations.
  - 15) RFIs.
  - 16) Status of proposal requests.
  - 17) Pending changes.
  - 18) Status of Change Orders.
  - 19) Pending claims and disputes.
  - 20) Documentation of information for payment requests.
3. Minutes: Contractor will record and distribute the meeting minutes.
  4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
    - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- E. Coordination Meetings: Contractor shall conduct subcontractor project coordination meetings at biweekly intervals or as agreed among all parties. Project subcontractor coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.
1. Attendees: In addition to representatives of Construction Manager, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    - c. Review present and future needs of each contractor present, including the following:

- 1) Interface requirements.
  - 2) Sequence of operations.
  - 3) Status of submittals.
  - 4) Deliveries.
  - 5) Off-site fabrication.
  - 6) Access.
  - 7) Site utilization.
  - 8) Temporary facilities and controls.
  - 9) Work hours.
  - 10) Safety.
  - 11) Progress cleaning.
  - 12) Quality and work standards
  - 13) RFIs.
  - 14) Change Orders.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.8 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response. All RFIs shall be submitted through the Contractor for review, logging and distribution. The Architect shall review and respond to all RFIs. Responses shall be in writing and will be distributed to the Contractor and Owner by the Architect.
  2. RFIs submitted directly to the Architect or Owner by sub-contractor or supplier will be returned with no response.
  3. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Project name.
  2. Date.
  3. Name of Contractor.
  4. Name of Architect.
  5. RFI number, numbered sequentially.
  6. Specification Section number and title and related paragraphs, as appropriate.
  7. Drawing number and detail references, as appropriate.
  8. Field dimensions and conditions, as appropriate.
  9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  10. Contractor's signature.

11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
  - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. RFIs shall be submitted electronically as software-generated RFIs.
  1. Hard-Copy RFIs: Identify each page of attachments with the RFI number and sequential page number.
  2. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow five working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day. RFI responses will be provided as soon as reasonably possible, but dependent upon the research required.
  1. The following RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for coordination information already indicated in the Contract Documents.
    - d. Requests for adjustments in the Contract Time or the Contract Sum.
    - e. Requests for interpretation of Architect's actions on submittals.
    - f. Incomplete or unnecessary RFIs, frivolous RFIs, or RFIs with numerous errors.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly. Include the following:
  1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect.
  4. RFI number including RFIs that were dropped and not submitted.

5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 013100**





SECTION 013200

CONSTRUCTION PROGRESS DOCUMENTATION

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Contractor's Construction Schedule.
  - 2. Submittals Schedule.
  - 3. Daily construction reports.
  - 4. Material Location Reports.
  - 5. Special Reports
- B. Related Sections include the following:
  - 1. Division 1 Section "Payment Procedures" for submitting the Schedule of Values.
  - 2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
  - 3. Division 1 Section "Submittal Procedures" for submitting schedules and reports.
  - 4. Division 1 Section "Quality Requirements" for submitting a schedule of tests and inspections.
  - 5. Division 1 Section "Closeout Procedures" for submitting photographic negatives as Project Record Documents at Project closeout.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
  - 2. Predecessor activity is an activity that must be completed before a given activity can be started.
- B. CPM: Critical Path Method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

- C. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- G. Major Area: A story of construction, a separate building, or a similar significant construction element.
- H. Milestone: A key or critical point in time for reference or measurement.
- I. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

#### 1.4 SUBMITTALS

- A. Submittals Schedule: Arrange the following information in a graphic format:
  - 1. Scheduled date for first submittal.
  - 2. Specification Section number and title.
  - 3. Submittal category (action or informational).
  - 4. Name of subcontractor.
  - 5. Description of the Work covered.
  - 6. Scheduled float for each submittal.
  - 7. Scheduled date for Architect's final release or approval.
  - 8. Critical path date for final release and approval.
- B. Contractor's Construction Schedule:
  - 1. Submit initial schedule to show entire schedule for entire construction period.
  - 2. Submit schedule updates coincident with the submission of Payment Application drafts.
- C. Weekly Construction Reports: Submit weekly on Monday for the prior week.
- D. Material Location Reports: Submit coincidentally with Payment Application drafts.
- E. Special Reports: Submit immediately.

#### 1.5 QUALITY ASSURANCE

- A. Pre-scheduling Conference: Contractor will conduct a conference at Project site following Notice to Proceed to discuss the overall project schedule and to identify critical shop drawing submittals required.
  - 1. Review software limitations, content, and format for submissions.
  - 2. Discuss phasing, staging of the Work, interim milestone dates, and dates for Owner occupancy.
  - 3. Review time required for production of submittals, submittal requirements and procedures, review of schedule impacts from re-submittals.
  - 4. Review time required for completion and equipment startup and commissioning procedures.
  - 5. Review and finalize list of construction activities to be included in schedule.
  - 6. Review schedule for work of separate contracts, including work by Owner.
  - 7. Review procedures for updating schedule.

#### 1.6 COORDINATION

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

### **PART 2 - PRODUCTS**

#### 2.1 SCHEDULE FORMAT

- A. Submit required schedules as PDF electronic files.

#### 2.2 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
  - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
  - 2. Distribute dates for return of submittals to match actual need, and to reasonably distribute review work load. Where appropriate, anticipate typically difficult submittals and schedule sufficient time to permit resubmittal.
  - 3. Initial Submittal: Submit submittals schedule prior to first submittal. Include schedule of submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead-time for manufacture or fabrication.
  - 4. Final Submittal: Submit submittals schedule concurrently with the first complete submittal of Contractor's Construction Schedule.

#### 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."

- B. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each building area as a separate numbered activity for each principal element of the Work.
  - 1. Activity Duration: Define activities so that no activity is longer than 30 days.
  - 2. Procurement: Include procurement process activities for long lead items and major equipment. Include submittals/resubmittals, purchasing, fabrication, delivery.
  - 3. Startup and Testing: Include realistic schedule period for start-up and testing.
  - 4. Indoor Air Quality Venting: Include facility ventilation period prior to occupancy consistent with LEED EQ Credit 3.2 criteria (14,000 cubic feet/square foot floor area).
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
  - 1. Phasing: Arrange list of activities on schedule by phase.
  - 2. Work under More Than One Contract: Include a separate activity for each contract.
  - 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
    - a. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Partial Occupancy, Substantial Completion, and Final Completion.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence within the next three weeks. Identify issues that need immediate resolution. Prepare for presentation at regular construction meetings.
- G. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.

## 2.4 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at the Project site. A weekly reporting form is preferred. Identify:
  - 1. Contractors/subcontractors at the Project site, including number of workers.
  - 2. Material deliveries.
  - 3. High and low temperatures, and general weather conditions.
  - 4. Accidents, unusual events.
  - 5. Visitors
  - 6. Accidents, stoppages, delays.
  - 7. Inspections
  - 8. Equipment starts and tests.

- B. Material Location Reports: At monthly intervals, submit a comprehensive list of materials delivered to and stored at the Project site, and of materials stored off-site. Materials stored off-site which have not been included in a payment application need not be included.
  - 1. Submit material location reports with Payment Application drafts.
- C. Special Reports: When any event of an unusual and significant nature occurs at the Project Site, whether or not related directly to the Work, prepare and submit a special report immediately subsequent to knowledge of the event.
  - 1. Submit Special Reports to Owner and Architect.

### **PART 3 - EXECUTION**

#### **3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE**

- A. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.
  - 1. Develop network so that it can be accepted no later than the submission of the second Application for Payment.
  - 2. Prepare a list of all activities required to complete the Work.
    - a. Indicate the estimated time duration, sequence requirements, and relationships of each activity in relation to other activities. Include time frames for submittals, mobilization, materials purchase, fabrication, delivery, installation, testing and commissioning, punch list inspection.
  - 3. Critical Path Activities: Identify critical path activities including those for interim completion dates.
  - 4. Process data to produce a computer drawn time scaled network of activities. Revise and reorganize as often as necessary to produce a schedule compliant with the Contract Time. Scheduled start and completion dates shall be consistent with the Contract dates.
  - 5. Format: Locate the critical path for the project and clearly mark on the schedule, indicating which activities are on the critical path. Sub-networks for activities that are off of the critical path may be on separate pages. Indicate float for each scheduled activity at front and back of each. Highlight any activity which has zero float.
- B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule to coincide with submission of draft Payment Applications.
  - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made.
  - 2. As the Work progresses, indicate Actual Completion percentage for each activity.
- C. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

**END OF SECTION 013200**

SECTION 013300

SUBMITTAL PROCEDURES

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
- B. Related Sections include the following:
  - 1. Division 1 Section "Payment Procedures" for submitting Applications for Payment.
  - 2. Division 1 Section "Project Management and Coordination" for submitting Requests for Information and meeting minutes.
  - 3. Division 1 Section "Coordination Drawings" for submitting Coordination Drawings.
  - 4. Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
  - 5. Division 1 Section "Quality Requirements" for submitting test and inspection reports, Delegated-Design Submittals, and for erecting mockups.
  - 6. Division 1 Section "Closeout Procedures" for submitting warranties Project Record Documents and operation and maintenance manuals.

1.3 SUBMITTALS

- A. Sample Submittal: Submit first project submittal within one week of Notice to Proceed. First project submittal shall be a sample of the Contractor's submittal review stamp incorporating the specified compliance statement. Submittal shall also demonstrate correct transmittal form, submittal format, numbering, etc. for project.
  - 1. Obtain approval of sample submittal prior to making any subsequent submittal.

1.4 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action including product data submittals and shop drawings. Refer to Part 2.
- B. Informational Submittals: Written information that does not require Architect's approval such as test reports, insurance certificates, etc. Refer to Part 2. Submittals may be rejected for not complying with requirements.

1.5 SUBMITTAL PROCEDURES

- A. General: Copies of Architectural Floor Plan drawings in digital format will be provided for a fee by the architect to those requesting same in accordance with the "Authorization Statement for Electronic Transfer" form. (Example attached herein). Information provided in digital format is for the sole information and use of the authorizing entity. Further copying or transfer of this information is prohibited by copyright.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities so that those who need to review submittals can plan their work.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal.
  - 1. Initial Review: Allow 21 calendar days for review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination. Submittal review periods will apply only with the submittal and approval of the submittal schedule.
  - 2. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- E. Identification: Place a permanent label or title block on each submittal for identification.
  - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
  - 2. Provide a space approximately 4 by 8 inches (100 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
  - 3. Submittal tracking number: Mark each submittal with a tracking number as follows:

25-05500-1A



Resubmittal Designation. Use "A" for first resubmittal, "B" for second, etc.

Submittal sequence number for Specification Section. Use a separate number for each item submitted, in sequence, within each Spec. Section. (For re-submittals, repeat the designation of the original submittal.)

Specification Section.

Transmittal number. Use a separate transmittal for each item or group of items within the same Section submitted together.



4. Include the following information on label for processing and recording action taken:
  - a. Project name.
  - b. Date.
  - c. Name and address of Architect.
  - d. Name and address of Contractor.
  - e. Name and address of subcontractor.
  - f. Name and address of supplier.
  - g. Name of manufacturer.
  - h. Submittal tracking number.
  - i. Drawing number and detail references, as appropriate.
  - j. Identification of submittal as an ACTION SUBMITTAL (requiring return) or INFORMATIONAL SUBMITTAL (requiring no return).
  - k. Other necessary identification.
  
- F. Deviations: Submit only specified products. Highlight, encircle, or otherwise identify minor deviations from the Contract Documents on submittals. Deviations not specifically approved and later found to be in conflict with Contract Documents may be rejected. Refer to Division 1 Section "Product Requirements" for substitution requirements.
  
- G. Transmittal: Package each submittal individually and appropriately for review and handling. Submittals transmitted together will be reviewed and returned together. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
  1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and all deviations proposed that represent a change from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
  2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
  3. Transmittal Form: Provide locations on form for the following information:
    - a. Project name.
    - b. Date.
    - c. Destination (To:).
    - d. Source (From:).
    - e. Names of subcontractor, manufacturer, and supplier.
    - f. Submittal tracking number.
    - g. Submittal purpose and description.
    - h. Submittal and transmittal distribution record.
    - i. Remarks.
    - j. Signature of transmitter.
  
- H. Distribution: Furnish copies of approved submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
  
- I. Use for Construction: Use only approved submittals with mark indicating action taken by Architect in connection with construction.

**PART 2 - PRODUCTS**

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
  - 1. Number of Copies: Submit the number of copies of each submittal the Contractor requires plus those required for reviewers, unless otherwise indicated. Architect will retain two copies. Mark up and retain one returned copy as a Project Record Document.
    - a. Electronic submittals will be acceptable for letter or 11x17" sized documents. Electronic information is to be presented in same format as would be submitted in print, but as .pdf files and formatted for printing without adjustments. Electronic submittals will be returned with comments in similar format.
      - 1) Color charts will not be accepted for final color selections if submitted electronically; physical samples are required.
  
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
  - 3. Include the following information, as applicable:
    - a. Manufacturer's written recommendations.
    - b. Manufacturer's product specifications.
    - c. Manufacturer's installation instructions.
    - d. Standard color charts.
    - e. Manufacturer's catalog cuts.
    - f. Wiring diagrams showing factory-installed wiring.
    - g. Printed performance curves.
    - h. Operational range diagrams.
    - i. Mill reports.
    - j. Standard product operating and maintenance manuals.
    - k. Compliance with recognized trade association standards.
    - l. Compliance with recognized testing agency standards.
    - m. Application of testing agency labels and seals.
    - n. Notation of coordination requirements.
  
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents.
  - 1. Preparation: Include the following information, as applicable:
    - a. Dimensions.
    - b. Identification of products.
    - c. Fabrication and installation drawings.
    - d. Roughing-in and setting diagrams.
    - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
    - f. Shopwork manufacturing instructions.
    - g. Templates and patterns.
    - h. Schedules.
    - i. Design calculations.
    - j. Compliance with specified standards.

- k. Notation of coordination requirements.
  - l. Notation of dimensions established by field measurement.
  2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
  3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
  4. Number of Copies: Submit two black line prints. Architect will return one print.
- D. Coordination Drawings: Comply with requirements in Division 1 Sections "Project Coordination Drawings" and "Project Management and Coordination."
- E. Samples: Prepare physical units of materials or products, including the following:
1. Comply with requirements in Division 1 Section "Quality Requirements" for mockups.
  2. Refer to Division 9 Section "Color and Finish Schedule" for color and material selections.
  3. Samples for Selection:
    - a. When indicated, submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available. Physical samples may be required for final color selection, at the Architect's discretion.
    - b. When indicated, submit full-size units or samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:
    - a. Generic description of Sample.
    - b. Product name or name of manufacturer.
    - c. Sample source.
  5. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:
    - a. Size limitations.
    - b. Compliance with recognized standards.
    - c. Availability.
    - d. Delivery time.
  6. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
    - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
    - b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

7. Number of Samples for Selection: Submit three sets of Samples. Architect will retain one Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.
    - a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
  8. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- F. Mock-Ups: Erect mock-ups on-site as specified, and submit a photo of the mock-up with a submittal transmittal. Architect will review mock-up on-site and return comments or approval per the procedure for any submittal.
1. Coordinate preparation of mock-ups with regularly scheduled site meeting dates.
- G. Product Schedule or List: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product.
  2. Number and name of room or space.
  3. Location within room or space.
- H. Delegated-Design Submittal: Comply with requirements in Division 1 Section "Quality Requirements."
- I. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for Architect's action.
- J. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."
- K. Application for Payment: Comply with requirements in Division 1 Section "Payment Procedures."
- L. Schedule of Values: Comply with requirements in Division 1 Section "Payment Procedures."
- M. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
  2. Number and title of related Specification Section(s) covered by subcontract.
  3. Drawing number and detail references, as appropriate, covered by subcontract.

## 2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
  - 1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies. For certifications, submit not less than one original signature copy.
    - a. Informational submittals, other than certifications, may be submitted electronically if letter or 11x17" sized documents. Electronic information is to be presented in same format as would be submitted in print, but as .pdf files and formatted for printing without adjustments.
  - 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
  - 3. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."
- B. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."
- C. Daily Construction Reports: Submit daily construction reports on each Monday for the prior week.
- D. Material Location Reports: Submit material location reports with payment applications.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- G. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- H. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- I. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- J. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- K. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

- L. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.
- M. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- N. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.
- O. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- P. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- Q. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures."
- R. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- S. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
  - 1. Preparation of substrates.
  - 2. Required substrate tolerances.
  - 3. Sequence of installation or erection.
  - 4. Required installation tolerances.
  - 5. Required adjustments.
  - 6. Recommendations for cleaning and protection.

- T. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
  - 1. Name, address, and telephone number of factory-authorized service representative making report.
  - 2. Statement on condition of substrates and their acceptability for installation of product.
  - 3. Statement that products at Project site comply with requirements.
  - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  - 6. Statement whether conditions, products, and installation will affect warranty.
  - 7. Other required items indicated in individual Specification Sections.
  
- U. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
  
- V. Material Safety Data Sheets: Submit information directly to Owner. If submitted to Architect, Architect will not review this information but will return it with no action taken.

### PART 3 - EXECUTION

#### 3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
  
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
  - 1. Stamp or statement shall include the following:

"The Contractor represents that he has determined and verified that all materials, field measurements, and field construction criteria related to this submittal are coordinated, compatible, and appropriate, and that he has checked and coordinated the information contained within this submittal with the requirements of the Work and of the Contract Documents."

#### 3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
  
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will respond to each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

APPROVED

- PROVIDE AS NOTED
- REJECTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIED ITEM
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

This review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the formation given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the Contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for: quantities and dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

SMRT, Inc.

Date \_\_\_\_\_

By \_\_\_\_\_

- C. The action stamp above will be appropriately marked and executed to indicate whether the submittal returned is approved for unrestricted release, final-but-restricted release, returned for resubmittal, or not approved.
1. Final Unrestricted Release/Approved: When the Architect/Engineer marks a submittal or a part of a submittal "APPROVED", the Work covered by the submittal or part of a submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
    - a. Marking: "APPROVED"
  2. Final-But-Restricted Release/Conditionally Approved: When the Architect/Engineer marks a submittal or part of a submittal "PROVIDE AS NOTED," the Work covered by the submittal or part of a submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
    - a. Marking: "PROVIDE AS NOTED"
  3. Returned for Resubmittal/Not Approved: When the Architect/Engineer marks a submittal or part of a submittal "REVISE AND RESUBMIT," do not proceed with Work covered by the submittal or part of a submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.



- a. Do not use, or allow others to use, submittals marked "REVISE AND RESUBMIT" at the Project Site or elsewhere where Work is in progress.
  - b. Marking: "REVISE AND RESUBMIT" or "RESUBMIT SPECIFIC ITEM"  
When a submittal is marked "RESUBMIT SPECIFIC ITEM", only that item need be resubmitted.
4. Not approved: When the Architect/Engineer marks a submittal or part of a submittal "REJECTED", the Work covered by the submittal or part of a submittal does not conform to the contract documents. Submittal of specified item is required prior to proceeding with Work covered by the submittal.
  5. Informational Submittal: Informational submittal items are filed for project record only. Informational submittals do not require an action, though they may cause a reaction if the information reported identifies a problem to be resolved. Refer to specific submittals for further information.
  6. Not a Required Submittal: When the Architect/Engineer marks a submittal or part of a submittal "NOT A REQUIRED SUBMITTAL - NOT REVIEWED", the submittal is not required and approval is not required. All copies may be returned with no action taken. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

**END OF SECTION 013300**



**AUTHORIZATION STATEMENT For Electronic Transfer**

*SMRT Project Name and No.: Portland Department of Veterans Affairs, 10022*

**ORDERED BY:** Ledgewood Construction, 27 Main Street, South Portland, Maine 04106  
(company name, address)

**DESCRIPTION OF SERVICE:** Providing electronic base drawing information.

**FEE BASIS:**  \$ (Minimum \$250 per request)  Fee Waived

**TERMS AND CONDITIONS:** All documents and information prepared by SMRT, Inc. for this project, including information in electronic format, are instruments of our service, and are for use solely with respect to this project. SMRT, Inc. retains all common law, statutory and other reserved rights, including the copyright for these instruments of service.

Use of design information in electronic format from SMRT, Inc. does not represent review or approval of the user's work by the design professional. Making this information available in electronic format, in no way implies that the recipient is required by SMRT, Inc. to use it. Use of information supplied by SMRT, Inc. in electronic format is at the sole risk and liability of the user. The user agrees to waive any claim against SMRT, Inc. and our employees, and to defend, indemnify, and hold them harmless from any claim or liability that allegedly arises from the use of information furnished in electronic format.

The decision to use design information in electronic format obligates the user to verify the accuracy of the design against hard-copy representation of the design bearing the same issuance date. Information supplied in electronic format represents the most current status of the design at the date of the drawing's issuance. It is the user's responsibility to verify that the electronic information in their possession stays current throughout the life of the project, and to update the information as required to maintain it current. The user is also responsible to compare design information received in electronic format with field measurements and conditions prior to their making use of the information.

Information provided in digital format is for the sole information and use of the authorizing entity. Further copying or transfer of this information is prohibited by copyright. Payment for information in electronic format is due in full prior to transmittal of the information.

**AUTHORIZATION:** I/We hereby agree to the Terms and Conditions.

**APPROVED/ACCEPTED BY:** Ledgewood Construction  
*Company Name*

Representative Signature: \_\_\_\_\_

Print or type name here: \_\_\_\_\_

**SMRT, INC.**   
\_\_\_\_\_  
David Lay, Project Manager

Date: August 2, 2010

SECTION 014000

QUALITY REQUIREMENTS

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
  - 1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
  - 2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
  - 3. Divisions 2 through 33 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects

and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.

1. Mockup approvals shall be logged and processed under Division 1 Section "Submittals".

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

#### 1.4 DELEGATED DESIGN

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

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

#### 1.5 SUBMITTALS

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

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

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

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

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

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.

9. Test and inspection results and an interpretation of test results.
10. Ambient conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

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

## 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.
- G. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.
- H. Pre-construction Testing: Testing agency shall perform pre-construction testing for compliance with specified requirements for performance and test methods.
1. Contractor responsibilities include the following:

- a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.
  - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
  - c. Fabricate and install test assemblies using installers who will perform the same tasks for Project.
  - d. When testing is complete, remove assemblies; do not reuse materials on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
  2. Notify Architect seven days in advance of dates and times when mockups will be constructed by submitting a transmittal for the mock-up as a product sample submittal.
  3. Demonstrate the proposed range of aesthetic effects and workmanship.
  4. Obtain Architect's approval of mockups before starting work, fabrication, or construction. Approval will be recorded as a return submittal.
  5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  6. Demolish and remove mockups when directed, unless otherwise indicated.

## 1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
  2. Payment for these services will be made by Owner.
  3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.
  2. Payment for these services will be made by the Contractor.
  3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.
1. Testing agency will notify Architect, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Architect, Contractor and to authorities having jurisdiction.
  3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
  5. Testing agency will retest and reinspect corrected work.
- D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
- E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Architect, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  3. Promptly submit a certified written report, of each test, inspection, and similar quality-control service. Submission may be electronically.
  4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
  5. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify the testing agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field-curing of test samples.
  5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  6. Security and protection for samples and for testing and inspecting equipment at Project site.

- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a preliminary schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Finalize scheduled testing requirements. Submit schedule within 30 days of date established for commencement of the Work.
  - 1. Distribution: Distribute schedule to Owner, Architect, testing agencies, Contractor and each other party involved in performance of portions of the Work where tests and inspections are required.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.1 REPAIR AND PROTECTION**

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - 1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
  - 2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

**END OF SECTION 014000**



SECTION 014200

REFERENCES

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if

bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.
- D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the organizations responsible for the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA)	(800) 872-2253
	Architectural Barriers Act (ABA)	(202) 272-0080
	Accessibility Guidelines for Buildings and Facilities Available from Access Board <a href="http://www.access-board.gov">www.access-board.gov</a>	
CFR	Code of Federal Regulations	(866) 512-1800
	Available from Government Printing Office	(202) 512-1800
	<a href="http://www.gpoaccess.gov/cfr/index.html">www.gpoaccess.gov/cfr/index.html</a>	
DOD	Department of Defense Military Specifications and Standards	(215) 697-6257
	Available from Department of Defense Single Stock Point <a href="http://dodssp.daps.dla.mil">http://dodssp.daps.dla.mil</a>	
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification	(215) 697-6257
	Available from Department of Defense Single Stock Point <a href="http://dodssp.daps.dla.mil">http://dodssp.daps.dla.mil</a>	
	Available from Defense Standardization Program <a href="http://www.dps.dla.mil">www.dps.dla.mil</a>	

	Available from General Services Administration	(202) 619-8925
	<a href="http://www.gsa.gov">www.gsa.gov</a>	
	Available from National Institute of Building Sciences	(202) 289-7800
	<a href="http://www.nibs.org">www.nibs.org</a>	
FTMS	Federal Test Method Standard (See FS)	
MIL	(See MILSPEC)	
MIL-STD	(See MILSPEC)	
MILSPEC	Military Specification and Standards	(215) 697-6257
	Available from Department of Defense Single Stock Point <a href="http://dodssp.daps.dla.mil">http://dodssp.daps.dla.mil</a>	
UFAS	Uniform Federal Accessibility Standards	(800) 872-2253
	Available from Access Board	(202) 272-0080
	<a href="http://www.access-board.gov">www.access-board.gov</a>	

#### 1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) <a href="http://www.aluminum.org">www.aluminum.org</a>	(703) 358-2960
AAADM	American Association of Automatic Door Manufacturers <a href="http://www.aaadm.com">www.aaadm.com</a>	(216) 241-7333
AABC	Associated Air Balance Council <a href="http://www.aabchq.com">www.aabchq.com</a>	(202) 737-0202
AAMA	American Architectural Manufacturers Association <a href="http://www.aamanet.org">www.aamanet.org</a>	(847) 303-5664

AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	American Concrete Institute www.concrete.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AHRI	Air-Conditioning, Heating, and Refrigeration Institute www.ahrinet.org	(703) 524-8800
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction	(303) 792-9559

	<a href="http://www.aitc-glulam.org">www.aitc-glulam.org</a>	
ALSC	American Lumber Standard Committee, Incorporated <a href="http://www.alsc.org">www.alsc.org</a>	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. <a href="http://www.amca.org">www.amca.org</a>	(847) 394-0150
ANSI	American National Standards Institute <a href="http://www.ansi.org">www.ansi.org</a>	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. <a href="http://www.aosaseed.com">www.aosaseed.com</a>	(405) 780-7372
APA	Architectural Precast Association <a href="http://www.archprecast.org">www.archprecast.org</a>	(239) 454-6989
APA	APA - The Engineered Wood Association <a href="http://www.apawood.org">www.apawood.org</a>	(253) 565-6600
API	American Petroleum Institute <a href="http://www.api.org">www.api.org</a>	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute (Now AHRI)	
ARMA	Asphalt Roofing Manufacturers Association <a href="http://www.asphaltroofing.org">www.asphaltroofing.org</a>	(202) 207-0917
ASCE	American Society of Civil Engineers <a href="http://www.asce.org">www.asce.org</a>	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air- Conditioning Engineers <a href="http://www.ashrae.org">www.ashrae.org</a>	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers International) <a href="http://www.asme.org">www.asme.org</a>	(800) 843-2763 (973) 882-1170
ASSE	American Society of Safety Engineers <a href="http://www.asse.org">www.asse.org</a>	(847) 699-2929
ASSE	American Society of Sanitary Engineering <a href="http://www.asse-plumbing.org">www.asse-plumbing.org</a>	(440) 835-3040
ASTM	ASTM International	(610) 832-9500

	(American Society for Testing and Materials International) www.astm.org	
ATIS	Alliance for Telecommunications Industry Solutions www.atis.org	(202) 628-6380
AWCI	Association of the Wall and Ceiling Industry www.awci.org	(703) 534-8300
AWCMA	American Window Covering Manufacturers Association (Now WCMA)	
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association) www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
BWF	Badminton World Federation (Formerly: IBF - International Badminton Federation) www.internationalbadminton.org	6-03-9283 7155
CCC	Carpet Cushion Council www.carpetcushion.org	(610) 527-3880
CDA	Copper Development Association www.copper.org	(212) 251-7200

CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263
CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CPA	Composite Panel Association www.pbmdf.com	(703) 724-1128
CPPA	Corrugated Polyethylene Pipe Association www.plasticpipe.org	(800) 510-2772 (202) 462-9607
CRI	Carpet and Rug Institute (The) www.carpet-rug.com	(706) 278-3176
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	Canadian Standards Association	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Cast Stone Institute www.caststone.org	(717) 272-3744
CSI	Construction Specifications Institute (The)	(800) 689-2900

	www.csinet.org	(703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
ECA	Electronic Components Association www.ec-central.org	(703) 907-8024
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (770) 968-7945
EJCDC	Engineers Joint Contract Documents Committee www.ejdc.org	(703) 295-5000
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA) www.intertek-etlsemko.com	(800) 967-5352
FIBA	Federation Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation) www.fivb.org	41 21 345 35 35
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FMG	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors	(407) 671-3772



	Association, Inc. www.floridarooft.com	
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Part of GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydraulic Institute www.pumps.org	(973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAS	International Approval Services (Now CSA International)	
IBF	International Badminton Federation (Now BWF)	
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission	41 22 919 02 11

	<a href="http://www.iec.ch">www.iec.ch</a>	
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) <a href="http://www.ieee.org">www.ieee.org</a>	(212) 419-7900
IES	Illuminating Engineering Society <a href="http://www.ies.org">www.ies.org</a>	(212) 248-5000
IESNA	Illuminating Engineering Society of North America (Now IES)	
IEST	Institute of Environmental Sciences and Technology <a href="http://www.iest.org">www.iest.org</a>	(847) 981-0100
IGCC	Insulating Glass Certification Council <a href="http://www.igcc.org">www.igcc.org</a>	(315) 646-2234
IGMA	Insulating Glass Manufacturers Alliance <a href="http://www.igmaonline.org">www.igmaonline.org</a>	(613) 233-1510
ILI	Indiana Limestone Institute of America, Inc. <a href="http://www.iliai.com">www.iliai.com</a>	(812) 275-4426
ISO	International Organization for Standardization <a href="http://www.iso.ch">www.iso.ch</a>	41 22 749 01 11
	Available from ANSI <a href="http://www.ansi.org">www.ansi.org</a>	(202) 293-8020
ISSFA	International Solid Surface Fabricators Association <a href="http://www.issfa.net">www.issfa.net</a>	(877) 464-7732 (702) 567-8150
ITS	Intertek Testing Service NA (Now ETL SEMCO)	
ITU	International Telecommunication Union <a href="http://www.itu.int/home">www.itu.int/home</a>	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association <a href="http://www.kcma.org">www.kcma.org</a>	(703) 264-1690
LPI	Lightning Protection Institute <a href="http://www.lightning.org">www.lightning.org</a>	(800) 488-6864
MBMA	Metal Building Manufacturers Association <a href="http://www.mbma.com">www.mbma.com</a>	(216) 241-7333
MFMA	Maple Flooring Manufacturers Association, Inc. <a href="http://www.maplefloor.org">www.maplefloor.org</a>	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc.	(312) 644-6610

	<a href="http://www.metalframingmfg.org">www.metalframingmfg.org</a>	
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America <a href="http://www.mhia.org">www.mhia.org</a>	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America <a href="http://www.marble-institute.com">www.marble-institute.com</a>	(440) 250-9222
MPI	Master Painters Institute <a href="http://www.paintinfo.com">www.paintinfo.com</a>	(888) 674-8937 (604) 298-7578
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. <a href="http://www.mss-hq.com">www.mss-hq.com</a>	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers <a href="http://www.naamm.org">www.naamm.org</a>	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) <a href="http://www.nace.org">www.nace.org</a>	(800) 797-6623 (281) 228-6200
NADCA	National Air Duct Cleaners Association <a href="http://www.nadca.com">www.nadca.com</a>	(202) 737-2926
NAGWS	National Association for Girls and Women in Sport <a href="http://www.aahperd.org/nagws/">www.aahperd.org/nagws/</a>	(800) 213-7193, ext. 453 (703) 476-3400
NAIMA	North American Insulation Manufacturers Association <a href="http://www.naima.org">www.naima.org</a>	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. <a href="http://www.nbgqa.com">www.nbgqa.com</a>	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) <a href="http://www.ncaa.org">www.ncaa.org</a>	(317) 917-6222
NCMA	National Concrete Masonry Association <a href="http://www.ncma.org">www.ncma.org</a>	(703) 713-1900
NCPI	National Clay Pipe Institute <a href="http://www.ncpi.org">www.ncpi.org</a>	(262) 248-9094
NCTA	National Cable & Telecommunications Association <a href="http://www.ncta.com">www.ncta.com</a>	(202) 775-2300
NEBB	National Environmental Balancing Bureau	(301) 977-3698

	<a href="http://www.nebb.org">www.nebb.org</a>	
NECA	National Electrical Contractors Association <a href="http://www.necanet.org">www.necanet.org</a>	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association <a href="http://www.nelma.org">www.nelma.org</a>	(207) 829-6901
NEMA	National Electrical Manufacturers Association <a href="http://www.nema.org">www.nema.org</a>	(703) 841-3200
NETA	InterNational Electrical Testing Association <a href="http://www.netaworld.org">www.netaworld.org</a>	(888) 300-6382 (269) 488-6382
NFHS	National Federation of State High School Associations <a href="http://www.nfhs.org">www.nfhs.org</a>	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) <a href="http://www.nfpa.org">www.nfpa.org</a>	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council <a href="http://www.nfrc.org">www.nfrc.org</a>	(301) 589-1776
NGA	National Glass Association <a href="http://www.glass.org">www.glass.org</a>	(866) 342-5642 (703) 442-4890
NHLA	National Hardwood Lumber Association <a href="http://www.natlhardwood.org">www.natlhardwood.org</a>	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority <a href="http://www.nlga.org">www.nlga.org</a>	(604) 524-2393
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association) <a href="http://www.nofma.com">www.nofma.com</a>	(901) 526-5016
NOMMA	National Ornamental & Miscellaneous Metals Association <a href="http://www.nomma.org">www.nomma.org</a>	(888) 516-8585
NRCA	National Roofing Contractors Association <a href="http://www.nrca.net">www.nrca.net</a>	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association <a href="http://www.nrmca.org">www.nrmca.org</a>	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) <a href="http://www.nsf.org">www.nsf.org</a>	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association	(800) 342-1415

	<a href="http://www.nssga.org">www.nssga.org</a>	(703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) <a href="http://www.ntma.com">www.ntma.com</a>	(800) 323-9736 (540) 751-0930
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)	
NWFA	National Wood Flooring Association <a href="http://www.woodfloors.org">www.woodfloors.org</a>	(800) 422-4556 (636) 519-9663
NWWDA	National Wood Window and Door Association (Now WDMA)	
PCI	Precast/Prestressed Concrete Institute <a href="http://www.pci.org">www.pci.org</a>	(312) 786-0300
PDCA	Painting & Decorating Contractors of America <a href="http://www.pdca.com">www.pdca.com</a>	(800) 332-7322 (314) 514-7322
PDI	Plumbing & Drainage Institute <a href="http://www.pdionline.org">www.pdionline.org</a>	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute <a href="http://pgi-tp.cee.uiuc.edu">http://pgi-tp.cee.uiuc.edu</a>	(217) 333-3929
PLANET	Professional Landcare Network <a href="http://www.landcarenetwork.org">www.landcarenetwork.org</a>	(800) 395-2522 (703) 736-9666
PTI	Post-Tensioning Institute <a href="http://www.post-tensioning.org">www.post-tensioning.org</a>	(602) 870-7540
RCSC	Research Council on Structural Connections <a href="http://www.boltcouncil.org">www.boltcouncil.org</a>	
RFCI	Resilient Floor Covering Institute <a href="http://www.rfci.com">www.rfci.com</a>	(301) 340-8580
RIS	Redwood Inspection Service <a href="http://www.redwoodinspection.com">www.redwoodinspection.com</a>	(925) 935-1499
SAE	SAE International <a href="http://www.sae.org">www.sae.org</a>	(877) 606-7323 (724) 776-4841
SCTE	Society of Cable Telecommunications Engineers <a href="http://www.scte.org">www.scte.org</a>	(800) 542-5040 (610) 363-6888
SDI	Steel Deck Institute <a href="http://www.sdi.org">www.sdi.org</a>	(847) 458-4647
SDI	Steel Door Institute	(440) 899-0010

	<a href="http://www.steeldoor.org">www.steeldoor.org</a>	
SEFA	Scientific Equipment and Furniture Association <a href="http://www.sefalabs.com">www.sefalabs.com</a>	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SGCC	Safety Glazing Certification Council <a href="http://www.sgcc.org">www.sgcc.org</a>	(315) 646-2234
SIA	Security Industry Association <a href="http://www.siaonline.org">www.siaonline.org</a>	(866) 817-8888 (703) 683-2075
SJI	Steel Joist Institute <a href="http://www.steeljoist.org">www.steeljoist.org</a>	(843) 626-1995
SMA	Screen Manufacturers Association <a href="http://www.smainfo.org">www.smainfo.org</a>	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association <a href="http://www.smacna.org">www.smacna.org</a>	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers <a href="http://www.smpte.org">www.smpte.org</a>	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance <a href="http://www.sprayfoam.org">www.sprayfoam.org</a>	(800) 523-6154
SPIB	Southern Pine Inspection Bureau <a href="http://www.spib.org">www.spib.org</a>	(850) 434-2611
SPRI	Single Ply Roofing Industry <a href="http://www.spri.org">www.spri.org</a>	(781) 647-7026
SSINA	Specialty Steel Industry of North America <a href="http://www.ssina.com">www.ssina.com</a>	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings <a href="http://www.sspc.org">www.sspc.org</a>	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute <a href="http://www.steeltank.com">www.steeltank.com</a>	(847) 438-8265
SWI	Steel Window Institute <a href="http://www.steelwindows.com">www.steelwindows.com</a>	(216) 241-7333
SWRI	Sealant, Waterproofing, & Restoration Institute <a href="http://www.swrionline.org">www.swrionline.org</a>	(816) 472-7974

TCNA	Tile Council of North America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrassod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tilerroofing.org	(312) 670-4177
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTECC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WCSC	Window Covering Safety Council www.windowcoverings.org	(800) 506-4636 (212) 297-2109
WDMA	Window & Door Manufacturers Association www.wdma.com	(800) 223-2301 (847) 299-5200
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of	(916) 372-9943

California)  
www.wicnet.org

WIC	Woodwork Institute of California (Now WI)	
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DIN	Deutsches Institut f?r Normung e.V. www.din.de	49 30 2601-0
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543
UBC	Uniform Building Code (See ICC)	

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers www.usace.army.mil	(202) 761-0011
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce www.commerce.gov	(202) 482-2000
DOD	Department of Defense http://.dodssp.daps.dla.mil	(215) 697-6257



DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Buildings Service (See GSA)	
PHS	Office of Public Health and Science www.hhs.gov/ophs	(202) 690-7694
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
SD	State Department www.state.gov	(202) 647-4000
TRB	Transportation Research Board <a href="http://gulliver.trb.org">http://gulliver.trb.org</a>	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791

USPS Postal Service (202) 268-2000  
www.usps.com

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG Americans with Disabilities Act (ADA) (800) 872-2253  
Architectural Barriers Act (ABA) (202) 272-0080  
Accessibility Guidelines for Buildings and Facilities  
Available from U.S. Access Board  
www.access-board.gov

CFR Code of Federal Regulations (866) 512-1800  
Available from Government Printing Office (202) 512-1800  
www.gpoaccess.gov/cfr/index.html

DOD Department of Defense Military Specifications and Standards (215) 697-2664  
Available from Department of Defense Single Stock Point  
http://dodssp.daps.dla.mil

DSCC Defense Supply Center Columbus  
(See FS)

FED-STD Federal Standard  
(See FS)

FS Federal Specification (215) 697-2664  
Available from Department of Defense Single Stock Point  
http://dodssp.daps.dla.mil  
Available from Defense Standardization Program  
www.dps.dla.mil

Available from General Services Administration (202) 619-8925  
www.gsa.gov

Available from National Institute of Building Sciences (202) 289-7800  
www.wbdg.org/ccb

FTMS Federal Test Method Standard

(See FS)

MIL (See MILSPEC)

MIL-STD (See MILSPEC)

MILSPEC Military Specification and Standards (215) 697-2664  
Available from Department of Defense Single Stock Point  
<http://dodssp.daps.dla.mil>

UFAS Uniform Federal Accessibility Standards (800) 872-2253  
Available from Access Board (202) 272-0080  
[www.access-board.gov](http://www.access-board.gov)

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation (800) 952-5210  
[www.dca.ca.gov/bhfti](http://www.dca.ca.gov/bhfti) (916) 574-2041

CCR California Code of Regulations (916) 323-6815  
[www.calregs.com](http://www.calregs.com)

CDHS California Department of Health Services  
(See CDPH)

CDPH California Department of Public Health, Indoor Air Quality Section (510) 620-2802  
[www.cal-iaq.org](http://www.cal-iaq.org)

CPUC California Public Utilities Commission (415) 703-2782  
[www.cpuc.ca.gov](http://www.cpuc.ca.gov)

TFS Texas Forest Service (979) 458-6650  
Forest Resource Development  
<http://txforestservation.tamu.edu>

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 014200**

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.
- B. Temporary utilities include, but are not limited to, the following:
1. Sewers and drainage.
  2. Water service and distribution.
  3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
  4. Heating and cooling facilities.
  5. Ventilation.
  6. Electric power service.
  7. Lighting.
  8. Telephone service.
- C. Support facilities include, but are not limited to, the following:
1. Temporary roads and paving.
  2. Dewatering facilities and drains.
  3. Project identification and temporary signs.
  4. Waste disposal facilities.
  5. Field offices.
  6. Storage and fabrication sheds.
  7. Lifts and hoists.
  8. Temporary stairs.
  9. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
1. Environmental protection.
  2. Stormwater control.
  3. Tree and plant protection.
  4. Pest control.
  5. Site enclosure fence.
  6. Security enclosure and lockup.
  7. Barricades, warning signs, and lights.
  8. Temporary enclosures.
  9. Temporary partitions.

10. Fire protection.

E. Related Sections include the following:

1. Division 1 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
2. Division 1 Section "Execution Requirements" for progress cleaning requirements.
3. Divisions 2 through 33 for temporary heat, ventilation, and humidity requirements for products in those Sections.

### 1.3 DEFINITIONS

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

### 1.4 USE CHARGES

A. General: Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:

1. Owner's construction forces.
2. Occupants of Project.
3. Architect.
4. Testing agencies.
5. Personnel of authorities having jurisdiction.

B. Sewer Service: Owner will pay sewer service use charges for sewer usage, by all parties engaged in construction, at Project site.

C. Water Service: Owner will pay metered water service use charges for water delivered through existing or permanent meters used by all entities engaged in construction activities at Project site. Non-metered or temporary metered water services arranged for use of the Contractor shall be paid by the Contractor.

D. Electric Power Service: Owner will pay for metered electric power service use charges for electricity delivered through existing or permanent meters used by all entities engaged in construction activities at Project site. Non-metered or temporary metered services arranged for the use of the Contractor shall be paid by the Contractor.

E. Gas Service: Owner will pay for metered gas service use charges for gas delivered through existing or permanent meters used by entities engaged in construction activities at Project site.

### 1.5 SUBMITTALS

A. Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

- B. Implementation and Termination Schedule: Within 15 days of date established for submittal of Contractor's Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.

## 1.6 QUALITY ASSURANCE

- A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
  - 1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
  - 2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

## 1.7 PROJECT CONDITIONS

- A. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.
  - 1. Temporary Use of Existing Facilities to be Demolished: Use of existing facilities for temporary use is permitted. The Contractor shall be responsible for maintaining the operating condition of existing equipment to be demolished as required for safe operation.
  - 2. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.
- B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
  - 1. The Owner payment of use charges is conditioned upon the reasonable and prudent use of Owner-paid energy resources by the Contractor. Should energy resources be found to be wasted by negligent management by the Contractor, the Contractor shall pay the total cost of the energy resource.
  - 2. Keep temporary services and facilities clean and neat.
  - 3. Relocate temporary services and facilities as required by progress of the Work.

## **PART 2 - PRODUCTS**

### 2.1 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.
- B. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry."

- C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively.
- D. Paint: Comply with requirements in Division 9 Section "Painting."
- E. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.
- F. Water: Potable.

## 2.2 EQUIPMENT

- A. General: Provide equipment suitable for use intended.
- B. Field Offices:
  - 1. The Contractor will be permitted to utilize a portion of the existing facility on the project site for a field office.
  - 2. Trade contractors may utilize mobile units with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading. Temporary mobile unit utilities shall be provided with separate service entrances or meters, and utilities paid by the trade contractor responsible. Placement of temporary mobile units shall be coordinated to not restrict access to other facilities which share the existing curb cut and drive.
- C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
  - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- D. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
- F. Heating Equipment:
  - 1. Use of existing mechanical heating equipment is permitted for temporary heat. The Contractor shall be responsible for the condition and safe use of the existing equipment.
  - 2. Until Owner authorizes use of permanent heating system, and when the progress of the Work requires temporary heating units, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
    - a. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
    - b. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.
- G. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.



- H. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.
  - 1. The use of existing electrical equipment to be demolished is permitted for temporary power. The Contractor shall be responsible for the condition and safe use of existing equipment.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

#### 3.2 TEMPORARY UTILITY INSTALLATION

- A. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction until permanent water service is in use. Sterilize temporary water piping before use.
  - 1. Provide rubber hoses as necessary to serve Project site.
- B. Sanitary Facilities: When required, provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
  - 1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
  - 2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
  - 3. Drinking-Water Facilities: Provide bottled-water, drinking-water units.
  - 4. Locate toilets and drinking-water fixtures so personnel need not walk more than two stories vertically or 200 feet (60 m) horizontally to facilities.
  - 5. The Contractor shall maintain Owner provided facilities used as temporary facilities in clean, operational and safe condition. Existing facilities utilized by the Contractor and not demolished as a part of the work shall be returned to condition no worse than they were at the start of the Work.
- C. Heating: Provide necessary enclosures, and pay for heating devices as needed to maintain specified conditions for all trades and phases of the work. Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Pay for fuel not provided by Owner as specified in this Section, including propane or other fuel for portable heating devices. Select to utilize and operate equipment that will not have a harmful effect on completed installations or elements being installed.

- D. Provide temporary heat when exterior temperatures are less than 50 degrees F. Provide temporary heat to protect all concrete and masonry work during installation as well as other trades needing specific heat requirements to perform and protect their work. See individual specification sections for detailed information. All concrete slabs on grade, footings and foundations not below the frost line shall be protected from freezing either by heating or protecting with insulation until substantial completion.
1. Maintain a minimum temperature of 50 deg F (10 deg C) in permanently enclosed portions of building for normal construction activities, and 65 deg F (18.3 deg C) for finishing activities and areas where finished Work has been installed.
- E. Heating Facilities:
1. Provide gas/oil fired space heaters that are UL labeled and approved for construction space heating by appropriate agency. Provide adequate ventilation and thermostatic control. Heaters shall be located outside the building and combustion gases shall be vented outside the building. Maintain observation of units in operation. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.
  2. Permanent air heating systems may be used to provide heat only when finishes are complete enough to eliminate construction dust and with the prior approval of the Architect and Owner. All operating costs other than fuel resulting from the use of the permanent heating system prior to "substantial completion" shall be paid by the Contractor. All warranty periods for such systems shall be extended at the Contractor's cost so that the Owner gets the fully intended warranty period effective the day of "Substantial Completion".
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.
1. Install electric power service underground, except where overhead service will be used.
  2. Install power distribution wiring overhead and rise vertically where least exposed to damage.
  3. Connect temporary service to Owner's existing power source, as directed by electric company officials, when applicable.
- H. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
  2. Provide warning signs at power outlets other than 110 to 120 V.
  3. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.

4. Provide metal conduit enclosures or boxes for wiring devices.
  5. Provide 4-gang outlets, spaced so 100-foot extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.
  6. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
  7. Provide one 100-W incandescent lamp per 500 sq. ft., uniformly distributed, for general lighting, or equivalent illumination.
  8. Provide one 100-W incandescent lamp every 50 feet in traffic areas.
  9. Provide one 100-W incandescent lamp per story in stairways and ladder runs, located to illuminate each landing and flight.
  10. Install exterior-yard site lighting that will provide adequate illumination for construction operations, traffic conditions, and signage visibility when the Work is being performed.
- I. Telephone/Data Service: Provide temporary telephone/data service throughout construction period. Install no less than one dedicated telephone line for contractor's field office, with telephone service provider furnished message recording.
1. Provide additional tele/data lines for the following:
    - a. Provide not less than one field computer with high-speed internet connection sufficient for electronic communications and with the capacity for the reasonably expedient transfer of up to 10GB drawing files to or from the Contractor's field office.
    2. At each telephone, post a list of important telephone numbers.
      - a. Police and fire departments.
      - b. Ambulance service.
      - c. Contractor's home office.
      - d. Architect's office.
      - e. Engineers' offices.
      - f. Owner's office.
      - g. Principal subcontractors' field and home offices.
    3. Furnish Contractor superintendent and assistants with cellular telephones for individual use, each with answering service for messages.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Locate storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access. Coordinate with the City for required approvals.
  2. Provide non-combustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with NFPA 241.
  3. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.

- C. Dewatering Facilities and Drains: Comply with requirements in applicable Division 2 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
  2. Remove snow and ice as required to minimize accumulations.
- D. Project Identification and Temporary Signs: Install signs to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.
1. Provide a project sign 4' x 7'. Engage an experienced sign painter to apply graphics for project identification sign. Include name of project, and names of Owner, Architect and Contractor. Include color images for Owner and company logos (may be adhered.) Submit sign design graphic to Architect for approval prior to fabrication.
  2. Prepare temporary signs to provide directional information to construction personnel and visitors.
  3. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood 3/4 inch thick. Support on posts or framing of preservative-treated wood or steel.
  4. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.
- E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements. Comply with Division 1 Section "Construction Waste Management" for separation of wastes for recycling.
1. Provide separate containers, clearly labeled, for each type of waste material to be deposited.
  2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type. Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.
- F. Contractor's Field Office: The Contractor may use the existing facility as a field office. Keep office clean and orderly. Set up office to accommodate typical contractor operations, plus set aside a conference area sufficient in size to accommodate 12 participants.
1. Maintain existing heating and cooling systems and use them for heating and cooling or provide temporary equipment.
  2. Maintain existing plumbing systems and use them for operations within the field office or provide portable units.
  3. Furnish and equip office as follows:
    - a. Provide an office with two desks and four chairs, four-drawer file cabinets, a plan table, a plan rack, and bookcase.
    - b. Provide a room of not less than 240 sq. ft. (22.5 sq. m) for Project meetings. Furnish room with conference table, 12 folding chairs.
- G. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site.

1. Construct framing, sheathing, and siding using fire-retardant-treated lumber and plywood.
2. Paint exposed lumber and plywood with exterior-grade acrylic-latex emulsion over exterior primer.

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

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

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

C. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch- (16-mm-) thick exterior plywood.

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

1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Vertical Openings: Close openings of 25 sq. ft. (2.3 sq. m) or less with plywood or similar materials.
3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
5. Where temporary wood or plywood enclosure exceeds 100 sq. ft. (9.2 sq. m) in area, use fire-retardant-treated material for framing and main sheathing.

E. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.
  - a. Field Offices: Class A stored-pressure water-type extinguishers.

- b. Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
- c. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposure areas.
4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
5. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
6. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
7. Provide temporary standpipes and hoses for fire protection if directed by the Authority Having Jurisdiction. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

### 3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
  1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
  2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Temporary Facility Changeover: Except for using permanent fire protection as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.
  2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials

contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

**END OF SECTION 015000**





SECTION 016000

PRODUCT REQUIREMENTS

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
  - 1. Division 1 Section "Alternates" for products selected under an alternate as applicable.
  - 2. Division 1 Section "References" for applicable industry standards for products specified.
  - 3. Division 1 Section "Closeout Procedures" for submitting warranties for contract closeout.
  - 4. Divisions 2 through 33 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

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

#### 1.4 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use form provided at end of Section.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
    - b. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    - c. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    - d. Samples, where applicable or requested.
    - e. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    - f. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    - g. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
    - h. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
  - 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed. Provide specified item if substitution is not accepted.

#### 1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
  - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
  - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

**1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
  - 5. Store products to allow for inspection and measurement of quantity or counting of units.
  - 6. Store materials in a manner that will not endanger Project structure.
  - 7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  - 8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  - 9. Protect stored products from damage.

**1.7 PRODUCT WARRANTIES**

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
  - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  - 2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
  - 3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

**PART 2 - PRODUCTS**

**2.1 PRODUCT OPTIONS**

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.
  - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Where products are specified by name, and/or accompanied by the term "or approved equal" or "or approved substitute," comply with provisions in Procedural Documents regarding the preparation of separate alternate bids.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.
  - a. Substitutions submitted as separate proposals as required and permitted in bidding instructions may be considered, unless otherwise indicated.
2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide product by the manufacturer or from the source named that complies with requirements.
  - a. Substitutions submitted as separate proposals as required in bidding instructions may be considered, unless otherwise indicated.
3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
  - a. Substitutions submitted as separate proposals as required in bidding instructions may be considered, unless otherwise indicated.
4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
  - a. Substitutions submitted as separate proposals as required in bidding instructions may be considered, unless otherwise indicated.
5. Available Products: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
6. Available Manufacturers: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
7. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

8. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample or specified product. Products listed by name in Division 9 Section "Color and Finish Schedule" shall be matched. Architect's decision will be final on whether a proposed product matches satisfactorily.
  - a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.
9. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.
  - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
  - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.
  - c. Division 9 Section: "Color and Finish Schedule" selections shall be matched regardless of individual specification language regarding standard or premium products.
10. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division 1 for allowances that control product selection and for procedures required for processing such selections.

## 2.2 PRODUCT SUBSTITUTIONS

- A. Conditions: Architect will consider Contractor's request for substitution if the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
  1. Requested substitution offers Owner an advantage in encouraging competitive bidding, cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Refer to Instructions to Bidders. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
  2. Requested substitution does not require revisions to the Contract Documents.
  3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  4. Substitution request is fully documented and properly submitted.
  5. Requested substitution will not adversely affect Contractor's Construction Schedule.
  6. Requested substitution has received necessary approvals of authorities having jurisdiction.
  7. Requested substitution is compatible with other portions of the Work.
  8. Requested substitution has been coordinated with other portions of the Work.
  9. Requested substitution provides specified warranty.
  10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
  11. Requested substitution is presented as an alternative bid proposal as required in bidding documents, or the material or product specified is not available.

**2.3 COMPARABLE PRODUCTS**

- A. Where products or manufacturers are not limited to specific products or manufacturers, submit the following, in addition to other required submittals as applicable, to obtain approval of an unnamed product:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, compliance with referenced industry standards, visual effect, and specific features and requirements indicated.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  5. Samples, if requested.
- B. Refer to Section 01330 Submittal Requirements for additional information and requirements.

**PART 3 - EXECUTION (Not Used)**

SUBSTITUTION REQUEST FORM

Project: \_\_\_\_\_ Substitution Request Number: \_\_\_\_\_  
To: \_\_\_\_\_ From: \_\_\_\_\_  
Re: \_\_\_\_\_ Date: \_\_\_\_\_

Specification Title: \_\_\_\_\_ Description: \_\_\_\_\_  
Section: \_\_\_\_\_ Page: \_\_\_\_\_ Article/Paragraph: \_\_\_\_\_

Proposed Substitution: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_ Address: \_\_\_\_\_ Phone: \_\_\_\_\_  
Trade Name: \_\_\_\_\_ Model No. \_\_\_\_\_

Attached data includes product description, specifications, drawings, and performance and test data adequate for evaluation of the request: applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitutions will require for its proper installation.

The Undersigned certifies:

1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the Substitution as for the specified Product.
3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
4. Waive claims for additional costs or time extension that may subsequently become apparent.
5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with substitution.

Submitted By: \_\_\_\_\_  
Signed By: \_\_\_\_\_  
Firm: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

A/E's REVIEW AND ACTION

- Submission approved - Make submittals in accordance with Specification Section 01330.  
 Submission approved as noted - Make submittals in accordance with Specification Section 01330.  
 Submission rejected - Use specified materials.  
 Submission request received too late - Use specified materials.

Signed by: \_\_\_\_\_ Date: \_\_\_\_\_

Supporting Data Attached:  Drawings  Product Data  Samples  Tests  Reports  
 Other \_\_\_\_\_

**END OF SECTION 016000**





SECTION 017300

EXECUTION

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. General installation of products.
  - 4. Coordination and support of other contractors hired by the Owner to install specific systems.
  - 5. Progress cleaning.
  - 6. Starting and adjusting.
  - 7. Protection of installed construction.
  - 8. Correction of the Work.
  - 9. Exposure to silica.
- B. Related Sections include the following:
  - 1. Division 1 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
  - 2. Division 1 Section "Submittal Procedures" for submitting surveys.
  - 3. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
  - 4. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

- A. Qualification Data: For professional engineer to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
1. Before construction, verify the location and points of connection of utility services.
  2. Before the start of work in any area of the existing structures, generally compare the recorded information included in the Contract Documents to identify any differences between what is observed to what is recorded.
  3. As demolition work exposes existing conditions that may or may not be recorded in the Contract Documents, generally observe the condition of existing improvements to identify any deteriorated or otherwise non-compatible conditions with the Work.
  4. Notify the Architect of any condition that conflicts with the Work as planned, or which otherwise creates a situation that in any way provides an obstacle to the provision of the Work as designed. Refer to Division 1 Section "Project Management and Coordination" for RFI submission requirements, and to Division 1 Section "Contract Modification Procedures" for requirements related to approvals required prior to performing work not included in the Contract.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
  2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
    - a. Description of the Work.
    - b. List of detrimental conditions, including substrates.
    - c. List of unacceptable installation tolerances.
    - d. Recommended corrections.
  2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
  3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

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

### 3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents. Submit requests on "Request for Interpretation/ Information" Form.

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General:
  1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  3. Inform installers of lines and levels to which they must comply.
  4. Check the location, level and plumb, of every major element as the Work progresses.
  5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

**3.4 FIELD ENGINEERING**

- A. Identification: Identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

**3.5 INSTALLATION**

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
  - 4. Maintain minimum headroom clearance of 8 feet (2.4 m) in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
  - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.

2. Allow for building movement, including thermal expansion and contraction.
- G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.
  1. Refer to attached memorandum regarding the exposure of personnel to silica dust.
- I. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
  1. Excessive static or dynamic loading.
  2. Excessive internal or external pressures.
  3. Excessively high or low temperatures.
  4. Thermal shock.
  5. Excessively high or low humidity.
  6. Air contamination or pollution.
  7. Water or ice.
  8. Solvents.
  9. Chemicals.
  10. Light.
  11. Radiation.
  12. Puncture.
  13. Abrasion.
  14. Heavy traffic.
  15. Soiling, staining and corrosion.
  16. Bacteria.
  17. Rodent and insect infestation.
  18. Combustion.
  19. Electrical current.
  20. High speed operation,
  21. Improper lubrication,
  22. Unusual wear or other misuse.
  23. Contact between incompatible materials.
  24. Destructive testing.
  25. Misalignment.
  26. Excessive weathering.
  27. Unprotected storage.
  28. Improper shipping or handling.
  29. Theft.
  30. Vandalism.

### 3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily in accordance with OSHA requirements. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
  2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.7 STARTING AND ADJUSTING

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

- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

**3.8 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

**3.9 CORRECTION OF THE WORK**

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
  - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

**END OF SECTION 017300**





SECTION 017329

CUTTING AND PATCHING

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
  - 1. Division 01 Section "Selective Demolition" for demolition of selected portions of the building.
  - 2. Divisions 2 through 33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
  - 3. Division 07 Section "Penetration Firestopping" for patching fire-rated construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
  - 1. Primary operational systems and equipment.
  - 2. Air or smoke barriers.
  - 3. Fire-suppression systems.
  - 4. Mechanical systems piping and ducts.
  - 5. Control systems.
  - 6. Communication systems.

7. Conveying systems.
8. Electrical wiring systems.
9. Operating systems of special construction in Division 13 Sections.

C. **Miscellaneous Elements:** Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

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

D. **Visual Requirements:** Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. **Cutting and Patching Conference:** Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

## 1.5 WARRANTY

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

## **PART 2 - PRODUCTS**

### 2.1 MATERIALS

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

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

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

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
  - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
  - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

#### 3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.

5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
  2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

**END OF SECTION 017329**

SECTION 017419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
  - 1. Salvaging non-hazardous construction waste.
  - 2. Recycling non-hazardous construction waste.
  - 3. Disposing of non-hazardous construction waste.
- B. Related Sections include the following:
  - 1. Division 01 Section "Temporary Facilities and Controls" for environmental-protection measures during construction
  - 2. Division 31 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.
  - 3. Division 04 Section "Unit Masonry" for disposal requirements for masonry waste.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction operations. Construction waste includes packaging.
- B. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- D. Salvage: Recovery of construction waste and subsequent sale or reuse in another facility.
- E. Salvage and Reuse: Recovery of construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE GOALS

- A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 50 percent by weight of total waste generated by the Work.
- B. Salvage/Recycle Goals: Owner's goal is to salvage and recycle as much nonhazardous construction waste as possible including the following materials:
- C. Salvage/Recycle Goals: Owner's goal is to salvage and recycle as much non-hazardous construction waste as possible. Owner has established minimum goals for the following materials:
  - 1. Construction Waste:
    - a. Site-clearing waste.
    - b. Masonry and CMU.
    - c. Lumber.
    - d. Wood sheet materials.
    - e. Wood trim.
    - f. Metals.
    - g. Roofing.
    - h. Insulation.
    - i. Carpet and pad.
    - j. Gypsum board.
    - k. Piping.
    - l. Electrical conduit.
    - m. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
      - 1) Paper.
      - 2) Cardboard.
      - 3) Boxes.
      - 4) Plastic sheet and film.
      - 5) Polystyrene packaging.
      - 6) Wood crates.
      - 7) Plastic pails.

1.5 SUBMITTALS

- A. Waste Management Plan: General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan. Submit 3 copies of plan within 30 days of date established for the Notice to Proceed.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit 3 copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

**PART 2 - PRODUCTS - (Not Used)**

**PART 3 - EXECUTION**

3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
  - 1. Comply with Division 01 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
  - 1. Distribute waste management plan to everyone concerned within 3 days of submittal return.
  - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
  - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
    - a. Inspect containers and bins for contamination and remove contaminated materials if found.
  - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
  - 4. Store components off the ground and protect from the weather.
  - 5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees.

1. Comply with requirements in Division 32 Section "Plants" for use of chipped organic waste as organic mulch.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
  - a. Comply with requirements in Division 32 Section "Plants" for use of clean sawdust as organic mulch.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

D. Disposal: Transport waste materials off Owner's property and legally dispose of them.

**END OF SECTION 017419**



SECTION 017700

CLOSEOUT PROCEDURES

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Inspection procedures.
  - 2. Warranties.
  - 3. Final cleaning.
- B. Related Sections include the following:
  - 1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
  - 2. Division 01 Section "Execution" for progress cleaning of Project site.
  - 3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 4. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 5. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
  - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
  - 2. Advise Owner of pending insurance changeover requirements.
  - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

5. Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

#### 1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Contractor. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

**1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)**

- A. Preparation: Submit list of incomplete items. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  - 1. Organize list of spaces in sequential order by Area Plan Designations, starting with exterior areas first and proceeding from lowest floor to highest floor.
  - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, doors and frames, equipment, and building systems.
  - 3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Page number.

**1.6 WARRANTIES**

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
  - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11 inch paper.
  - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
  - 1. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.
    - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
    - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials.

- Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- k. Remove labels that are not permanent.
  - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
    - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
  - m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - n. Replace parts subject to unusual operating conditions.
  - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
  - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - q. Clean ducts, blowers, and coils if units were operated without filters during construction.
  - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
  - s. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.
- E. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Construction Waste Management and Disposal."

**END OF SECTION 017700**



SECTION 017823

OPERATION AND MAINTENANCE DATA

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, subsystems, and equipment.
  - 4. Maintenance manuals for the care and maintenance of products, materials, systems and equipment.
- B. Related Sections include the following:
  - 1. Division 1 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
  - 2. Division 1 "Closeout Procedures" for submitting operation and maintenance manuals.
  - 3. Division 1 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
  - 4. Divisions 2 through 33 for specific operation and maintenance manual requirements for products in those Sections.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

- A. Submit one (1) copies of each manual at least fifteen (15) days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

## **PART 2 - PRODUCTS**

### **2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY**

- A. Organization: Include a section in the directory for each of the following:
  - 1. List of documents.
  - 2. List of systems.
  - 3. List of equipment.
  - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with the same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

### **2.2 MANUALS, GENERAL**

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.
  - 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
  - 1. Subject matter included in manual.
  - 2. Name and address of Project.
  - 3. Name and address of Owner.
  - 4. Date of submittal.
  - 5. Name, address, and telephone number of Construction Manager.
  - 6. Name and address of Architect.
  - 7. Cross-reference to related systems in other operation and maintenance manuals.



- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
  - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
  - 1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
  - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  - 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
  - 4. Supplementary Text: Prepared on 8-1/2-by-11-inch, 20-lb/sq. ft. , white bond paper.
  - 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
  - 1. Type of emergency.
  - 2. Emergency instructions.
  - 3. Emergency procedures.

- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  - 1. Fire.
  - 2. Flood.
  - 3. Gas leak.
  - 4. Water leak.
  - 5. Power failure.
  - 6. Water outage.
  - 7. System, subsystem, or equipment failure.
  - 8. Chemical release or spill.
  
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
  
- D. Emergency Procedures: Include the following, as applicable:
  - 1. Instructions on stopping.
  - 2. Shutdown instructions for each type of emergency.
  - 3. Operating instructions for conditions outside normal operating limits.
  - 4. Required sequences for electric or electronic systems.
  - 5. Special operating instructions and procedures.

## 2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  - 1. System, subsystem, and equipment descriptions.
  - 2. Performance and design criteria if Construction Manager is delegated design responsibility.
  - 3. Operating standards.
  - 4. Operating procedures.
  - 5. Operating logs.
  - 6. Wiring diagrams.
  - 7. Control diagrams.
  - 8. Piped system diagrams.
  - 9. Precautions against improper use.
  - 10. License requirements including inspection and renewal dates.
  
- B. Descriptions: Include the following:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Equipment identification with serial number of each component.
  - 4. Equipment function.
  - 5. Operating characteristics.
  - 6. Limiting conditions.
  - 7. Performance curves.

8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
  2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
  5. Instructions on stopping.
  6. Normal shutdown instructions.
  7. Seasonal and weekend operating instructions.
  8. Required sequences for electric or electronic systems.
  9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## 2.5 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
  2. Manufacturer's name.
  3. Color, pattern, and texture.
  4. Material and chemical composition.
  5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
  2. Types of cleaning agents to be used and methods of cleaning.
  3. List of cleaning agents and methods of cleaning detrimental to product.
  4. Schedule for routine cleaning and maintenance.
  5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in the manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  - 1. Standard printed maintenance instructions and bulletins.
  - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - 3. Identification and nomenclature of parts and components.
  - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  - 1. Test and inspection instructions.
  - 2. Troubleshooting guide.
  - 3. Precautions against improper maintenance.
  - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - 5. Aligning, adjusting, and checking instructions.
  - 6. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
  - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

### **PART 3 - EXECUTION**

#### **3.1 MANUAL PREPARATION**

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
  - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
  - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.

2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."
- G. Comply with Division 1 Section "Closeout Procedures" for the schedule for submitting operation and maintenance documentation.

**END OF SECTION 017823**

SECTION 017839

PROJECT RECORD DOCUMENTS

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
1. Record Drawings.
  2. Record Specifications.
  3. Record Product Data.
- B. Related Sections include the following:
1. Division 01 Section "Closeout Procedures" for general closeout procedures.
  2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  3. Divisions 02 through 33 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
1. Initial Submittal: Submit one copy of marked-up Record Prints. Print each Drawing, whether or not changes and additional information were recorded. Architect will review and mark whether general scope of changes is acceptable. Architect will return prints for organizing into sets for printing, binding and final submittal.
  2. Final Submittal
    - a. Reproduce and submit two full size sets of Record Drawing. Bind one set with a durable cover and binding. Submit second set unbound.
    - b. Submit 3 labeled copies of scanned drawings in PDF format on CD or DVD storage medium.
- B. Record Specifications:
1. Submit one marked copy of Project's Specifications, including addenda and contract modifications.
  2. Submit 3 labeled copies in CD or DVD format. Specification files may be combined on a common disc with drawings.

- C. Record Product Data: Submit one copy of each Product Data submittal.
  - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

## PART 2 - PRODUCTS

### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of black-line white prints of the Contract Drawings and Shop Drawings.
  - 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an understandable drawing technique.
    - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
  - 2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Construction Change Directive.
    - k. Changes made following Architect's written orders.
    - l. Details not on the original Contract Drawings.
    - m. Field records for variable and concealed conditions.
    - n. Record information on the Work that is shown only schematically.
  - 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
  - 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.



6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable. Where supplemental drawings were issued to illustrate a change in the work, it is acceptable to paste applicable drawings onto the original print.
- B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect.
    - e. Name of Contractor.
  3. Scan drawings to create Adobe Acrobat PDF files for each drawing sheet with file names matching drawing titles.
  4. Organize marked "originals" into manageable sets and submit with sheets not bound, ready for filing.

## 2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
  5. Note related Change Orders and Supplemental Instructions and Record Drawings where applicable.
  6. Scan record specifications to create Adobe Acrobat PDF files for each specification with file names matching specification titles.

## 2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

**PART 3 - EXECUTION**

**3.1 RECORDING AND MAINTENANCE**

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's and Construction Manager's reference during normal working hours.

**END OF SECTION 017839**

SECTION 018110

SUSTAINABLE DESIGN REQUIREMENTS

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general requirements and procedures for compliance with certain U.S. Green Building Council's (USGBC) LEED prerequisites and credits selected for incorporation into the project and its construction process.
- B. Related Sections include the following:
  - 1. Divisions 01 through 33 Sections for LEED requirements specific to the Work of each of those Sections. These requirements may or may not include reference to LEED.

1.3 DEFINITIONS

- A. Certificates of Chain-of-Custody: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria." Certificates shall include evidence that mill is certified for chain-of-custody by an FSC-accredited certification body.
- B. LEED: Leadership in Energy & Environmental Design.
- C. Rapidly Renewable Materials: Materials made from agricultural products that are typically harvested within a ten-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.
- D. Regionally Manufactured Materials: Materials that are manufactured within a radius of 500 miles (800 km) from the Project location. Manufacturing refers to the final assembly of components into the building product that is installed at the Project site.
- E. Regionally Extracted, Harvested, or Recovered Materials: Materials that are extracted, harvested, or recovered and manufactured within a radius of 500 miles (800 km) from the Project site.
- F. Recycled Content: The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer).

1. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.
2. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.

#### 1.4 SUBMITTALS

- A. General: Submit additional LEED submittal requirements included in other sections of the Specifications.
- B. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.
- C. LEED Action Plans: Provide preliminary submittals within 30 days of date established for commencement of work indicating how the following requirements will be met.
  1. Credit MR 2.1 and 2.2: Waste management plan complying with Division 01 Section "Construction Waste Management and Disposal."
  2. Credit MR 4.1 and 4.2: List of proposed materials with recycled content.
    - a. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
  3. Credit MR 5.1 and 5.2: List of proposed regionally manufactured materials.
    - a. Identify each regionally manufactured material, its source, and cost.
  4. Credit MR 7.0: List of proposed certified wood products.
    - a. Indicate each product containing certified wood, its source, and cost.
    - b. Include statement indicating total cost for wood-based materials used for Project, including non-rented temporary construction.
  5. Credit EQ 3.1: Construction indoor air quality management plan. Include the "during construction" phase and the "after construction, before occupancy" phase.

## **PART 2 - PRODUCTS**

### 2.1 RECYCLED CONTENT OF MATERIALS

- A. Credit MR 4.1: Provide building materials with recycled content such that the sum of the post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the Project.

1. The cost of post-consumer recycled content of an item shall be determined by dividing the weight of post-consumer recycled content in the item by the total weight of the item and multiplying by the cost of the item.
2. The cost of post consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing the weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by the total weight of the item and multiplying by the cost of the item.
3. Do not include mechanical and electrical components in the calculation.
4. Recycled content of materials shall be defined according to the Federal Trade Commission's "Guide for the Use of Environmental Marketing Claims," 16 CFR 260.7 (e).

## 2.2 REGIONAL MATERIALS

- A. Credit MR 5.1: Provide 20 percent of building materials (by cost) that are regionally manufactured materials.

## 2.3 CERTIFIED WOOD

- A. Credit MR 7.0: Provide a minimum of 50 percent (by cost) of wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."
  1. Wood-based materials include but are not limited to the following materials when made from made wood, engineered wood products, or wood-based panel products:
    - a. Rough carpentry.
    - b. Miscellaneous carpentry.
    - c. Architectural woodwork.
    - d. Wood cabinets.
    - e. Non-rented temporary construction, including bracing, concrete formwork, pedestrian barriers, and temporary protection.

## 2.4 LOW-EMITTING MATERIALS

- A. Credit EQ 4.1: For interior applications use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24):
  1. Wood Glues: 30 g/L.
  2. Metal to Metal Adhesives: 30 g/L.
  3. Adhesives for Porous Materials (Except Wood): 50 g/L.
  4. Subfloor Adhesives: 50 g/L.
  5. Plastic Foam Adhesives: 50 g/L.
  6. Carpet Adhesives: 50 g/L.
  7. Carpet Pad Adhesives: 50 g/L.
  8. VCT and Asphalt Tile Adhesives: 50 g/L.
  9. Cove Base Adhesives: 50 g/L.

10. Gypsum Board and Panel Adhesives: 50 g/L.
11. Rubber Floor Adhesives: 60 g/L.
12. Multipurpose Construction Adhesives: 70 g/L.
13. Fiberglass Adhesives: 80 g/L.
14. Wood Flooring Adhesive: 100 g/L.
15. Contact Adhesive: 250 g/L.
16. ABS Welding Compounds: 400 g/L.
17. CPVC Welding Compounds: 490 g/L.
18. PVC Welding Compounds: 510 g/L.
19. Adhesive Primer for Plastic: 650 g/L.
20. Sealants: 250 g/L.
21. Single-Ply Roof Membrane Adhesives: 450 g/L.
22. Sealant Primers for Nonporous Substrates: 250 g/L.
23. Sealant Primers for Porous Substrates: 775 g/L.
24. Modified Bituminous Sealant Primers: 500 g/L.

B. Credit EQ 4.2: For interior applications use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the following chemical restrictions:

1. Flat Paints and Coatings: VOC not more than 50 g/L.
2. Non-Flat Paints and Coatings: VOC not more than 150 g/L.
3. Anti-Corrosive Coatings: VOC not more than 250 g/L.
4. Varnishes and Sanding Sealers: VOC not more than 350 g/L.
5. Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.
6. Dry-Fog Coatings: VOC not more than 400 g/L.
7. Stains: VOC not more than 250 g/L.
8. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
9. Restricted Components: Paints and coatings shall not contain any of the following:
  - a. Acrolein.
  - b. Acrylonitrile.
  - c. Antimony.
  - d. Benzene.
  - e. Butyl benzyl phthalate.
  - f. Cadmium.
  - g. Di (2-ethylhexyl) phthalate.
  - h. Di-n-butyl phthalate.
  - i. Di-n-octyl phthalate.
  - j. 1,2-dichlorobenzene.
  - k. Diethyl phthalate.
  - l. Dimethyl phthalate.
  - m. Ethylbenzene.
  - n. Formaldehyde.
  - o. Hexavalent chromium.
  - p. Isophorone.
  - q. Lead.
  - r. Mercury.
  - s. Methyl ethyl ketone.

- t. Methyl isobutyl ketone.
- u. Methylene chloride.
- v. Naphthalene.
- w. Toluene (methylbenzene).
- x. 1,1,1-trichloroethane.
- y. Vinyl chloride.

- C. Credit EQ 4.4: Do not use composite wood and agrifiber products that contain urea-formaldehyde resin.

### **PART 3 - EXECUTION**

#### **3.1 CONSTRUCTION WASTE MANAGEMENT**

- A. Credit MR 2.1 and 2.2: Comply with Division 01 Section "Construction Waste Management and Disposal."

#### **3.2 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT**

- A. Credit EQ 3.1: Comply with SMACNA IAQ Guideline for Occupied Buildings under Construction.
  - 1. If Owner authorizes the use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 01 Section "Temporary Facilities and Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
  - 2. Replace all air filters immediately prior to occupancy or building flush-out.
  - 3. Replacement air filters shall have a MERV 13 according to ASHRAE 52.2.
- B. Credit EQ 3.2:
  - 1. Conduct a two-week building air flush-out after construction ends with new air filters and 100 percent outdoor air. Replace air filters after building air flush-out. Replacement air filters shall have a MERV 13 according to ASHRAE 52.2.
  - 2. Owner may engage an independent testing and inspecting agency to conduct a baseline indoor air quality testing program according to EPA Protocol for Environmental Requirements, Baseline IAQ and Materials, for Research Triangle Park Campus, Section 01445.

**END OF SECTION 018110**





SECTION 019113

GENERAL COMMISSIONING REQUIREMENTS

**PART 1 - GENERAL**

1.1 SUMMARY

- A. This Section specifies project commissioning requirements. Commissioning efforts are intended to serve as the link between design intent and the final delivered building product.
- B. Scope of Commissioning Efforts: Commissioning scope is limited to the following systems, including their life safety, electrical, plumbing and related interfaces:
  - 1. Heating, Ventilating and Air Conditioning Systems, (HVAC), and controls.

The objective of commissioning these systems is to provide documented confirmation they fulfill the functional and performance requirements set forth by the design engineer and the building owner, occupants, and operators.

1.2 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to;
  - 1. Division 23 Sections for mechanical systems and equipment being commissioned.
  - 2. Division 28 Sections for electrical and fire alarm system requirements for interface with mechanical equipment being commissioned.
  - 3. Division 26 Sections for electrical systems and equipment being commissioned.

1.3 COMMISSIONING TEAM

- A. General: The Commissioning Team shall consist of the following parties.
  - 1. Owner Representative: Mike Marino
  - 2. Architect : SMRT, Inc. (AE)
  - 3. Construction Manager Advisor: Ledgewood Construction (CM)
  - 4. Commissioning Authority: SMRT (CA)
  - 5. Mechanical Designer/Contractor (MC)
  - 6. Controls Contractor
  - 7. Testing, Adjusting and Balancing Contractor
  - 8. Electrical Designer/Contractor (EC)

1.4 QUALITY ASSURANCE

- A. BCA: Commissioning procedures shall comply with the Building Commissioning Association's Essential Attributes.

- B. ASHRAE: Commissioning procedures shall comply with the intent outlined in the American Society of Heating, Refrigerating and Air Conditioning Engineers Guideline 0.

**1.5 ROLES, RESPONSIBILITIES AND LINES OF COMMUNICATION**

- A. General: The following roles and responsibilities are assigned to each member of the Commissioning Team.
- B. Owner:
  - 1. The Owner holds the responsibility of authorizing / not authorizing the AE and Mechanical Contractor to make document and construction modifications based on Commissioning Authority correspondence.
- C. Construction Manager Advisor, (CM):
  - 1. The CM will receive and distribute all communications between parties.
- D. Commissioning Authority, (CA):
  - 1. The Commissioning Authority will generate and maintain a commissioning plan for their services.
  - 2. The Commissioning Authority will direct all correspondence to Owner and transmit all communications through the CM.
  - 3. The Commissioning Authority will courtesy copy correspondence to the AE.
  - 4. The Commissioning Authority will lead commissioning related meetings and will keep minutes of these meetings.
  - 5. The Commissioning Authority will perform verification and oversight functions, as well as track these verifications.
  - 6. The Commissioning Authority will generate functional performance documents for the project, based on approved controls sequences and project design criteria.
- E. Mechanical Designer/Contractor:
  - 1. The Mechanical Contractor will provide a Basis of Design narrative for mechanical systems being commissioned, (RE: section 230000).
  - 2. The Mechanical Contractor shall include the cost of associated commissioning efforts in their contract price.
  - 3. The Mechanical Contractor will insure that start-up, O&M requirements of this project are included in each equipment purchase order or service sub-contract. The Mechanical Contractor is responsible for compiling and presenting this data in a form consistent with the requirements of this project.
  - 4. The Mechanical Contractor will work with equipment suppliers to provide manufacturer's standard pre-functional and basic start-up checklists for equipment being commissioned.
  - 5. The Mechanical Contractor will provide timely responses to Commissioning Authority generated construction oversight issues. The Mechanical Contractor will maintain a tracking log of these issues and will periodically issue this log to Owner and the CA such that the status of these issues can be tracked.
  - 6. The Mechanical Contractor will provide timely responses to commissioning related issues.
  - 7. The Mechanical Contractor will make project shop drawings, RFI's, addenda, bulletins, drawing revisions and similar documentation available to the Commissioning Authority

at the field construction office upon request. The Mechanical Contractor will provide hard copies of select documents as well, (if extended off-site review becomes necessary).

8. The Mechanical Contractor will conduct a review of the Testing/Balancing Contractor report against design requirements.
9. The Mechanical Contractor will direct all commissioning related correspondence to Owner and transmit all communications through the CM.

**F. Controls Contractor:**

1. The Controls Contractor shall include the cost of associated commissioning efforts in their contract price.
2. The Controls Contractor will be a sub-contract to the Mechanical Contractor. As such, the Controls Contractor will direct all commissioning related correspondence to the Mechanical Contractor.
3. The Controls Contractor will coordinate efforts with the Mechanical Contractor, Electrical Contractor, Commissioning Authority and Testing/Balancing Contractor.
4. The Controls Contractor will insure that start-up, O&M requirements of this project are included in each equipment purchase order or service sub-contract. The Controls Contractor is responsible for compiling and presenting this data in a form consistent with the requirements of this project.
5. The Controls Contractor will demonstrate performance and adherence to sequences of operation for equipment and systems being commissioned in the presence of, and participating with the Commissioning Authority.
6. The Controls Contractor will provide timely responses to construction oversight comments.
7. The Controls Contractor will participate in, and provide timely responses to start-up verification and closeout issues.
8. The Controls Contractor will participate in, and expedite actions required by post-occupancy commissioning efforts.

**G. Testing, Adjusting and Balancing Contractor:**

1. The Testing/Balancing Contractor will direct all correspondence to the Mechanical Contractor.
2. The Testing/Balancing Contractor will coordinate efforts with the Mechanical Contractor, Electrical Contractor, Controls Contractor and Commissioning Authority.
3. Upon completion of the Testing/Balancing Contractor work, the Testing/Balancing Contractor will coordinate with the Controls Contractor to demonstrate performance of equipment and systems to Owner, Mechanical Contractor, and the Commissioning Authority.
4. The Testing/Balancing Contractor will repeat any measurement contained in the Testing/Balancing Contractor report, where required by Owner, or the Commissioning Authority for verification purposes.
5. The Testing/Balancing Contractor will participate in, and provide timely responses to start-up verification and closeout issues.

**H. Electrical Contractor:**

1. The Electrical Contractor shall include the cost of commissioning efforts in their contract price.
2. The Electrical Contractor will direct all commissioning related correspondence to the Owner and transmit all communications through the CM.
3. The Electrical Contractor will insure that start-up, O&M requirements of this project are included in each equipment purchase order or service sub-contract. The Electrical

Contractor is responsible for compiling and presenting this data in a form consistent with the requirements of this project

4. The Electrical Contractor will provide timely responses to construction oversight comments.
5. The Electrical Contractor will participate in, and provide timely responses to start-up verification and closeout issues.

#### 1.6 SUBMITTALS

- A. General: The following actions shall be made part of project submittal and close out activities, in support of the commissioning process.
- B. Pre-Construction Submittals: At the time of initial equipment submittal, each submittal shall include pre-functional / basic start-up checklists. These checklists shall be as provided by the original equipment manufacturers, (OEM).
- C. Submittals During Construction: As project close out milestones are reached, each activity shall be documented and signed off by the appropriate parties. Copies of documents shall be made available to the CA.
  1. Pre-Start Up: The contractor shall prepare and complete pre-start up reports based on project manual requirements, (pressure tests, AHJ inspections, etc.).
  2. Pre-Functional / Basic Start-Up: The contractor shall work in conjunction with the equipment suppliers and representatives to complete manufacturer's standard pre-operational checks and checks of equipment operation under manual control.
  3. Functional Performance: The Mechanical Contractor shall provide an approved copy of the controls submittal to the CA for use in preparing functional performance verifications documents.
- D. Project Close Out Submittals:
  1. O&M Manuals and Record Drawings: Provide per other sections of this manual.

#### 1.7 FUNCTIONAL VERIFICATION PERFORMANCE DOCUMENTATION

- A. The Commissioning Authority will generate project specific functional performance documents. These forms will be based on approved controls sequences and operating parameters defined in appropriate trade specifications.
- B. The Mechanical Contractor, Electrical Contractor, Controls Contractor and Testing/Balancing Contractor will work with the Commissioning Authority to demonstrate the performance of commissioned systems and their components. Successful demonstration as well as deficiencies will be recorded on the functional performance forms by the Commissioning Authority. The Commissioning Authority and appropriate parties will sign the completed forms.

#### 1.8 MECHANICAL CONTRACTOR CLOSE OUT SCHEDULING

- A. General: The Mechanical Contractor shall provide as much advance notice as possible to the Commissioning Authority such that the Commissioning Authority may schedule on-site verifications and witnessing.

**PART 2 - PRODUCTS (not used)**

**PART 3 - EXECUTION**

3.1 OBSERVATION AND VERIFICATION REQUIREMENTS

- A. General: The CA shall verify performance of the systems identified in Part 1 of this section according to the following minimum sample rates, in terms of percentage of system components verified.
- B. HVAC Systems:
- |   |      |
|---|------|
| 1. Gas-fired Boilers and Associated Equipment | 100% |
| 2. Pumps                                      | 100% |
| 3. Air handling Units                         | 100% |
| 4. Ventilation and Exhaust Fans               | 25%  |
| 5. Humidifiers                                | 100% |
| 6. VFD's                                      | 100% |
| 7. Air Terminal Units                         | 25%  |
| 8. Ductwork                                   | 50%  |
| 9. Piping                                     | 25%  |
- C. Building Automation Systems:
- |                                     |      |
|-------------------------------------|------|
| 1. Temperature / Humidity Sensors   | 100% |
| 2. Pressure Sensors and Controllers | 100% |
| 3. Sequence of Operation            | 100% |
| 4. Airflow Stations                 | 100% |
| 5. Damper / Valve Actuators         | 100% |

3.2 COMMISSIONING APPROACH

- A. General: The Commissioning process will consist of three general phases. The CA shall provide commissioning services for each phase as called for in the CA Request for Proposals, and as summarized herein.
1. Design / Bid Phase Commissioning Services.
  2. Construction and Acceptance Phase Commissioning Services.
  3. Post Occupancy Commissioning Services.
- B. Design / Bid Phase:
1. CA to generate and maintain a commissioning plan.
  2. CA to perform a comprehensive review of the 100% construction documents, with focus of commissioned systems.
- C. Construction and Acceptance Phase:
1. CA to conduct a kick-off meeting.
  2. CA shall periodically visit the construction site to confirm compliance with the construction documents, good industry practices and manufacturer's requirements.
  3. CA will provide informal review of submittals of components of commissioned systems as appropriate.

4. CA will verify the completion and documentation of pre-start up and basic operational activities.
  5. CA will verify the functional performance of systems under building management control. The CA will document these activities.
    - a. Verifications to be conducted on all commissioned systems, (with seasonal conditions providing for optimal operation of facility heating systems).
  6. CA will verify the completion and documentation of project close documentation, including record drawings and O&M manuals.
  7. CA to maintain an issues log and shall provide an outstanding issues report near the time of contractor request for substantial completion. CA to provide follow up verification of completion of these issues.
- D. Post Occupancy Phase:
1. CA to schedule and verify functional performance of facility cooling systems during the cooling season following substantial completion / occupancy.
  2. CA to review operational concerns with the Owner's maintenance staff 10 months into the one year warrantee period. Assist the Owner in developing plans of action for remedying performance issues.
  3. CA to provide an outstanding issues report for seasonal and operational issues. CA to provide follow up verification of completion of these issues

**END OF SECTION 019113**

SECTION 024119

SELECTIVE DEMOLITION

**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. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Coordination with utility companies for removal of utility company equipment.

B. Related Requirements:

1. Division 01 Section "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Division 01 Section "Cutting and Patching" for cutting and patching procedures.
3. Division 31 Section "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- C. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
1. Utility company equipment not the property of the Owner remains the property of the utility company.

**1.5 PREINSTALLATION MEETINGS**

**A. Predemolition Conference:**

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review sequence of work and its coordination with the Contractor's shoring and bracing plan.
4. Review status of hazardous materials by Owner's separate contractor if applicable.
5. Review access to site for work, schedule, sequence of the work, and coordination with other work on site.
6. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
7. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
8. Review utility company equipment to be removed, contacts made with utility companies, and schedule for removal.
9. Review areas where existing construction is to remain and requires protection.

**1.6 INFORMATIONAL SUBMITTALS**

**A. Qualification Data: For refrigerant recovery technician.**

**B. 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.**

**C. 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.
2. Coordination for shutoff, capping, and continuation of utility services.

**D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.**

**E. Predemolition Photographs or Video: Submit before Work begins.**

**1.7 CLOSEOUT SUBMITTALS**

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

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



**1.8 FIELD CONDITIONS**

- A. Salvage
  - 1. Before selective demolition, remove the following items:
    - a. Security alarm control panel.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials:
  - 1. Hazardous materials will be removed by Owner before start of the Work.
  - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. 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 as directed by the Authority Having Jurisdiction.
  - 2. Coordinate with Owner for termination of utility services when required. Owner will authorize work to be performed by utility companies providing services to site. Remove equipment abandoned by utility companies subsequent to disconnection.

**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 ANSI/ASSE A10.6 and NFPA 241.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

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

- B. Review documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in documents. Notify the Architect of any discrepancy.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Survey of Existing Conditions: Record existing conditions by use of measured drawings, and preconstruction photographs.
  - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage 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 indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. 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 as required for temporary heat.
  - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components.
    - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

### 3.3 PREPARATION

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

1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent facilities to remain.
  1. 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.
  2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  3. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  1. Strengthen or add new supports when required during progress of selective demolition.

#### 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 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, to minimize disturbance of adjacent surfaces. 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 adequate ventilation when using cutting torches.
  6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  8. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."
- B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store in protected area until required for reinstallation.

- C. 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, 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. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
1. Asbestos may exist within some existing flooring products. Report any materials found that appear suspect.

### 3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
  4. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

### 3.7 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.

3.8 SELECTIVE DEMOLITION SCHEDULE

- A. Existing Items to Be Removed: Refer to drawings.
- B. Existing Items to Be Removed and Reinstalled: None.
- C. Existing Items to Remain: Do not remove piping or electrical cabling serving adjacent properties/tenants. Coordinate for interruptions of services as specified in Division 1 Section "Summary" where required to modify existing connections for the work of this project. Refer to drawings for other items to remain.

**END OF SECTION 024119**



SECTION 033000

CAST-IN-PLACE CONCRETE

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Post footings.
  - 2. Slabs-on-grade.
  - 3. Foundation walls.
  - 4. Exterior concrete associated with sitework.
- B. Related Sections include the following:
  - 1. Division 07 Section "Joint Sealants".
  - 2. Division 31 Section "Earth Moving" for structural fill under slabs-on-grade.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

- A. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, vapor retarder, protective coating, sealer, and others if requested by Architect.
  - 1. Submit a letter from the manufacturer of the curing compound certifying that the curing compound will not inhibit the bond of successive floor treatments.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4.1 and Credit MR 4.2: 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. Testing Agency Qualifications: If the trial batch method is used to design concrete mixes, testing shall be performed by an independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
  - 1. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
  
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
  
- E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specification for Structural Concrete."
  - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
  - 3. ACI 318, "Building Code Requirements for Structural Concrete."
  - 4. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
  
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
  - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Concrete subcontractor.
    - e. Testing agency responsible for field quality control.
    - f. Design architect or engineer.
  
  - 2. Review testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, joint-filler strips, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurements, concrete curing and protection.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

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



2. Design Mixtures for Credit ID 1.1: For each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements and for equivalent concrete mixtures that do not contain portland cement replacements.
- C. Concrete Mix Design: Submit proposed design mixes for each different type and strength of concrete to be used. Provide separate mix designs for any change in ingredients. Include the following items:
1. Mix proportions for all ingredients of the mix. Designate within the submittal where each mix is proposed to be used. Proportions shall be established by one of the following methods in accordance with ACI 301.
    - a. Field experience.
    - b. Trial batch
    - c. Water/cement ratios specified in this section.
  2. Cement type.
  3. Aggregate gradations taken within 3 months from the date of submission. Specify size of coarse aggregate in accordance with ASTM size numbers.
  4. Provide data for all proprietary items incorporated into the mix including, but not limited to admixtures.
  5. Compressive strength results from an independent testing laboratory for mixes designed in accordance with trial batch or field experience methods.
    - a. Trial batches shall be tested within 12 months from the date of submission.
    - b. Submit quantity of tests in accordance with ACI 301. Note that mix designs developed in accordance with the field experience method must include a minimum of 30 consecutive tests, with an allowance for 10 to 30 consecutive tests with a higher average strength required.
    - c. Slump and air content shall be consistent with specifications for this project within tolerances specified within ACI 301.
- D. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
- E. Manufacturer Certification: Submit verification of the certification of the concrete supplier for compliance with paragraph 1.5.B.1.
- F. Minutes of preinstallation conference.
- 1.5 QUALITY ASSURANCE
- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
  - 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

### 2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  - 1. Medium-density overlay, class 1 or better; mill-release agent treated and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
  - 1. Coated paper tubes may be utilized to form post piers.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
  - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
  - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.

### 2.3 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus on-half of preconsumer recycled content is not less than 25 percent.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

- C. Plain-Steel Wire: ASTM A 82, as drawn.
- D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

#### 2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut bars 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, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete 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.

#### 2.5 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. Portland Cement: ASTM C 150, Type I, Type II, or Type I/II, gray:
    - a. Fly Ash: ASTM C 618, Class C or F.
    - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
  - 1. Maximum Coarse-Aggregate Size: Comply with the size limits in ACI 301.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M and potable.

#### 2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

## 2.7 VAPOR RETARDER

- A. Plastic Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
  1. Available Products:
    - a. Fortifiber Corporation; Moistop Ultra A.
    - b. Raven Industries, Inc.; Vapor Block 15
    - c. Stego Industries, LLC; Stego Wrap, 15 mils.

## 2.8 FLOOR AND SLAB TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.
  1. Available Products:
    - a. Burke by Edoco; Titan Hard.
    - b. ChemMasters; Chemisil Plus.
    - c. ChemTec International; ChemTec One.
    - d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
    - e. Curecrete Distribution Inc.; Ashford Formula.
    - f. Dayton Superior Corporation; Day-Chem Sure Hard.
    - g. Euclid Chemical Company (The); Euco Diamond Hard.
    - h. Kaufman Products, Inc.; SureHard.
    - i. L&M Construction Chemicals, Inc.; Seal Hard.
    - j. Meadows, W. R., Inc.; Liqui-Hard.
    - k. Metalcrete Industries; Floorsaver.
    - l. Nox-Crete Products Group, Kinsman Corporation; Duranox.
    - m. Symons Corporation, a Dayton Superior Company; Buff Hard.
    - n. US Mix Products Company; US Spec Industraseal.
    - o. Vexcon Chemicals, Inc.; Vexcon StarSeal PS.

- B. Sealer (Protective Coating) for Exterior Slabs: Consolideck Saltguard from Prosoco, Inc., or an approved equal.

## 2.9 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
  1. Available Products:

- a. Axim Concrete Technologies; Cimfilm.
  - b. Burke by Edoco; BurkeFilm.
  - c. ChemMasters; Spray-Film.
  - d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
  - e. Dayton Superior Corporation; Sure Film.
  - f. Euclid Chemical Company (The); Eucobar.
  - g. Kaufman Products, Inc.; Vapor Aid.
  - h. Lambert Corporation; Lambco Skin.
  - i. L&M Construction Chemicals, Inc.; E-Con.
  - j. MBT Protection and Repair, Div. of ChemRex; Confilm.
  - k. Meadows, W. R., Inc.; Sealtight Evapre.
  - l. Metalcrete Industries; Waterhold.
  - m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
  - n. Sika Corporation, Inc.; SikaFilm.
  - o. Symons Corporation, a Dayton Superior Company; Finishing Aid.
  - p. Unitex; Pro-Film.
  - q. US Mix Products Company; US Spec Monofilm ER.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
1. Available Products:
    - a. Burke by Edoco; Spartan Cote WB II 20 Percent.
    - b. ChemMasters; Safe-Cure Clear.
    - c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; High Seal.
    - d. Dayton Superior Corporation; Safe Cure and Seal (J-19).
    - e. Euclid Chemical Company (The); Diamond Clear VOX.
    - f. Kaufman Products, Inc.; SureCure Emulsion.

## 2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
  - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

## 2.11 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
  - 4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
  - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

## 2.12 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture, field test data, or default water-cement ratio given below, according to ACI 301.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. When acceptable data is not available for either field experience or trial batch design methods, provide normal weight concrete with the following properties:
  - 1. 4000 psi 28-day compressive strength; water-cement ratio, 0.44 maximum (non-air entrained), 0.35 maximum (air-entrained).

- C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  - 1. Fly Ash: 25 percent.
  - 2. Combined Fly Ash and Pozzolan: 25 percent.
  - 3. Ground Granulated Blast-Furnace Slag: 50 percent.
  - 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing or high-range water-reducing admixtures in concrete, as required, for placement and workability.
  - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  - 3. Use high range water-reducing admixture in 4000 psi, air entrained concrete, unless otherwise approved in mix designs prepared by trial batch or field experience methods.
  - 4. Use air entraining admixture in perimeter foundations, exterior slabs, and other locations where concrete will be exposed to freeze-thaw cycles.
- F. Air Content: Add air-entraining admixture to concrete exposed to freeze-thaw conditions at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5 percent, unless otherwise indicated:
  - 1. Air Content: 5.5 percent for 1-1/2-inch- (38-mm-) nominal maximum aggregate size.
  - 2. Air Content: 6 percent for 1-inch- (25-mm-) nominal maximum aggregate size.
  - 3. Air Content: 6 percent for 3/4-inch- (19-mm-) nominal maximum aggregate size.
- G. Do not air entrain normal-weight concrete to trowel-finished interior floors. Do not allow entrapped air content to exceed 3 percent.

## 2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings, Foundation walls, Piers and Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  - 2. Slump Limit: 4 inches (100 mm) or 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
  - 3. Air Content:
    - a. Do not allow air content of troweled finished interior floors to exceed 3 percent.
    - b. Provide air entrainment for exterior slabs as specified in paragraph 2.12 F.
- B. All Other Concrete: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
2. Slump Limit: 4 inches (100 mm) or 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
3. Air Content: As specified in paragraph 2.12.F. for concrete exposed to freeze-thaw conditions in service.

**2.14 FABRICATING REINFORCEMENT**

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

**2.15 CONCRETE MIXING**

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, and furnish batch ticket information. Clearly indicate on the batch ticket the time the cement is added to the mix.
1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
  2. Mixing time will be measured from the time the cement is added to the mix.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
  2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
  3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

**PART 3 - EXECUTION**

**3.1 FORMWORK**

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:



1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
  2. Class C, 1/2 inch (13 mm) for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Install keyways, reglets, recesses, and the like, for easy removal.
  2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install anchor rods and proprietary anchorage devices, accurately located, to elevations required.
    - a. Secure anchor bolts to templates before concrete placement. Do not force anchor bolts into concrete after it has begun to set.
    - b. Set post bases and other proprietary anchorage devices in fresh concrete immediately after finishing. Provide support as required to maintain the correct position.

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of walls, piers, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.4 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Inspect subgrade prior to placement of vapor retarder for conduits, and for stakes or connections that might tear or penetrate vapor retarder. Bury conduits below slab bearing surface and below vapor retarders. Adjust hazards to guard against penetrations.
  - 2. Install vapor retarders immediately below concrete slab on-grade. Install vapor retarders no earlier than 30 hours prior to concrete placement.
  - 3. Install vapor retarders with upturned or downturned edges and fastened to vertical surfaces as required to hold in-place and seal perimeter.
  - 4. Lap joints 6 inches (150mm) and seal with manufacturer's recommended tape.
  - 5. Wrap all penetrations of vapor retarders and seal to adjacent vapor retarder with tape. Tape material to penetration immediately below the top of slab.
  - 6. Inspect vapor retarders one hour prior to placement of concrete and subsequent to all slab preparatory operations. Repair all holes or tears, loosened tape on seams or joints.

### 3.5 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.
- 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.
  - 1. Support welded wire fabric on chairs or other approved methods. The use of lifting hooks to set the position of welded wire fabric is prohibited.
  - 2. The maximum spacing between welded wire fabric supports shall be 3'-0".

### 3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Provide slab construction joints at locations indicated for control joints as desirable to terminate the placement.
  - 2. Construct construction joints in accordance with details on the Drawings.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
  - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces except at pedestrian pavements.
  - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Sawcuts must be made within 12 hours of concrete placement. Do not saw joints at pedestrian pavements.
  - 3. Contraction joints may be used interchangeably with construction joints at the contractor's option.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, and other locations, as indicated.
  - 1. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
  - 2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
  - 3. At isolation joints surrounding steel columns, omit joint filler strips. Break bond with an approved material and tool edges to permit installation of joint sealant.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- C. Maintain a minimum of 2 working vibrators on the jobsite during each concrete placement.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 2. Maintain reinforcement in position on chairs during concrete placement.
  - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 4. Slope surfaces uniformly to drains where required.
  - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. Maintain the temperature of concrete above 50 deg F (10 deg C) for seven days after placement.
  - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range as follows:
    - a. 55 degrees F for sections less than 12 inches in the least dimension.
    - b. 50 degrees F for all other concrete members.
    - c. Do not exceed the minimum concrete temperatures stated above plus 20 degrees.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
4. The use of high early strength concrete, if approved, will reduce heating time to 3 days.
5. Protection of Footings against Freezing: Cover completed work at footing level with sufficient temporary or permanent cover as required to protect footings and adjacent subgrade against possibility of freezing; maintain cover for time period as necessary.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

### 3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to view on building sides other than the south side.

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

### 3.9 FINISHING FLOORS AND SLABS

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

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

1. Apply float finish to surfaces to receive trowel finish.

- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighen until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply a trowel finish to surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, sealer, or built-up epoxy flooring.
  - 2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:
    - a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
  - 1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- E. Broom Finish: Apply a broom finish to exterior concrete slabs-on-grade, steps, and elsewhere as indicated. At pedestrian pavements provide a broom finish and joints with polished edges using a groover or edger to polish slab edges.
  - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
  - 2. Using a groover with 2" sides, polish the edges of exterior pedestrian pavement slab joints.
  - 3. Using an edger with a 2" side, polish the edges of exterior pedestrian pavement slab perimeters.

### 3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

### 3.11 CONCRETE PROTECTING AND CURING

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

weather protection during curing. Maintain concrete continuously moist, with the temperature above 50 deg F (10 deg C) for seven days after placement.

- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
    - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
    - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
  - 4. Slab Protection: For slabs that are scheduled within occupied rooms to perform as the finished wearing finished floor, protect surface from construction processes and

associated materials by overlaying slab with sheet polyethylene and wood panels. Maintain protection until final cleaning.

### 3.12 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
  - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
  - 2. Do not apply to concrete that is less than 28 days' old.
  - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Protective Coating (Sealer) for Exterior Slabs: Prepare surface and apply in accordance with the manufacturer's specifications. Remove curing compound and other surface contaminants before application. Delay application until as late as practicable in the project schedule, a minimum of 28 days after concrete placement, but prior to the application of deicing salts. Apply in two (2) coats.

### 3.13 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 (1.18-mm) 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 than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. 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 Architect.



- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  2. After concrete has cured at least 14 days, correct high areas by grinding.
  3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage an inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
1. Steel reinforcement placement.
  2. Anchor bolts and proprietary anchorage devices.
  3. Verification of use of required design mixture.

4. Concrete placement, including conveying and depositing.
  5. Curing procedures and maintenance of curing temperature.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture less than 25 cu. yd. (19 cu.m.), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C 31/C 31M.
    - a. Cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C 39/C 39M; test one laboratory-cured specimen at 7 days and two specimens at 28 days. Retain the fourth specimen for testing at 56 days in the event that the 28-day strength does not attain the specified strength.
    - a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
  7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
  8. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
  9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
  10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

**END OF SECTION 033000**



SECTION 042000

UNIT MASONRY ASSEMBLIES

**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 unit masonry assemblies consisting of the following:

1. Concrete masonry units (CMUs).
2. Mortar and grout.
3. Reinforcing steel.
4. Masonry joint reinforcement.
5. Ties and anchors.
6. Embedded flashings.
7. Miscellaneous masonry accessories.

- B. Related Sections include the following:

1. Division 1 Section: "Sustainable Design Requirements" for recycled content and regionally manufactured material goals.
2. Division 1 Section: "Construction Waste Management and Disposal" for recycling and salvage of construction waste requirements.
3. Division 7 Section "Through-Penetration Firestop Systems" for firestopping at openings in interior rated masonry walls.
4. Division 7 Section "Joint Sealants" for sealing control joints in unit masonry.

- C. Products installed, but not furnished, under this Section include the following:

1. Steel lintels for unit masonry, furnished under Division 5 Section "Metal Fabrications."

1.3 DEFINITIONS

- A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following net-area compressive strengths (f'm) at 28 days. Determine compressive strength of masonry by testing masonry prisms according to ASTM C 1314:

1. For Concrete Unit Masonry:  $f'_m = 1500$  psi (10.3 MPa).

#### 1.5 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory and other manufactured product specified.
- B. Mix Designs: For each type of mortar and grout. Include aggregate gradations taken within 2 months of the submission.
- C. Preconstruction Testing Results: Perform the following preconstruction testing to verify acceptability of products proposed for use on the project. Submit test results for approval. Submitted test reports shall be dated within 2 months of the submission.
  1. Aggregate gradations for materials intended for use in mortar and grout.
  2. Concrete Masonry Unit Test: For each concrete masonry unit indicated, per ASTM C140.
  3. Prism Test: For each type of concrete masonry wall construction indicated, per ASTM C1314.
  4. Mortar Test: For each mix required, according to ASTM C 109/C 109M for compressive strength and ASTM C1506 for water retention.
  5. Grout Test: For compressive strength per ASTM C1019.
- D. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

#### 1.6 QUALITY ASSURANCE

- A. Source Limitations for Masonry Units: Obtain masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
- C. Preconstruction Testing Service: The Contractor shall engage a qualified independent testing agency to perform the specified preconstruction testing. The testing agency shall be an independent agency qualified according to ASTM C 1093 for testing indicated for each product required.
- D. Masonry Standard: comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

## 1.8 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.
- B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with the following requirements:
  - 1. Cold-Weather Construction: When the ambient air temperature is within the limits indicated, use the following procedures:
    - a. 40 to 32 deg F (4 to 0 deg C): Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C) at the time of mixing. Heat grout materials that have a temperature below 32 deg F (10 deg C).
    - b. 32 to 25 deg F (0 to -4 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 70 and 120 deg F (21 and 49 deg C). Maintain mortar above freezing until used in masonry. Maintain grout temperature above 70 deg F (21 deg C) at the time of grout placement.
    - c. 25 to 20 deg F (-4 to -7 deg C): Comply with paragraph 1.8 D.1.b. and the following: Heat masonry surfaces under construction to 40 deg F (4 deg C). Use wind breaks or enclosures when wind velocity exceeds 15 mph (24 km/h). Heat masonry to a minimum of 40 deg F (4 deg C) prior to grouting.
    - d. 20 deg F (-7 deg C) and Below: Comply with paragraph 1.8 D.1.c. and the following: Provide enclosures and heat to maintain air temperatures above 32 deg F (0 deg C) within the enclosures for 48 hours after installation and grout placement.
  - 2. Cold-Weather Protection: When the anticipated daytime low temperature is within the limits indicated, provide the following protection. This is in addition to construction procedures specified above:
    - a. 40 to 25 deg F (4 to -4 deg C): Cover masonry with a weather-resistive membrane for 24 hours after construction.

- b. 25 to 20 deg F (-4 to -7 deg C): Cover newly constructed masonry completely with weather-resistive insulating blankets for 48 hours after installation and grout placement.
  - c. 20 deg F (-7 deg C) and Below: Provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within the enclosure for 48 hours after installation and grout placement.
  3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- C. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Maintain sand piles in a damp, loose condition. Provide artificial shade and wind breaks and use cooled materials as required to produce mortar with a temperature less than 120 deg F (49 deg C).
1. Hot Weather Construction: When the ambient air temperature is within the following limits, use the following procedures:
    - a. Above 100 deg F (38 deg C), or 90 deg F (32 deg C) with a wind speed greater than 8 mph (13 km/h): Maintain the temperature of mortar and grout less than 120 deg F (49 deg C). Flush mixer, mortar transport container and mortar boards with cool water before they come into contact with mortar ingredients or mortar. Maintain mortar consistency by retempering with cool water. Use mortar within 2 hours of initial mixing.
  2. Hot Weather Protection: When the mean daily temperature exceeds 100 deg F (38 deg C), or exceeds 90 deg F (32 deg C) with a wind speed greater than 8 mph (13 km/h), fog spray newly constructed masonry until damp at least 3 times daily until the masonry is 3 days old.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
  2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

### **2.2 MASONRY UNITS, GENERAL**

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.



2.3 CONCRETE MASONRY UNITS (CMUs)

- A. Shapes: Provide shapes indicated and as follows:
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- B. Concrete Masonry Units: ASTM C 90.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi (14.8 MPa).
  - 2. Weight Classification: Normal weight unless otherwise indicated or required to attain specified fire-rated construction.
  - 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
    - a. Refer to Drawings for wall types.
  - 4. Finish: Smooth.

2.4 MASONRY LINTELS

- A. General: Provide masonry lintels made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout. Temporarily support lintels until cured.
- B. Accurately place reinforcement as indicated. Maintain 1/2 inch minimum clearance between the steel reinforcement and the face of the masonry unit. Secure reinforcement to maintain position during grout placement.

2.5 MORTAR AND GROUT MATERIALS

- A. Regional Materials: Provide aggregate for mortar and grout, cement, and lime that have been extracted, harvested, or recovered, as well as manufactured within 500 miles (800 KM) of the project site.
- B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
- E. Aggregate for Mortar: ASTM C 144.
- F. Aggregate for Grout: ASTM C 404.
- G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Available Products:
  - a. Addiment Incorporated; Mortar Kick.
  - b. Euclid Chemical Company (The); Accelguard 80.
  - c. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Morset.
  - d. Sonneborn, Div. of ChemRex; Trimix-NCA.

H. Water: Potable.

## 2.6 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420).
- B. Masonry Joint Reinforcement, General: ASTM A 951.
  1. Interior Walls: Mill-galvanized, carbon steel.
  2. Exterior Walls: Hot Dipped Galvanized.
  3. Wire Size for Side Rods: W2.8 or 0.188-inch (4.8-mm) diameter except as otherwise indicated.
  4. Wire Size for Cross Rods: W1.7 or 0.148-inch (3.8-mm) diameter.
  5. Wire Size for Veneer Ties: W2.8 or 0.188-inch (4.8-mm) diameter.
  6. Spacing of Cross Rods, and Cross Ties: Not more than 16 inches (407 mm) o.c.
  7. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

## 2.7 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with eight subparagraphs below, unless otherwise indicated.
  1. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 641/A 641M, Class 1 coating.
  2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
  3. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
  4. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
  5. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
  6. Steel Plates, Shapes and Bars: ASTM A 36/A 36M.
- B. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.4 mm) thick by 24 inches (600 mm) long, with ends turned up 2 inches (50 mm) or with cross pins.
  1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.8 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: Headed anchor rods or L-shaped threaded rods complying with ASTM F1554, Grade 36; with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.
- B. Postinstalled Anchors: Provide chemical or torque-controlled expansion anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
  - 1. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).
  - 2. Corrosion Protection: Hot-dipped galvanized components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group 1 or 4) for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.
- C. Joint Stabilization Anchors: Hot-dipped galvanized anchors designed to span expansion joints, resisting differential movement perpendicular to the wall surface while permitting movement parallel to the wall surface.
  - 1. Acceptable Products:
    - a. Dur-O-Wal D/A 2200.
    - b. Hohmann and Barnard # Slip-Set Stabilizer.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Preformed Control-Joint Gaskets: Made from PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch (3.6-mm) steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated. Provide units sized to fit specified reinforcing steel sizes, oversized by ¼ inch.
  - 1. Available Products:
    - a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
    - b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
    - c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
    - d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

**2.10 MORTAR AND GROUT MIXES**

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless specifically approved by the Architect.
  - 1. Do not use calcium chloride in mortar or grout.
  - 2. Limit cementitious materials in mortar to portland cement and lime. The use of masonry cement is not permitted.
  - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
  - 1. For masonry below grade or in contact with earth, use Type S.
  - 2. For all concrete masonry walls, and partitions use Type S.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
  - 2. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
  - 1. If unsatisfactory conditions are encountered, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
  - 2. Verify that foundations are within tolerances required for work.
  - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- D. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
  - 1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
  - 2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
  - 3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
  - 4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm). Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
  - 5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).
  - 6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.
  - 7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (1.5 mm) from one masonry unit to the next.

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Lay masonry with all units in a wythe in running bond. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, and remove loose masonry units and mortar as applicable and if required before laying fresh masonry.

- D. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- E. Where masonry extends below grade, fully grout all cells and cavities to create a solid unit, free of voids.

### 3.4 MORTAR BEDDING AND JOINTING

- A. Lay concrete masonry units as follows:
  - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
  - 2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
  - 3. With webs fully bedded in mortar in all courses of columns, piers, and pilasters.
  - 4. With webs fully bedded in mortar in grouted masonry.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

### 3.5 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
  - 1. Space reinforcement as indicated on the Drawings but not more than 16 inches (406 mm) o.c.
  - 2. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings.
    - a. Reinforcement above is in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control joints.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

### 3.6 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials other than structural bond beam reinforcement to span control joints without provision to allow for in-plane wall or partition movement.

- B. Form joints in brick back-up wythe as follows:
1. Install preformed control-joint gaskets designed to fit standard sash block.
  2. Joint reinforcement shall be discontinuous at control joints.
  3. Structural bond beam reinforcement shall be continuous through control joints.
  4. Locate vertical control joints at locations indicated on the drawings or, if not indicated, at a maximum spacing of 30 feet on center.
    - a. Do not locate control joints within 32 inches (813 mm) of a masonry opening with a masonry lintel.
- C. Form expansion joints in brick masonry veneer as follows:
1. Install specified joint stabilizing anchors in horizontal joints at a maximum vertical spacing of 16 inches on center.
  2. Install temporary foam-plastic filler in vertical joints and remove filler when unit masonry is complete for application of sealant.
  3. Locate expansion joints as indicated on architectural elevations.

### 3.7 LINTELS

- A. Install steel lintels at openings in concrete masonry veneer wider than 16 inches (406 mm) and at openings in veneer wider than 8 inches (203 mm) and elsewhere as indicated.
- B. Provide reinforced masonry lintels in 8-inch and 12-inch concrete masonry walls and partitions where shown and where openings of more than 24 inches (610 mm) are shown without structural steel or other supporting lintels.
1. Refer to structural drawings for required masonry lintel details.
- C. Provide minimum bearing of 8 inches (200 mm) at each jamb, unless otherwise indicated.

### 3.8 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
1. Layout vertical reinforcement with specified jamb reinforcement 4" from each corner, control joint, and opening jamb. Space bars between at a uniform spacing that does not

- exceed the spacing specified, rounded to the nearest 8". Maximum spacing shall not exceed 48" in any location.
- a. Where steel lintels are specified over openings, locate vertical jamb reinforcement at 12" from the opening, unless otherwise indicated.
2. Minimum splice length for deformed bar reinforcement shall be in accordance with the schedule on Structural Drawings. Secure lap splices by tying with wire, except as permitted for vertical bars in paragraph 3.11. B.3.b.
  3. Secure reinforcement in place before placing grout. For vertical reinforcement, use one of the following methods:
    - a. Secure bar at the bottom of each grout lift by tying to dowels. Build masonry around reinforcement. Install rebar positioners at the top of each bar and at a maximum spacing of 192 bar diameters.
    - b. Install rebar positioner at the bottom course of the grout lift, located within 4 inches of the dowel to be spliced. Lay up masonry units. Set vertical bar in the rebar positioner. Install additional rebar positioners at the top of the bar, and at a maximum spacing of 192 bar diameters.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
  2. Definitions:
    - a. Grout Lift - Grout placed in one continuous operation. The maximum time span for the grout placement in one lift is 1-1/2 hours measured from the time water is added to the grout mix. The minimum time span between successive grout lifts is one hour.
    - b. Grout Pour - The height of masonry to be grouted prior to the erection of additional masonry.
  3. Do not exceed the following pour heights for fine grout:
    - a. For minimum widths of grout spaces of 3/4 inch (19 mm) or for minimum grout space of hollow unit cells of 1-1/2 by 2 inches (38 by 51 mm), pour height of 12 inches (305 mm).
    - b. For minimum widths of grout spaces of 2 inches (51 mm) or for minimum grout space of hollow unit cells of 2 by 3 inches (51 by 76 mm), pour height of 60 inches (1524 mm).
    - c. For minimum widths of grout spaces of 2-1/2 inches (63 mm) or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches (63 by 76 mm), pour height of 12 feet (3.6 m).
    - d. For minimum widths of grout spaces of 3 inches (76 mm) or for minimum grout space of hollow unit cells of 3 by 3 inches (76 by 76 mm), pour height of 24 feet (7.3 m).
  4. Do not exceed the following pour heights for coarse grout:
    - a. For minimum widths of grout spaces of 1-1/2 inches (38 mm) or for minimum grout space of hollow unit cells of 1-1/2 by 3 inches (38 by 76 mm), pour height of 12 inches (305 mm).
    - b. For minimum widths of grout spaces of 2 inches (51 mm) or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches (63 by 76 mm), pour height of 60 inches (1524 mm).
    - c. For minimum widths of grout spaces of 2-1/2 inches (63 mm) or for minimum grout space of hollow unit cells of 3 by 3 inches (76 by 76 mm), pour height of 12 feet (3.6 m).



- d. For minimum widths of grout spaces of 3 inches (76 mm) or for minimum grout space of hollow unit cells of 3 by 4 inches (76 by 101 mm), pour height of 24 feet (7.3 m).
5. Provide cleanout holes at least 3 inches (76 mm) in least dimension for grout pours over 60 inches (1524 mm) in height.
  - a. Provide cleanout holes at each vertical reinforcing bar.
6. Consolidate grout with a mechanical vibrator.
  - a. Use a low velocity vibrator with a 3/4 inch head.
  - b. Vibrate each cell in concrete masonry units twice. Insert vibrator to bottom of lift and activate for 1 to 2 seconds.
  - c. Perform initial consolidation at each cell immediately after grout placement.
  - d. Perform reconsolidation in each cell by reinserting vibrator when grout is still plastic.

### 3.9 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at the contractor's expense.
- B. Inspections: Level 1 special inspections according to the "International Building Code."
  1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
  2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
- C. Testing Frequency: One set of tests for each 5000 sq. ft. (465 sq. m) of wall area or portion thereof.
- D. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140.
- E. Mortar Test: For each mix provided, per ASTM C 780. Test mortar for mortar air content and compressive strength.
- F. Grout Test: For each mix provided, per ASTM C 1019. Test for slump and compressive strength.
- G. Prism Test: For each type of construction provided, per ASTM C 1314 at 28 days.

### 3.10 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent

construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.

### 3.11 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site. Refer to Division 1 Section "Construction Waste Management and Disposal".

**END OF SECTION 042000**

SECTION 051200

STRUCTURAL STEEL

**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 the following:

- 1. Structural steel.
- 2. Grout.

- B. Related Sections include the following:

- 1. Division 1 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
- 2. Division 5 Section "Steel Decking" for field installation of shear connectors through deck.
- 3. Division 5 Section "Metal Fabrications" for steel lintels not attached to structural-steel frame, miscellaneous steel fabrications, and other metal items not defined as structural steel.
- 4. Division 5 Section "Metal Stairs" for steel framing associated with stair systems.

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. Architecturally Exposed Structural Steel: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.

1.4 PERFORMANCE REQUIREMENTS

- A. Connections: The fabricator is responsible for the design and detailing of all connections in accordance with notes, loads, and details on the Drawings.
  - 1. Where specific connection details are provided with weld sizes and lengths, and bolt sizes, grade, and quantity indicated, fabricate as shown. Where typical details are indicated without specific information, design connections for loading as indicated to comply with typical aspects indicated.
  - 2. Connection design may utilize either Load and Resistance Factor Design or Allowable Stress Design Specifications.

3. All connection designs and details are subject to approval by the structural engineer of record.

B. Construction: Simple shear connections are typical unless otherwise noted.

C. Design for Galvanizing: Structural steel shall be of sufficient metal thickness, and with vents as required for successful hot-dip galvanizing. Assemblies that are warped, deformed, or that have not been fully coated with zinc will be rejected.

## 1.5 SUBMITTALS

A. Product Data: For each type of product utilized in structural steel fabrication or erection including, but not limited to primer paint, non-shrink grout, and anchorage devices.

B. LEED Submittal:

1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycle 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.

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

5. Provide complete details of fabricator-designed connections. Include field welds and other requirements for proper erection.

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, including the following:

1. Power source (constant current or constant voltage).

2. Electrode manufacturer and trade name.

E. Welding certificates.

F. Qualification Data: For fabricator.

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

H. Certification of Compliance: After completion of fabrication, the fabricator shall submit a letter certifying that the fabricated steel conforms with the construction documents for the project.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."
- C. Comply with applicable provisions of the following specifications and documents:
  - 1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  - 2. AISC's "Specification for Structural Steel Buildings."
  - 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Preinstallation Conference: Conduct conference at Project site prior to shop drawing preparation to comply with requirements in Division 1 Section "Project Management and Coordination."
  - 1. The following personnel are required to attend:
    - a. Contractor's Project Manager
    - b. Fabricator's Project Manager
    - c. Detailer
    - d. Erector's Foreman
    - e. Structural Engineer of Record
    - f. Special Inspector

1.7 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 erosion and deterioration.
  - 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 2. 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.

1.8 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. W-Shapes: ASTM A 992/A 992M or ASTM A 572/A 572M, Grade 50 (345).
- B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M or ASTM A 572/A 572M, Grade 50 (345).
- C. Plate and Bar: ASTM A 36/A 36M or ASTM A 572/A 572M, Grade 50 (345).
- 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.
  - 1. Weight Class: Standard, unless otherwise indicated.
  - 2. Finish: Black, except where indicated to be galvanized.
- F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
  - 1. Finish: Plain, except provide hot-dip zinc coating, ASTM A 153/A 153M, Class C for connections to galvanized structural steel.
  - 2. Direct-Tension Indicators (optional): ASTM F 959, Type 325 (ASTM F 959M, Type 8.8,) compressible-washer type.
    - a. Finish: Plain, except provide mechanically deposited zinc coating, ASTM B 695, Class 50 for connections to galvanized structural steel.
- B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies (optional): ASTM F 1852, Type 1, heavy hex or round head steel structural bolts with splined ends; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
  - 1. Finish: Plain, except provide mechanically deposited zinc coating, ASTM B 695, Class 50 for connections to galvanized structural steel.
- C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- D. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
  - 1. Configuration: Hooked.
  - 2. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
  - 3. Plate Washers: ASTM A 36/A 36M carbon steel.

4. Finish: Plain, except provide hot-dip zinc coating, ASTM A 153/A 153M, Class C for connections to galvanized structural steel.
- E. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
1. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
  2. Plate Washers: ASTM A 36/A 36M carbon steel.
  3. Finish: Plain, except provide hot-dip zinc coating, ASTM A 153/A 153M, Class C for connections to galvanized structural steel.
- F. Threaded Rods: ASTM A 36/A 36M or ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6).
1. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
  2. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
  3. Finish: Plain, except provide hot-dip zinc coating, ASTM A 153/A 153M, Class C for connections to galvanized structural steel.
- G. Eye Bolts and Nuts: ASTM A 108, Grade 1030, cold-finished carbon steel.
- H. Expansion Bolts: Wedge anchor appropriate for solid masonry or concrete of size as noted on the Drawings, or if not noted, as required to withstand required loading. Acceptable products include, but are not limited to, the following.
1. Hilti Kwik-Bolt 3 Expansion Anchor
  2. Powers Power-Stud Wedge Expansion Anchor
  3. Simpson Strong-Tie Wedge-All Wedge Anchor
- I. Adhesive Anchors: Threaded anchors with a chemical capsule containing premeasured amounts of resin, quartz aggregate and a catalyst. Size and embedment depth shall be as noted on the Drawings, or if not noted, as required to withstand required loading. Acceptable products include, but are not limited to, the following:
1. Hilti HVA Adhesive Anchors
  2. Powers Chem-Stud Spin-Type Capsule Adhesive
  3. Simpson Strong-Tie VGC Vinylester Glass Capsule Adhesive
- 2.3 PRIMER
- A. Primer: Modified alkyd, rust-inhibitive primer: Tnemec 10-99 or an approved equal.
- B. Galvanizing Repair Paint: ASTM A 780.
- 2.4 GROUT
- A. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404, Size No. 2. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. 100 Non-Shrink Grout (Non-Metallic); Conspec, Inc.
    - b. Supreme Grout; Cormix, Inc.
    - c. Sure Grip Grout; Dayton Superior
    - d. Euco N.S.; Euclid Chemical Co.
    - e. Crystex; L & M Construction Chemicals, Inc.
    - f. Masterflow 713; Master Builders

## 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's "Specification for Structural Steel Buildings."
  - 1. Camber structural-steel members where indicated.
  - 2. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
  - 3. Mark and match-mark materials for field assembly.
  - 4. 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.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP1, "Solvent Cleaning."
- 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 and manufacturer's written instructions.
- G. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  - 2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.



- H. AESS: In addition to special care used to handle and fabricate AESS, comply with the following:
1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
  2. Grind sheared, punched, and flame-cut edges of AESS to remove burrs and provide smooth surfaces and edges.
  3. Fabricate AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
  4. Fabricate AESS with exposed surfaces free of seams to maximum extent possible.
  5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and galvanizing or priming.
  6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
  7. Fabricate AESS to the tolerances specified in the AISC Code of Standard Practice for Steel Buildings and Bridges for steel that is designated AESS.
  8. Fabricate AESS to the tolerances specified in AISC Code of Standard Practice for Steel Buildings and Bridges for steel that is not designated AESS.
  9. Seal-weld open ends of hollow structural sections with 3/8-inch (9.5-mm) closure plates for AESS.

## 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: Snug tightened.
    - a. Provide pretensioned bolts where loaded in direct tension and where slip-critical joints are specified.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
  2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
- C. AESS: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
  2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
  3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.
  4. Provide continuous welds of uniform size and profile where AESS is welded.

5. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch (plus 1.5 mm, minus 0 mm) for AESS.
6. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch (plus 1.5 mm, minus 0 mm) for AESS. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.
7. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for AESS.
8. At locations where welding on the far side of an exposed connection of AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
9. Make fillet welds for AESS oversize and grind to uniform profile with smooth face and transition.
10. Make fillet welds for AESS of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

## 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 2 inches (50 mm).
  2. Surfaces to be field welded.
  3. Surfaces to receive sprayed fire-resistive materials.
  4. 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 dry film thickness of not less than 2.5 mils (0.063 mm). 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 inaccessible surfaces 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 holes and grind smooth after galvanizing. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
  2. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.

3. Galvanize all exterior structural steel including supports for rooftop equipment, unless otherwise indicated. Exterior structural steel includes structural steel within exterior walls to the exterior of insulation.

## 2.9 SOURCE QUALITY CONTROL

- A. Owner may 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.
- 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."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
  1. Magnetic Particle Inspection: For fillet welds, ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  2. Ultrasonic Inspection: For partial and full penetration welds, ASTM E 164.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 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.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360, "Specification for Structural Steel Buildings."
  - 1. AESS: Erect AESS to the tolerances specified in the AISC Code of Standard Practice for Steel Buildings and Bridges for steel that is designated AESS.
    - a. Do not use thermal cutting during erection.
    - b. Installation: Comply with fabricator's and galvanizer's requirements for installation of materials and fabrications of galvanized items, including use of nylon slings or padded cables for handling factory-coated materials.
- B. Base and Bearing Plates: Clean concrete-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
  - 1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Snug-tighten 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 base or bearing plate before packing with grout.
  - 3. Promptly pack grout solidly between bearing surfaces and base or bearing 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.
  - 4. Alternatively, 1/4" thick leveling plates, with plan dimensions equal to the specified base or bearing plates, may be set on non-shrink grout. Leveling plates shall bear uniformly on nonshrink grout with the required anchor bolts projecting through them and with the top surface level in all directions. Base and bearing plates will then be set directly on the leveling plate. Tighten anchor bolts after all members are set in their final position and plumb.
- 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 forming 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.
- 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.

- 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: Snug tightened.
    - a. Provide pretensioned bolts where loaded in direct tension and where slip-critical joints are specified.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
  - 1. Comply with AISC 303, "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360, "Specification for Structural Steel Buildings" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
  - 2. Remove backing bars or runoff tabs, 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 of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
  - 4. Utilize AWS prequalified weld procedures for all welds to structural steel.

### 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: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
  - 1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E 165 for fillet welds.
    - b. Ultrasonic Inspection: ASTM E 164 for full and partial penetration welds.
- 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. For galvanized surfaces, apply organic zinc repair paint complying with requirements of ASTM A 780, modified to 95 percent zinc in dry film. Galvanizing repair paint shall have 95 percent zinc by weight, ZiRP by Duncan Galvanizing. Thickness of applied galvanizing repair paint shall be not less than coating thickness required by ASTM A 123.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel.
1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
  2. Apply primer of same type as shop primer used on adjacent surfaces. Apply to a minimum dry film thickness of 2.5 mils.

**END OF SECTION 051200**

SECTION 054000

COLD-FORMED METAL 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. This Section includes the following:
1. Exterior wall z-furring.
  2. Exterior non-load-bearing wall framing.
  3. Exterior soffit framing.
- B. Related Sections include the following:
1. Division 05 Section "Metal Fabrications" for lintels.
  2. Division 06 Section "Sheathing" for gypsum and plywood sheathing.
  3. Division 09 Section "Gypsum Board Assemblies" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide cold formed metal framing complying with the following minimum requirements:
1. Member depth as indicated on the drawings.
  2. Minimum uncoated steel thickness: .0451 inches (18 gage).
  3. Minimum flange width: 1 5/8 inches, except for standard tracks.
- B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing – Header Design."
  2. Studs: Design according to AISI's "Standard for Cold-Formed Steel Framing – Wall Stud Design." Delete three subparagraphs below if not applicable.

1.4 SUBMITTALS

- A. Leed Submittals:
1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- B. Welding certificates.

**1.5 QUALITY ASSURANCE**

- A. **Installer Qualifications:** An experienced installer who has completed cold-formed metal framing 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.
- B. **Welding:** Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- C. **AISI Specifications and Standards:** Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
  - 1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. **Available Manufacturers:** Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Allied Studco.
  - 2. AllSteel Products, Inc.
  - 3. California Expanded Metal Products Company.
  - 4. Clark Steel Framing.
  - 5. Consolidated Fabricators Corp.; Building Products Division.
  - 6. Craco Metals Manufacturing, LLC.
  - 7. Custom Stud, Inc.
  - 8. Dale/Incor.
  - 9. Design Shapes in Steel.
  - 10. Dietrich Metal Framing; a Worthington Industries Company.
  - 11. Formetal Co. Inc. (The).
  - 12. Innovative Steel Systems.
  - 13. MarinoWare; a division of Ware Industries.
  - 14. Quail Run Building Materials, Inc.
  - 15. SCAFCO Corporation.
  - 16. Southeastern Stud & Components, Inc.
  - 17. Steel Construction Systems.
  - 18. Steeler, Inc.
  - 19. Super Stud Building Products, Inc.



20. United Metal Products, Inc.

## 2.2 MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  1. Grade: As required by structural performance.
  2. Coating:
    - a. G90 (Z275) at exterior non-load bearing studs supporting masonry veneer.
    - b. G60 (Z180) at all other cold-formed metal framing.

## 2.3 EXTERIOR WALL AND SOFFIT FRAMING

- A. Steel Studs and Joists: At exterior walls and soffits, provide manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:
  1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
  2. Minimum Flange Width: 1-5/8 inches (41 mm).

## 2.4 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
  1. Supplementary framing.
  2. Bracing, bridging, and solid blocking.
  3. Web stiffeners.
  4. Anchor clips.
  5. End clips.
  6. Foundation clips.
  7. Stud kickers.
  8. Hole reinforcing plates.

## 2.5 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel headless, hooked bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by mechanically deposition according to ASTM B 695, Class 50.

- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
  - 1. For fastening to concrete, provide .177 inch diameter fasteners with 1½ inches embedment.
  - 2. For fastening to structural steel, provide .145 inch diameter fasteners with length adequate for the tip to penetrate the back side of the member.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
  - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
  - 2. Minimum size; No. 10-16 (D=.190"), with length adequate for 3 threads to project through the connected members.
- F. Welding Electrodes: Comply with AWS standards.
- G. Miscellaneous Clips: Drawings indicate clips for specific conditions. Substitutions are acceptable provided the products are equal in configuration and load capacity. All substitution requests shall be clearly identified in submittals, with structural data provided for verification of load capacity.

## 2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

## 2.7 FABRICATION

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  - 1. Fabricate framing assemblies using jigs or templates.
  - 2. Cut framing members by sawing or shearing; do not torch cut.

3. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
  4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION, GENERAL

- A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
1. Cut framing members by sawing or shearing; do not torch cut.
  2. Fasten cold-formed metal framing members by welding or screw fastening. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

- C. Install framing and bracing members in one-piece lengths unless splice connections are indicated for track or tension members.
- D. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- E. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- F. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- G. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
  - 1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

### 3.3 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

**END OF SECTION 054000**

**SECTION 055000**

**METAL FABRICATIONS**

**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 the following:
1. Steel ladders.
  2. Loose bearing and leveling plates.
  3. Steel framing and supports for mechanical and electrical equipment as detailed.
  4. Steel components, framing, and supports for applications where framing and supports are not specified in other Sections.
  5. Miscellaneous metal trim.
- B. Products furnished, but not installed under this Section:
1. Loose steel lintels.
  2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
  3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
- C. Related Sections include the following:
1. Division 03 Section "Cast-in-Place Concrete" for installing anchor bolts and other items cast into concrete.
  2. Division 04 Section "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
  3. Division 05 Section "Structural Steel" for structural-steel framing system components.
  4. Division 05 Section "Pipe and Tube Railings" for other railings.

1.3 SUBMITTALS

- A. Product Data: For the following:
1. Paint products.
  2. Grout.
- B. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
1. Provide templates for anchors and bolts specified for installation under other Sections.

- C. Samples: Submit bolt samples for exposed exterior bolts in steel trim.
- D. Welding Certificates: Copies of certificates for welding procedures and personnel.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

#### 1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Welding: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1, "Structural Welding Code--Steel."
  - 2. AWS D1.3, "Structural Welding Code--Sheet Steel."
  - 3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- C. Architectural Exposed Steel: Comply with the Fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for all exposed exterior steel.
- D. Design for Galvanizing: Structural steel shall be of sufficient metal thickness, and with vents as required for successful hot-dip galvanizing. Assemblies that are warped, deformed, or that have not been fully coated with zinc will be rejected.

#### 1.5 PROJECT CONDITIONS

- A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

#### 1.6 COORDINATION

- A. Coordinate installation of anchorages and embedments for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- B. Coordinate selection of shop primers with specified topcoats to be applied. Comply with paint and coating manufacturer's written recommendations to ensure that shop primers and topcoats are compatible with one another.

## PART 2 - PRODUCTS

### 2.1 METALS, GENERAL

- A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

### 2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500, Grade B.
- C. Steel Pipe: ASTM A 53, Type E or S, Grade B, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- D. Malleable-Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).
- E. Bar Gratings Materials: Steel Bar: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M. Wire Rod for Crossbars: ASTM A 510 (ASTM A 510M).
- F. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
  - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- G. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- H. Slotted Channel Framing: Cold formed metal box channel (struts) complying with MFMA-4.
  - 1. Size of Channels: 1-5/8 y 1-5/8 inches (41 x 41 mm).
  - 2. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B, structural steel, grade 33 (Grade 230), with G90 (Z275) coating 0.0108 inch (2.8 mm) nominal thickness.

### 2.3 PAINT

- A. Shop Primer for Ferrous Metal:

1. For exterior applications where galvanizing is not indicated, provide an organic zinc-rich primer complying with SSPC Print 20 and compatible with topcoat specified under Division 9 Section "Painting". Subject to compliance with requirements, provide the following
    - a. Tneme-Zinc 90-97; Tnemec Company, Inc.
  2. For interior applications, provide fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

#### 2.4 FASTENERS

- A. General: Provide fasteners of materials compatible with connected parts. Where galvanized fasteners are indicated, provide zinc-plated fasteners with coating complying with ASTM B633, Class Fe/Zn5. Select fasteners for type, grade, and class required to withstand loading and atmospheric conditions anticipated in service.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, nuts, and flat washers; ASTM F593 (ASTM F 738M) for bolts and ASTM F 594 (ASTM F 836M) for nuts, Alloy Group 2 (A4).
1. Provide stainless steel bolts and nuts where bolt or nut will be exposed and unfinished at exterior locations.
- D. Anchor Bolts: ASTM F 1554, Grade 36.
1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).
1. Provide stainless steel Alloy Group 2 (Type 316) stainless steel machine screws where anchor is to be exposed and unfinished at exterior locations.
- F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
1. Provide stainless steel Alloy Group 2 (Type 316) stainless steel lag bolts where anchor is to be exposed and unfinished at exterior locations.
- G. Wood Screws: Flat head, carbon steel, ASME B18.6.1.
1. Provide stainless steel Alloy Group 2 (Type 316) stainless steel screw where anchor is to be exposed and unfinished at exterior locations.



- H. Plain Washers: Round, carbon steel, ASME B18.22.1 (ASME B18.22M).
  - 1. Provide stainless steel Alloy Group 2 (Type 316) stainless steel washer where anchor is to be exposed and unfinished at exterior locations.
- I. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1 (ASME B18.21.2M).
  - 1. Provide stainless steel Alloy Group 2 (Type 316) stainless steel lock washer where anchor is to be exposed and unfinished at exterior locations.
- J. Adhesive Anchors: Threaded anchors with a chemical capsule containing prepared amounts of liquid polyester resin, quartz aggregate, and a catalyst. Size and embedment depth shall be as noted on the drawings, or if not noted, as required to withstand required loading. Acceptable products include, but are not limited to:
  - a. Hilti HVA Adhesive Anchors
  - b. Red Head Redi-Chem Anchors
  - c. Rawl Needle-Capsule Anchors System
  - d. Fastenal Chemical Capsule Anchors
  - 2. Provide stainless steel Alloy Group 2 (Type 316) stainless steel adhesive anchors where anchor is to be exposed and unfinished at exterior locations.
- K. Sleeve Anchors: Hilti or Rawl Lok/Bolt with Hex Nut (HX). Provide tamperproof nut as indicated.
  - 1. Provide stainless steel Alloy Group 2 (Type 316) stainless steel anchors where anchor is to be exposed and unfinished at exterior locations.
- L. Renovation Anchors: Hilti, HIT C-20 system, female type.
  - 1. Provide stainless steel Alloy Group 2 (Type 316) stainless steel anchors where anchor is to be exposed and unfinished at exterior locations.
- M. 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 and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
  - 1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
  - 2. Material: Alloy Group 2 stainless-steel bolts complying with ASTM F 593 (ASTM F 738M) and nuts complying with ASTM F 594 (ASTM F 836M).
  - 3. Products:
    - a. Hilti Kwik-Bolt II Stud Anchors
    - b. Red Head Wedge Anchors
    - c. Rawl Power-Fast Anchors
    - d. Fastenal Stud Anchors
- N. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.
  - 1. Provide stainless steel Alloy Group 2 (Type 316) stainless steel toggle bolts where anchor is to be exposed and unfinished at exterior locations.

2.5 GROUT

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

## 2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Shear and punch metals cleanly and accurately. Remove burrs.
- C. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate. Fabricate joints that will be exposed to inmates in a manner to provide no concealed spaces in which foreign objects might be concealed including flat metal pieces.
- H. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Remove sharp or rough areas on exposed surfaces. Fabricate with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust, scale, rolled trade names and roughness. Before cleaning, treating, galvanizing, or shop priming, remove blemishes by filling or grinding or by welding and grinding.

- J. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, security, flat-head (countersunk) screws or bolts. Locate joints where least conspicuous. Back-up exposed joints to remove access to voids within fabrications.

## 2.7 STEEL LADDERS

- A. General: Fabricate ladders for locations shown.
  - 1. Comply with ANSI A14.3, unless otherwise indicated.
- B. Fabricate ladders from materials as detailed on the drawings or if not indicated, as follows:
  - 1. Siderails: Continuous, 1/2-by-3-1/2-inch steel flat bars, with eased edges, spaced 18 inches (457 mm) apart.
  - 2. Bar Rungs: 3/4-inch- (19-mm-) diameter steel bars, spaced equally but no more than 12 inches (300 mm) o.c. Align rungs with adjacent floors or standing surfaces.
  - 3. Fit rungs in centerline of side rails; plug-weld and grind smooth on outer rail faces.
  - 4. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted steel brackets. Size brackets to support design loads specified in ANSI A14.3.
  - 5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.

## 2.8 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

## 2.9 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.
- B. Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
  - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long at 24 inches (600 mm) o.c., unless otherwise indicated.
  - 2. Furnish inserts if units must be installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports at exterior locations. Exterior locations shall include areas on top of roofing membranes and outside of exterior wall gypsum sheathing or masonry.

## 2.10 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches (150 mm) from each end, 6 inches (150 mm) from corners, and 24 inches (600 mm) o.c., unless otherwise indicated.
- C. Galvanize miscellaneous steel trim at exterior locations, typically.

#### 2.11 BOLLARDS

- A. Fabricate bollards from steel pipe of the size indicated, or if not indicated of 6" round pipe. Size length for 4'-0" height above floor or pavement with a concrete embedment of 4'-0", and with top of concrete recessed below exterior pavements. Where located on structural slab, provide 3/8" x 12" base plate with countersunk fasteners. Provide concrete fill with domed top.
- B. Hot-dip galvanize bollards at exterior locations.

#### 2.12 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Hot-dip galvanize metal fabrications at exterior locations.

#### 2.13 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
  - 1. ASTM A 123, for galvanizing steel and iron products.
  - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
  - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.14 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of opening equal to 1/12 of the clear span but not less than 8 inches (200 mm) unless otherwise indicated.

**PART 3 - EXECUTION**

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

3.2 SETTING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonshrink, nonmetallic grout unless otherwise indicated.
- C. Where bearing plates are indicated with integral anchors, set in cement grout while grout is fluid. Level the surface and provide temporary support while grout hardens. Do not force anchors in partially hardened grout.
1. Where non-shrink grout is indicated, pack between bearing surfaces as indicated above.
- 3.3 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS
- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.
- 3.4 INSTALLING BOLLARDS
- A. Anchor embedded bollards in place with 24" diameter x 60" deep concrete footings set beneath exterior pavements or slabs. Where bollard is located on structural slab, thicken slab to no less than 8" at bollard.
- 3.5 ADJUSTING AND CLEANING
- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

**END OF SECTION 055000**

SECTION 055213

PIPE AND TUBE RAILINGS

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

- 1. Steel pipe and tube railings.

- B. Related Sections include the following:

- 1. Division 5 Section "Structural Steel" for expansion bolts, sleeve anchors, and adhesive anchors.
- 2. Division 10 Section "Awnings" for canvas infill panels in railings.

1.3 PERFORMANCE REQUIREMENTS

- A. General: In engineering railings to withstand structural loads indicated, determine load capacity of railing components and assemblies based on the thirteenth edition of "Specifications for Structural Steel Buildings" from the American Institute of Steel Construction.

- B. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

- 1. Handrails:

- a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
- b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

- 2. Top Rails of Guards:

- a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
- b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

- 3. Infill of Guards:

- a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
  - b. Uniform load of 25 lbf/sq. ft. (1.2 kN/sq. m) applied horizontally.
  - c. Infill load and other loads need not be assumed to act concurrently.
- C. Design for Galvanizing: Design pipe and tube railings of sufficient metal thickness, and with vents as required for successful hot-dip galvanizing. Warped, deformed, or assemblies that have not been fully coated with zinc will be rejected.

#### 1.4 SUBMITTALS

- A. Product Data: For all proprietary products utilized in the fabrication or erection of railing systems including, but not limited to, the following:
1. Manufacturer's product lines of mechanically connected railings.
  2. Grout, anchoring cement, and paint products.
  3. Railing brackets.
  4. Proprietary anchorage devices.
- B. LEED Submittals:
1. Product Data for Credit MR 4.1 and Credit MR 4.2: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
1. Provide complete erection details of connections as required to verify compliance with structural adequacy and to ensure proper erection.
  2. Indicate all field and shop welds using weld symbols and processes in accordance with AWS Specification D1.1. Utilize prequalified welds for all complete and partial joint penetration welds.
  3. Indicate bar for canvas panel attachment. Locate bar welded to tubes at perimeter of attachment as shown.
- D. Welding certificates.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain all railings from a single fabricator.
- B. Welding: Qualify procedures and personnel according to the following:
1. AWS D1.1, "Structural Welding Code--Steel."

#### 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.



1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.

#### 1.7 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

### **PART 2 - PRODUCTS**

#### 2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
  1. Remove all grease pencil piece markings from products, if used, after erection and prior to painting.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

#### 2.2 STEEL AND IRON

- A. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- B. Hollow Structural Sections: ASTM A 500 (cold formed), Grade B.
- C. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
  1. Where steel pipe posts are specified, use Extra Strong Weight (Schedule 80).
- D. Plates, Shapes, and Bars: ASTM A 36/A 36M.

#### 2.3 FASTENERS

- A. General: Provide the following:

1. Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 25 for electrodeposited zinc coating.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Fasteners for Interconnecting Railing Components:
  1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
- D. Post-Installed Anchors: Provide chemical, or torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
  1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.

#### 2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Nonsrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- C. Anchoring Cement: Factory-packaged, nonsrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
  1. Water-Resistant Product: Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

#### 2.5 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly

- mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
  - D. Form work true to line and level with accurate angles and surfaces.
  - E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
  - F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
  - G. Connections: Fabricate railings with welded connections except where approved otherwise.
  - H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
    - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
    - 2. Obtain fusion without undercut or overlap.
    - 3. Remove flux immediately.
    - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
    - 5. Utilize prequalified welds in accordance with AWS Specifications for all full and partial joint penetration welds.
  - I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
  - J. Form changes in direction by one of the following methods:
    - 1. By bending or by inserting prefabricated elbow fittings.
    - 2. By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.
  - K. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
  - L. Close exposed ends of railing members with prefabricated end fittings.
  - M. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
  - N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.
    - 1. Wall brackets shall provide 1.5" finger clearance to wall and 2-1/4" finger clearance below as required by code.

- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- P. For railing posts set in concrete, provide layout drawings for post locations to permit reinforcing steel to be placed around posts. Core drill the concrete to form grout pockets to receive railing posts.

## 2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.
- C. Galvanizing: Hot-dip galvanize items after fabrication to comply with applicable standard listed below:
  - 1. ASTM A 123, for galvanizing steel and iron products.
  - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates as required to verify acceptability for railing attachments. If conditions are encountered that may be detrimental to railing performance, report these conditions to the general contractor. Do not proceed with railing installation until such conditions are corrected.

### 3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
  - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

### 3.3 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article. Perform welding in the shop prior to galvanizing.
- B. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

### 3.4 ANCHORING POSTS

- A. Form or core-drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions. Set perimeter top of grout flush with adjacent concrete surface and crown top of grout 1/8" in exterior locations to prohibit water collection against railing post.

### 3.5 ATTACHING RAILINGS

- A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends prior to galvanizing or connected to railing ends using nonwelded connections.
- B. Attach railings to wall with wall brackets. Provide brackets with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
  - 1. Use type of bracket with predrilled hole for exposed bolt anchorage.
  - 2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- C. Secure wall brackets and railing end flanges to building construction as follows:
  - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hangers or lag bolts.
  - 2. For hollow masonry anchorage, use toggle bolts.
  - 3. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.
  - 4. For wood, use lag bolt.

### 3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds if provided, bolted connections, and abraded areas of galvanizing and prime with zinc-rich primer.

**END OF SECTION 055213**

**SECTION 061000**

**ROUGH CARPENTRY**

**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 the following:
1. Elevated decks including stairs and ramps.
  2. Miscellaneous framing.
  3. Rooftop equipment bases and support curb nailers.
  4. Wood blocking and nailers.
  5. Plywood electrical backing panels.
  6. Butyl sheet membrane material protection of metals from pressure treated woods.
- B. Related Sections include the following:
1. Division 1 Section: "Sustainable Design Requirements" for recycled content and regionally manufactured material goals.
  2. Division 1 Section: "Construction Waste Management and Disposal" for recycling and salvage of construction waste requirements.
  3. Division 6 Section "Sheathing".
  4. Division 7 Section "Weather Barriers".

1.3 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
1. NELMA - Northeastern Lumber Manufacturers Association.
  2. NLGA - National Lumber Grades Authority.
  3. SPIB - Southern Pine Inspection Bureau.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate

- type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
  3. For composite wood products, include composition data for bonding agents indicating that no urea formaldehyde is contained.
  4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. 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 American Lumber Standards Committee Board of Review.
- C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
1. Preservative-treated wood.
- D. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2 "Principles and Criteria":
1. Dimension lumber.
  2. Miscellaneous lumber.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Pressure-Treated Wood:
    - a. Arch Treatment Technologies, Inc.

### 2.2 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
1. Factory mark each piece of lumber with grade stamp of grading agency.
  2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  3. Provide dressed lumber, S4S, unless otherwise indicated.



4. Provide dry lumber with 15 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

**B. Wood Structural Panels:**

1. Plywood: DOC PS 1.
2. Composite wood products shall use bonding agents that contain no urea formaldehyde.
3. Thickness: As needed to comply with requirements specified but not less than thickness indicated.
4. Factory mark panels according to indicated standard.

**2.3 WOOD-PRESERVATIVE-TREATED MATERIALS**

**A. Pressure-Treated Wood: In accordance with AWPA C2 (lumber) and AWPA C9 (plywood).**

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and the following:
  - a. Copper azole, Type B (CA-B).
2. Preservative Retention:
  - a. Decking: 0.08 pcf.
  - b. Above Ground: 0.10 pcf.
  - c. Ground or Fresh Water Contact: 0.21 pcf.
3. 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 material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.**

**C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.**

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece, or 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.

**E. Product: Acceptable products include but are not limited to the following:**

1. Wolmanized Natural Select Wood by Arch Treatment Technologies, Inc.

**F. Substitutions: The specified product can be used with standard galvanized fasteners. Any proposed substitution shall be made with the understanding that stainless steel fasteners will be used unless written verification can be provided to show that galvanized fasteners are compatible with substitute product.**

**2.4 DIMENSION LUMBER**

- A. General: Provide dimension lumber of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.
- B. Framing: No. 2 grade and any of the following species:
  - 1. Mixed southern pine; SPIB.
  - 2. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.
- C. Composite Plastic Lumber: Solid shapes made from a mixture of cellulose fiber and polyethylene or polypropylene.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Advanced Environmental Recycling Technologies, Inc.
    - b. Certainteed Corporation.
    - c. Louisiana-Pacific Corporation.
    - d. TimberTech.
    - e. Trex Company, Inc.
  - 2. Decking Size: 7/8 by 5-1/2 inches (22 by 140 mm) actual.
  - 3. Configuration: Provide product with grooved edges designed for fastening with concealed splines.
  - 4. Surface Texture: Smooth.
  - 5. Color: Refer to Division 9 Section "Color and Finish Schedule".

## 2.5 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including the following:
  - 1. Rooftop equipment bases and support curbs.
  - 2. Blocking.
  - 3. Nailers.
- B. For items of dimension lumber size, provide No. 2 grade lumber with 15 percent maximum moisture content and any of the following species:
  - 1. Mixed southern pine; SPIB.
  - 2. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.

## 2.6 PROTECTION OF METALS AT PRESSURE TREATED LUMBER

- A. Sheet Membrane: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber 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 (0.6 mm)] [0.030 inch (0.8 mm)] [0.040 inch (1.0 mm)].
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.
- b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Butyl Self Adhered Flashing.
- c. Raven Industries Inc.; Fortress Flashshield.
- d. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
- e. Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
- f. Fortifiber Building Systems Group; Fortiflash 40.
- g. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor V40 Self-Adhered Flashing.

## 2.7 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4 inch (19 mm) thick. Paint flat black as required by electrical code.

## 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, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.0
  2. Railing and Decking Fasteners: Provide screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
    - a. Provide edge clips generally for decking.
    - b. Use color matched square drive screws manufactured by decking material manufacturer where exposed fasteners are provided.
  3. For pressure-preservative-treated wood, use stainless-steel fasteners.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Cold-Formed Metal Framing or Roof Decking: Hilti Kwik-Flex or Elco Dril-Flex; no substitutes. Provide stainless steel fasteners for use on pressure treated lumber.
  1. Plywood sheathing: 10-24 x 1-1/4 inch wafer head #3.
  2. 2 x wood blocking: 12-24 x 2-1/2 inch wafer head #3.
- F. Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M).
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in

unit masonry assemblies and equal to 4 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.

## 2.9 METAL FRAMING ANCHORS

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

1. KC Metals Products, Inc.
2. Simpson Strong-Tie Co., Inc.
3. Southeastern Metals Manufacturing Co., Inc.

- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated on Drawings. 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, G90 (Z270) coating designation.

- D. Joist Hangers: U-shaped, with 2-inch- (50-mm-) long seat and 1-1/4-inch- (32-mm-) wide nailing flanges at least 85 percent of joist depth.

- E. 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.

- F. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch (25 mm) above base and with 2-inch- (50-mm-) minimum side cover, socket 0.062 inch (1.6 mm) thick, and standoff and adjustment plates 0.108 inch (2.8 mm) thick.

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

1. Width: 3/4 inch (19 mm)
2. Thickness: 0.050 inch (1.3 mm)
3. Length: 16 inches (400 mm)

## 2.10 CONCEALED DECKING FASTENERS

- A. Deck Clips: Black oxide coated stainless-steel clips designed to be fastened to deck framing with screws, and to secure decking material with teeth that also provide uniform spacing of decking material.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Tiger Claw Inc.; Tiger Claw Hidden Deck Fasteners.

**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 nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Do not splice structural members between supports.
- C. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. CABO NER-272 for power-driven fasteners.
  - 2. Published requirements of metal framing anchor manufacturer.
  - 3. Table 2305.2, "Fastening Schedule," in the BOCA National Building Code.
- E. 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 between members. Install fasteners without splitting wood; predrill as required.
- F. Install plastic lumber to comply with manufacturer's written instructions.
- G. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - 1. Use copper naphthenate for items not continuously protected from liquid water.

**3.2 WOOD BLOCKING, AND NAILER INSTALLATION**

- A. Install where indicated and where required for 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.
  - 1. Provide blocking for all surface mounted equipment attached to stud partitions including toilet partitions, toilet accessories, cabinets, etc.
  - 2. Provide solid blocking to match roofing insulation thickness at roof curbs for equipment and skylights except where indicated otherwise. Refer to mechanical specifications for equipment which is to be provided with curbs to not require blocking. Provide roof curb blocking for all other curbs to match height of insulation.
  - 3. Provide blocking for roofing as indicated.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.

3.3 PROTECTION OF METALS

- A. Sheet Membrane: Install material between wood and metals to provide a separation layer, prohibiting physical contact between metals and pressure treated lumber.
  - 1. Size membrane material one inch larger in each direction than surface contact area.

3.4 WOOD FRAMING INSTALLATION, GENERAL

- A. Framing Standard: Comply with AFPA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Do not splice structural members between supports.

3.5 ELEVATED DECK JOIST FRAMING INSTALLATION

- A. General: Install joists with crown edge up and support ends of each member with not less than 1-1/2 inches (38 mm) of bearing on wood or metal, or 3 inches (76 mm) on masonry. Attach floor joists where framed into wood supporting members by using wood ledgers as indicated or, if not indicated, by using metal joist hangers. Do not notch joists.
- B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches (1200 mm).
- C. Lap members framing from opposite sides of beams or girders not less than 4 inches (102 mm) or securely tie opposing members together. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist over supports.
- D. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist at intervals of 96 inches (2438 mm) o.c., between joists.

3.6 STAIR INSTALLATION

- A. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:
  - 1. Stringer Size: 2 by 12 inches nominal (38 by 286 mm actual), minimum.
  - 2. Notching: Notch stringers to receive treads, risers, and supports; leave at least 3-1/2 inches (89 mm) of effective depth.
  - 3. Stringer Spacing: At least three stringers for each 36-inch (914-mm) clear width of stair.
- B. Provide stair framing with no more than 3/16-inch (4.7-mm) variation between adjacent treads and risers and no more than 3/8-inch (9.5-mm) variation between largest and smallest treads and risers within each flight.
- C. Treads and Risers: Secure by gluing and screwing to carriages. Countersink fastener heads, fill flush, and sand filler. Extend treads over carriages and finish with bullnose edge. Provide cut chamfer molding and install below bullnose edge nosings to provide no-trip transition to vertical riser.

3.7 WOOD PANEL INSTALLATION

- A. Fastening Methods: Fasten panels as indicated below:
  - 1. Provide fasteners 12 inches on center, 6 inches in from the perimeter of each sheet.  
Provide fasteners 16 inches on center in the field of the sheet.

**END OF SECTION 061000**





**SECTION 061600**

**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. Sheathing joint and penetration treatment.

B. Related Requirements:

- 1. Division 05 Section "Cold Formed Metal Framing" for framed walls.
- 2. Division 07 Section "Weather Barriers" for moisture barrier.

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.

1.4 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.

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.
- C. Plywood: Either DOC PS 1 or DOC PS 2.
- D. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- E. Factory mark panels to indicate compliance with applicable standard.

2.3 WALL SHEATHING

- A. Plywood Wall Sheathing: Exposure 1 sheathing.
  - 1. Span Rating: Not less than 32/16.
  - 2. Nominal Thickness: Not less than 19/32 inch (15 mm).
- B. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corporation; GlasRoc.
    - b. G-P Gypsum Corporation; Dens-Glass Gold.
    - c. National Gypsum Company; Gold Bond e(2)XP.
    - d. United States Gypsum Co.; Securock.
  - 2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
  - 3. Size: 48 by 96 inches (1219 by 2438 mm) and 48 by 120 inches (1219 by 3048 mm) for vertical installation.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. 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.
  - 1. For wall sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

- C. Screws for Fastening Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
  - 1. For steel framing less than 0.0329 inch (0.835 mm) thick, use screws that comply with ASTM C 1002.
  - 2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C 954.

## 2.5 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
  - 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

## 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. Coordinate wall 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.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. 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.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Wall and Roof Sheathing:
    - a. Screw to cold-formed metal framing.
  - 2. Space panels 1/8 inch (3 mm) apart at edges and ends.

3.3 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
  - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
  - 2. Install boards with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
  - 3. Install boards with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
  - 1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.
  - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- D. Seal sheathing joints according to sheathing manufacturer's written instructions.
  - 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
  - 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

**END OF SECTION 061600**

SECTION 064023

INTERIOR ARCHITECTURAL WOODWORK

**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 the following:

1. Plastic-laminate cabinets.
2. Solid-surfacing-material countertops.
3. Plastic-laminate countertops.
4. Plastic-laminate window stools.
5. Cabinet Hardware.
6. Closet shelving.

- B. Related Sections include the following:

1. Division 1 Section: "Sustainable Design Requirements" for recycled content and regionally manufactured material goals.
2. Division 1 Section: "Construction Waste Management and Disposal" for recycling and salvage of construction waste requirements.
3. Division 6 Section "Rough Carpentry" for wood blocking required for installing woodwork and concealed within other construction before woodwork installation.
4. Division 8 Section "Glazing" for reception window glass.
5. Division 9 Section "Painting" for clear wood finish on site fit natural wood materials.
6. Division 9 Section "Color and Finish Schedule" for color selections.
7. Division 10 Section "Miscellaneous Specialties" for windows at reception counter.

1.3 DEFINITIONS

- A. Interior architectural woodwork includes standing and running trim, cabinets, tops, wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

- A. Product Data: For medium-density fiberboard, particleboard, plywood, high-pressure decorative laminate, adhesive for bonding plastic laminate, thermoset decorative overlay, solid-surfacing material, cabinet hardware, equipment and accessories.

1. Submit manufacturer's product data for installation adhesives, including printed statement of VOC content and material safety data sheets.
  2. Submit composite wood manufacturer's data for each product used indicating that the bonding agent has not urea formaldehyde.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
1. Show details full size.
  2. Show locations and sizes of blocking, including concealed blocking and reinforcement specified in other Sections.
  3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, and other items installed in architectural woodwork.
- C. Samples for Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.
1. Plastic laminates.
  2. Thermoset decorative overlays.
  3. Solid-surfacing materials.
  4. Exposed cabinet hardware and accessories, one unit for each type and finish.
  5. PVC edge material options.
  6. Solid wood with clear finish as applicable.
- D. Forest Certification: For the interior architectural woodwork products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2 "Principles and Criteria":

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed architectural woodwork 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.
- B. Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Quality Standard: Unless otherwise indicated, comply with AWT's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation

areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
  - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

#### 1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

### **PART 2 - PRODUCTS**

#### 2.1 MATERIALS

- A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
  - 1. Hardboard: AHA A135.4.
  - 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, manufactured without the use of urea formaldehyde.
  - 3. Particleboard: ANSI A208.1, Grade M-2 Exterior Glue, manufactured without the use of urea formaldehyde.
  - 4. Softwood Plywood: DOC PS 1.
  - 5. Hardwood Plywood and Face Veneers: HPVA HP-1.
- C. Thermoset Decorative Overlay: Particleboard complying with ANSI A208.1, Grade M-2, or medium-density fiberboard complying with ANSI A208.2, Grade MD, with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

- D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
  - 1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
    - a. Formica Corporation.
    - b. Lamin-Art, Inc.
    - c. Nevamar Company, LLC; Decorative Products Div.
    - d. Panolam Industries International Incorporated.
    - e. Wilsonart International; Div. of Premark International, Inc.
- E. Adhesive for Bonding Plastic Laminate: Contact cement.
  - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
- F. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. E. I. du Pont de Nemours and Company.
    - b. Formica Corporation.
    - c. LG Chemical, Ltd.
    - d. Meganite Inc.; a division of the Pyrochem Group.
    - e. Nevamar Company, LLC; Decorative Products Div.
    - f. Wilsonart International; Div. of Premark International, Inc.
    - g. Avonite Surfaces, Aristech Acrylics.
  - 2. Colors and Patterns: Refer to Division 9 Section "Color and Finish Schedule" and drawings.

## 2.2 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Manufacturers listed are basis of design. Provide products by another manufacturer at the Contractor's option with product specifications equal to or better than the products specified.
- C. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.
- D. Frameless Concealed Hinges (European Style): BHMA A156.9, B01602, 170 degrees opening, self closing.
  - 1. Products:
    - a. Grass Nexis 125.
    - b. MEPLA Equivalent
    - c. Blum Clip Equivalent
- E. Wire Pulls: Back mounted, 4 inches long, 5/16" diameter, solid aluminum or brass in finish indicated below.
- F. Adjustable Shelf Standards and Supports for Casework:



1. Hardware Concepts, Inc.: Plastic double pin shelf clip. Provide 1/4 inch diameter hole, clear or white color as selected by the Architect.
  - G. Drawer Slides: Side-mounted, 3/4-extension, steel drawer slides with steel ball bearings, 75 pound capacity, baked-on epoxy finish. File drawer slides shall extend full depth. At contractor's option, drawer slides may be drawer side forming drawer slides similar to listed products:
    1. Grass Epoxy.
    2. MEPLA equivalent.
    3. Blum equivalent
    4. File Drawer Slides: Grass Nova Pro File Railing System, Mepla Prosystem, or Blum equivalent.
  - H. Counter Support Brackets: Heavy gage aluminum angle, MIG welded corners, 5/16 inch holes for mounting, and primed finish for field painting. Provide Rakks Counter Support, Model No. EH-1818, or size as required, by Ragine Corporation (800-826-6006) or approved substitution.
    1. Where countertop brackets are not otherwise indicated, provide metal brackets with fasteners for any countertop or shelf span greater than 36".
  - I. Drawer and Door Locks: Cylindrical type, 5-pin tumbler and cam, brass with chrome-plated finish, complying with BHMA A156.11, Grade 1.
    1. Provide minimum of 2 keys per lock and 6 master keys. Key all locks within a room with the same key. Key each room uniquely. Key all to master key.
    2. Provide on all drawers and doors.
  - J. Grommets for Cable Passage through Countertops: 3-inch (75-mm) OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
    1. Product: Subject to compliance with requirements, provide No. 35-3" by Outwater Plastics, Woodridge, NJ, (800) 631-8375.
    2. Location: Provide wire cable grommets for passage of cables at all computer work stations, printers, fax machines as directed. Provide drilled wire feed openings in cabinet sides as required.
  - K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
    1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
    2. Satin Stainless Steel: BHMA 630.
  - L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
- 2.3 CLOSET HARDWARE AND SHELVES
- A. Closet Shelf Support: Knappe and Vogt "83 Series" standards and "183 Series" brackets.
  - B. Shelves: Thermoset Decorative Overlay (melamine) with 3 mm PVC edging.
- 2.4 MISCELLANEOUS MATERIALS

- A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- B. Furring, Blocking, Shims and Hanger Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

## 2.5 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide Custom grade interior woodwork complying with the referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Complete fabrication, including assembly, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- D. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
  - 1. Seal edges of openings in countertops with a coat of varnish.

## 2.6 PLASTIC-LAMINATE CABINETS (PLAM)

- A. Quality Standard: Comply with AWI Section 400 requirements for laminate cabinets.
- B. Grade: Custom.
- C. AWI Type of Cabinet Construction: Flush overlay without face frame.
- D. Cladding for Surfaces: High-pressure decorative laminate complying with the following requirements:
  - 1. Body members - ends, bottom, divisions, rails and tops: .028" exterior laminate over 3/4 inch thick particleboard, interior Thermoset Decorative Overlay (melamine) with .020 inch PVC edging, all exposed and semi-exposed sides.
  - 2. Shelves: 3/4 inch thick particleboard, Thermoset Decorative Overlay (melamine) each side with 3 mm PVC edging. Provide laminate over plywood where shelf widths are required to meet AWI 400-G-8.

3. Backs: 1/4 inch thick particleboard, Thermoset Decorative Overlay (melamine) each side.
4. Drawer sides, backs and subfronts: 1/2" hardwood plywood or solid lumber.
5. Drawer Bottoms: 1/4" hardwood plywood.
6. Drawer Fronts: .028" exterior laminate over 3/4 inch thick particleboard, interior Thermoset Decorative Overlay (melamine) with 3 mm PVC edging.
7. Premanufactured drawer systems: Drawer systems will be acceptable similar to Blum Metabox or approved equal.
8. Cabinet Doors: .028" exterior laminate over 3/4 inch thick particleboard, interior Thermoset Decorative Overlay (melamine) with 3 mm PVC edging.
9. Edges: PVC T-mold matching laminate in color, pattern, and finish, to be selected by architect from manufacturer's full range.
10. Base Toe Kick: Hardwood plywood.

- E. Colors, Patterns, and Finishes: Provide products that comply with the features, colors and performance standards of the basis of design products.
- a. Basis of Design: PLAM-1, Pionite Decorative Surfaces, Sugar Maple (WM971-Suede).

## 2.7 PLASTIC-LAMINATE COUNTERTOPS (PLAM)

- A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.
- B. Grade: Premium.
- C. High-Pressure Decorative Laminate Grade: HGS, nominal thickness .048" (1.2 mm).
- D. Available Products: Provide products that comply with the features, colors and performance standards of the basis of design products. Subject to compliance with requirements, provide products as manufactured by:
  - a. Nevamar Decorative Surfaces.
  - b. Pionite Decorative Surfaces.
2. Colors and Patterns: As selected by Architect from manufacturer's full range. Refer to Drawings for selections.
- E. Grain Direction: Parallel to cabinet fronts.
- F. Edge Treatment: Solid surfacing.
- G. Core Material: Particleboard with exterior glue.

## 2.8 PLASTIC-LAMINATE WINDOW STOOLS

- A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.

- B. Grade: Premium.
- C. High-Pressure Decorative Laminate Grade: HGS, nominal thickness .048" (1.2 mm).
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
    - a. Formica Corporation.
    - b. Lamin-Art, Inc.
    - c. Nevamar Company, LLC; Decorative Products Div.
    - d. Panolam Industries International Incorporated.
    - e. Wilsonart International; Div. of Premark International, Inc.
  - 2. Colors and Patterns: To be selected by Architect from manufacturer's full range.
- E. Edge Treatment: Plastic laminate.
  - 1. Provide 1" edge thickness with 1" extensions beyond face of jambs for window stools.
- F. Core Material: Particleboard with exterior glue.

2.9 SOLID-SURFACING-MATERIAL COUNTERTOPS (SS)

- A. Quality Standard: Comply with AWI Section 400 requirements for countertops.
- B. Grade: Premium.
- C. Available Products: Provide products that comply with the features, colors and performance standards of the basis of design products.
  - 1. SS-1 & SS-2: Avonite Surfaces, Aristech Acrylics, Refer to Drawings for color and surface finish.
  - 2. SS-3: Formica Corporation, Refer to Drawings for color.
- D. Thickness: ½ - inch
- E. Sub-top Material: Particleboard.
  - 1. Core Material at Sinks: Provide particleboard made with exterior glue, complying with ANSI A208.1, Grade M-2.
- E. Fabrication:
  - 1. Solid surface should be factory fabricated to field measurements by an authorized dealer.
  - 2. Finished edges shall have a 1/16-inch radius.
  - 3. Provide shop fabricated integrally molded coves at back and ends where against walls or other vertical surfaces, with 3/8-inch radius between top and splash.
  - 4. Cutouts for sinks (and other accessories) shall be smooth and uniform without saw marks. Top and bottom of openings shall be finished smooth.
  - 5. Maintain a minimum ¼-inch radius for sink cutouts.
  - 6. Cut and finish component edges with clean. Sharp returns.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Coordinate the locations of and install wall blocking as required for attachment of cabinets, standing and running trim, and other architectural woodwork prior to the installation of gypsum wall board.
- B. Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- C. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing.
- D. Cure solid surface countertops for 24 hours, minimum, before exposure to moisture or pressure.

#### 3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
  - 2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, or blocking.
- F. Countertops: Fasten solid surface material to frame by anchoring screws to supports at all corner blocks. Attach solid surface material to leveled supports on frame with dabs of silicone every 12-24-inches, based on manufacturer's suggested practice.
  - 1. Align adjacent solid-surfacing-material countertops and form seams with manufacturer's color-matching or clear silicone adhesive. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

2. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
  3. Field install backsplashes with tight, sealed joints.
  4. Caulk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."
  5. Use substrates and/or supports every 18" inches. Restrict unsupported overhang to 6-inches. Refer to manufacturers suggested methods for additional requirements.
  6. Install solid surfaces in accordance with manufacturer's installation guidelines and recommendations.
- G. Closet Shelves: Install where shown with 6 shelves. Provide ¾" x 12" shelves x full width shown.

### 3.3 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, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

**END OF SECTION 064023**

SECTION 071113

BITUMINOUS DAMPPROOFING

**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.
- B. Related Sections include the Following:
  - 1. Division 5 Sections for steel.
  - 2. Division 10 Sections for flagpoles.

1.2 SUMMARY

- A. This Section includes cold-applied, emulsified-asphalt dampproofing applied to the following surfaces:
  - 1. Flagpole bases.
  - 2. Steel where set below grade.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has thoroughly cured.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Cold-Applied, Emulsified-Asphalt Dampproofing:
    - a. Euclid Chemical
    - b. Karnak Chemical Corporation.
    - c. Meadows, W. R., Inc.
    - d. Sonneborn, Div. of ChemRex, Inc.

2.2 BITUMINOUS DAMPPROOFING

- A. Trowel Grade: ASTM D 1227, Type II, Class 1 with fibers.
  - 1. Available Products:
    - a. Sealmastic, Type 3; W. R. Meadows
    - b. Hydrocide 700; Sonneborn Building Products.
    - c. Dampproofing Asphalt Coatings Mastic; Euclid
    - d. Karnak 920 AF; Karnac Chemical Corp.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Examine substrates, with Applicator present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.
  - 1. Begin dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.
  - 1. Clean substrate of projections and substances detrimental to work.
  - 2. Fill voids, seal joints, and apply bond breakers as recommended by prime material manufacturer, with particular attention being paid to construction joints in concrete.
  - 3. Prime substrate as recommended by manufacturer of prime material.



4. Protect other work. Do not allow liquid and mastic compounds to enter drains or coat conductors. Prevent spillage and migration onto other surfaces of work by masking adjoining work.
5. Apply additional coats if recommended by manufacturer or required to achieve coverages indicated.
6. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Apply one trowel coat at not less than 4 gal./100 sq. ft. (1.6 L/sq. m).

3.5 CLEANING

- A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

**END OF SECTION 071113**



**SECTION 072100**

**THERMAL INSULATION**

**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 the following:
  - 1. Foundation insulation.
  - 2. Spray Applied Polyurethane Foam Insulation.
- B. Related Sections include the following:
  - 1. Division 7 Section "Weather Barriers" for weather barriers.
  - 2. Division 7 Section "Thermoplastic Polyolefin (TPO) Roofing" for insulation specified as part of roofing construction.
  - 3. Divisions 22 and 23 Sections for duct insulation, equipment insulation, and pipe insulation.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
  - 1. Surface-Burning Characteristics: ASTM E 84.
  - 2. Fire-Resistance Ratings: ASTM E 119.
  - 3. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
  - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
  - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
  - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

## **PART 2 - PRODUCTS**

### **2.1 INSULATING MATERIALS**

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
  - 1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.
- B. Rigid Plastic Insulation: Extruded-Polystyrene Board Insulation, ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:
  - 1. Type IV, 1.60 lb/cu. ft. (26 kg/cu. m).
  - 2. Available Products:
    - a. Foamular 250; Owens Corning.
    - b. Styrofoam by Dow Chemical Co.
    - c. Amofoam-CM by Tenneco Building Products
  - 3. R- Value: R 5.5 per inch.
  - 4. Application: Perimeter under-slab insulation.
  - 5. Thickness:
    - a. Underslab Insulation: 2". Refer to drawings for additional requirements.
- C. Spray Applied Urethane Foam Insulation: ASTM C1029, Type II urethane foam insulation, conforming to the following:
  - 1. Flame/Smoke Properties: 50/450 in accordance with ASTM E84.
  - 2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. BASF Corporation.
    - b. BaySystems NorthAmerica, LLC.
    - c. Dow Chemical Company (The).
    - d. ERSystems, Inc.
    - e. Gaco Western Inc.
    - f. Henry Company.
  - 3. Minimum density of 1.5 lb/cu. ft. (24 kg/cu. m), thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).

- D. Insulation Accessories
  - 1. Adhesive: ChemRex, Inc. Contech Brands PL300 Foam Board Adhesive.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Clean substrates of substances harmful to insulations, including removing projections capable of interfering with insulation attachment.
- B. Test adhesion of sprayed foam insulation to substrates shown. Apply bonding agent to substrates when recommended by the manufacturer. If a bonding agent is not available and manufacturer does not offer a recommendation for application of spray insulation to substrate indicated, provide mechanically fastened wire lath.

#### **3.2 INSTALLATION, GENERAL**

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

#### **3.3 INSTALLATION OF PERIMETER INSULATION**

- A. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
- B. If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) in from exterior walls.
- C. Do not install insulation if surface to support insulation is not compacted, level and flat. Install below slab insulation on top of under-slab vapor barrier.
- D. Loosely lay insulation according to manufacturer's written instructions.

#### **3.4 INSTALLATION OF GENERAL BUILDING INSULATION**

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Apply foamed-in-place insulation, by spray or froth method to a uniform monolithic density without voids into miscellaneous voids and cavity spaces where shown. Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs or furring by using method recommended by insulation manufacturer.

### 3.5 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

**END OF SECTION 072100**

**SECTION 072500**

**WEATHER BARRIERS**

**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. Weather barriers (moisture barrier).
- 2. Flexible flashing.

B. Related Requirements:

- 1. Division 05 Section "Cold Formed Metal Framing"
- 2. Division 06 Section "Sheathing" for sheathing joint and penetration treatment.
- 3. Division 07 Section "Thermal Insulation".

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

**PART 2 - PRODUCTS**

2.1 WATER-RESISTIVE BARRIER

- A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. DuPont (E. I. du Pont de Nemours and Company); Tyvek CommercialWrap.

2. Water-Vapor Permeance: Not less than 20 g through 1 sq. m of surface in 24 hours per ASTM E 96/E 96M, Desiccant Method (Procedure A).
  3. Air Permeance: Not more than 0.004 cfm/sq. ft. at 0.3-inch wg (0.02 L/s x sq. m at 75 Pa) when tested according to ASTM E 2178.
  4. Allowable UV Exposure Time: Not less than three months.
- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

## 2.2 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than [0.025 inch (0.6 mm)] [0.030 inch (0.8 mm)] [0.040 inch (1.0 mm)].
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.
    - b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Butyl Self Adhered Flashing.
    - c. Raven Industries Inc.; Fortress Flashshield.
    - d. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
    - e. Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
    - f. Fortifiber Building Systems Group; Fortiflash 40.
    - g. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor V40 Self-Adhered Flashing.
- B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.
- C. Staples: ASTM F 1667, stainless steel.

## **PART 3 - EXECUTION**

### 3.1 COORDINATION

- A. Coordinate installation of weather barrier with other work, scheduling installation to permit seals to be made between assemblies.
- B. Where doors or windows are installed subsequent to weather barrier installation, leave paper faced flange of flashing material ready for window or door installer to bond to frame.



3.2 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:
  - 1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
  - 2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.
- C. Building Wrap: Comply with manufacturer's written instructions.
  - 1. Seal seams, edges, fasteners, and penetrations with tape.

3.3 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
  - 1. Prime substrates as recommended by flashing manufacturer.
  - 2. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
  - 3. Bond flashings to door and window frames for a fully watertight seal.
  - 4. Lap flashing over water-resistive barrier at bottom and sides of openings.
  - 5. Lap water-resistive barrier over flashing at heads of openings.
  - 6. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.
- B. Inspection
  - 1. Inspect wall assembly for weather tight condition. Inspect felts and flashings to be self-shedding to direct water to exterior through weeps. Repair any conditions that might direct water to the interior. Wall shall be weather-tight without finish material applied (brick, shingles, siding).

**END OF SECTION 072500**



SECTION 073116

METAL SHINGLES

**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. Individual flat lock metal shingles.
2. Leaders and downspouts installed on metal shingles, and elsewhere.
3. Metal trim for flat lock metal shingles.

B. Related Sections:

1. Division 06 Section "Sheathing" for sheathing.
2. Division 07 Section "Weather Barriers".
3. Division 07 Section "Thermal Insulation" for insulation.
4. Division 07 Section "Sheet Metal Flashing and Trim" for reglets, and counterflashings.
5. Division 07 Section "Thermoplastic Polyolefin Roofing" for fascia systems.

1.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Metal shingles shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

- B. Wind-Uplift Resistance: Provide metal-shingle assemblies that comply with the following wind-uplift requirements.

1. Class: 90 when tested according to UL 580.
2. Normal to the plane of the wall, deflection shall be limited to 1/60 of the panels span.

C. System Performance:

1. Make allowances for free and noiseless vertical and horizontal thermal movement due to the contraction and expansion of component parts, for an ambient temperature range of from plus 20 degrees F to plus 180 degrees F. Buckling, opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement of component parts shall be considered warrantable system failures. Fabrication,

assembly and erection procedure shall take into account the ambient temperature range at the time of the respective operation.

2. Impact Resistance: Class 4 when tested according to UL 2218.
3. Flatness Criteria: Maximum 1/8" in 15'-0" on panel in any direction for assembled units.
4. System shall not permit vibration harmonics, wind whistles.

- D. Recycled Content: Provide metal shingles with recycled content so that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 20 percent by weight.

#### 1.4 SUBMITTALS

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

B. LEED Submittals:

1. Product Data for Credit(s) MR 4.1 and MR 4.2: 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: For metal shingles. Show wall elevations, sections at openings, top and bottoms; details of metal shingles, flashing, trim, and accessories; and attachments to other work.

- D. Samples for Initial Selection: For each type of metal shingle and accessory indicated with factory-applied color finishes.

- E. Samples for Verification: Full-size components of each type of metal shingle indicated, including visible accessories.

- F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency or performed by a qualified testing agency, for metal shingles, demonstrating compliance with requirements specified in "Performance Requirements" Article.

1. Wind: ASTM E-330 or D-5260

- G. Warranty: Sample of special warranties.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain metal shingles from single source from single manufacturer.

- B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects. Document mockup as a submittal.

1. Build mockups of metal shingles, including related materials.

- a. Size: 48 inches (1200 mm) long by 96 inches (2400 mm) wide.
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. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at Project site.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store metal-shingle materials in contact with other materials that might cause staining, denting, or other surface damage. Store metal-shingle materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on metal shingles from exposure to sunlight and high humidity, except to the extent necessary for the period of metal-shingle installation.

#### 1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing to be performed according to manufacturer's written instructions and warranty requirements.

#### 1.8 WARRANTY

- A. Special Warranty: Provide warranty in which manufacturer agrees to repair or replace metal shingles and accessories that fail in materials within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Structural failures including wind uplift.
    - b. Water penetration.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  2. Materials-Only Warranty Period: 15 years from date of Substantial Completion.
- B. Special Project Warranty: Installer's Warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, in which Installer agrees to repair or replace components of roofing that fail in materials or workmanship within the following warranty period:
  1. Warranty Period: Five years from date of Substantial Completion.
- C. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal shingles that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
  - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
  - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
  - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Warranty Period: 15 years from date of Substantial Completion.

## 1.9 EXTRA MATERIALS

- A. Furnish extra materials from the same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Metal Shingles: 200 sq. ft. (9.3 sq. m) of exposed area, in each type and color, in unbroken bundles.

## PART 2 - PRODUCTS

### 2.1 METAL SHINGLES

- A. Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Atlas International, [www.atlas.com](http://www.atlas.com)
    - b. Firestone Metal Products, [www.unaclad.com](http://www.unaclad.com)
    - c. Millennium Tiles LLC., [www.millenniumtiles.com](http://www.millenniumtiles.com)
  2. Basis-of-Design Product: Subject to compliance with requirements, provide:
    - a. Millennium Tiles LLC
  3. Individual Shingles: Rectangular shingle units.
    - a. Material:
      - 1) Metallic: Formed steel, tensile strength 50,000 psi, 0.017 inch (0.43 mm) thick or greater thickness as needed to meet performance requirements.
      - 2) Painted: Formed steel, tensile strength 50,000 psi, .0240" (0.58 mm) thick or greater thickness as needed to meet performance requirements, Galvalume coated, ASTM A792, AZ55 weight.
    - b. Reinforcement: Manufacturer's standard insert material in units to increase rigidity.
    - c. Dimensions: 15" x 9-5/8".
    - d. Finish:
      - 1) Metallic: Millennium Tiles "Zalmag" alloy (11% aluminum, 3% magnesium, 86% zinc.)
      - 2) Painted: High-Performance Organic Coating, (Coil-Coated Finishes): Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed

metal surfaces to comply with coating and resin manufacturers' written instructions.

- a) Three-Coat Fluoropolymer: AAMA 621. System consisting of primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent PVDF resin by weight.
- e. Color: Refer to Division 9 Section "Color and Finish Schedule".

## 2.2 ACCESSORIES

- A. General: Provide materials and types of fasteners, protective coatings, separators, sealants, and other accessory items as required for a complete roofing system and as recommended by metal-shingle manufacturer unless otherwise indicated.
- B. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- C. Sealant: ASTM C 920, one-part elastomeric polymer joint sealant as recommended by metal-shingle manufacturer for installation indicated; of type, grade, class, and use classifications required to seal joints in metal shingles and remain watertight. Where sealant will be exposed, provide in color matching shingle.
- D. Sheet Metal Fasteners: Noncorrosive screws, nails, and anchors designed to withstand design loads as recommended in writing by metal-shingle manufacturer.
  1. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
  2. Blind Fasteners: High-strength stainless-steel rivets suitable for metal being fastened.
  3. Fasteners for Sheet metal: Series 300 stainless steel.
- E. Downspouts: Rectangular complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
  1. Coated Steel: Match metal shingle material: "Zalmag" finish. Provide not less than 24 ga. material.
  2. Size: Provide size indicated, but not less than 4" x 5".
  3. Style: Provide closed downspout for first 4' below conductor head; provide open front downspout below.
- F. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout, exterior flange trim, and built-in overflow.
  1. Match downspout material and finish. Provide not less than 24 ga. material.
  2. Size: 15" wide x 10" deep x 18" tall.
  3. Style: Provide conductor head similar to SMACNA Architectural Sheet Metal Manual 5<sup>th</sup> ed. Figure 1-25F.

**2.3 GENERAL FINISH REQUIREMENTS**

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

**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 wall sheathing to verify that sheathing joints are supported by framing and blocking, that tops of fasteners are flush with surface, and that installation is within flatness tolerances.
  - 2. Verify that substrate is sound, dry to the maximum moisture content recommended by metal-shingle manufacturer, smooth, clean, sloped for drainage, and completely anchored and that provision has been made for flashings and penetrations through metal shingles.
  - 3. Verify that penetrations through metal shingles have been installed and are securely fastened.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 FABRICATION**

- A. Fabricate panel units to dimensions indicated on the drawings based on an assumed design temperature of 70 degrees F. Allow for ambient temperature range of time of fabrication and erection.
- B. Fabricate panels in sizes indicated using metal composite material so that the panel thickness at the joinery is as required by design. Completed panel shall be properly fabricated and designed so that no restraints can be placed on the panel, which might result in compressive skin stresses.
- C. The installation detailing shall be such that the installed panels shall remain flat due to temperature changes. Oil canning of panel surface shall be repaired by panel removal and replacement.
- D. Fabricate for flat lock folding of the panels on two edges with a total overlay thickness of 3/8". Joints shall be provided with a 2" nominal lap with a flat lock design.



- E. Fabricate flashing from sheet matching the finish of the panels. Provide lap strip under flashing at abutting conditions with lapped surfaces with sealant.
- F. Shop fabricate units ready for erection. If not shop assembled, pre-fabricate components at the shop as required for proper and expeditious field assembly.

### 3.3 METAL-SHINGLE INSTALLATION

- A. General: Install metal shingles according to manufacturer's written instructions applicable to products and applications indicated; install level, plumb, and true to line.
- B. Do not install component parts, which are observed to be defective, including warped, bowed, dented, abraded and/or broken members.
- C. Do not cut, trim weld, or braze component parts during erection, in a manner which would damage finish, decrease strength, or result in a visual imperfection or a failure in performance of wall panels. Return component parts which require alteration to shop for re-fabrication, if possible, or for replacement by new parts.
- D. Maintain uniform exposure and coursing of metal shingles throughout installation.
- E. Apply sealant between shingles, flashing, trim, and exposed fasteners to achieve a weathertight system.
- F. Interlock and overlap shingles and align joints of tile-form shingle courses above and below.
- G. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by manufacturer of metal shingles or of the metals in contact.
  - 1. Do not use graphite pencils to mark metal surfaces.

### 3.4 ACCESSORY INSTALLATION

- A. General: Install accessories according to manufacturers' written instructions unless more stringent requirements are indicated.
- B. Metal Flashings and Trim: Install metal flashings and trim according to manufacturer's recommendations.
- C. Downspouts: Join sections with manufacturer's standard telescoping joints.
  - 1. Provide hangers designed to integrate with metal shingle coursing. Design to hold downspouts securely to walls and 0.5 inch (12 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c.
  - 2. Provide elbows at base of downspout to direct water away from building.

- D. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch (25 mm) below roof edge scupper discharge.
- E. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by manufacturer of metal shingles or of the metals in contact.

### 3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal shingles within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

### 3.6 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed metal shingles or metal shingles that do not comply with specified requirements. Replace shingles with damaged or deteriorated finishes and other components of the Work that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as metal shingles are installed unless otherwise indicated in manufacturer's written installation instructions.
- C. On completion of installation, clean exposed surfaces of metal shingles according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Remove excess sealants. Maintain metal shingles in a clean condition during construction.
- D. Remove excess metal shingles and debris from Project site.

### 3.7 INSTALLER'S WARRANTY

- A. WHEREAS **<Insert name>** of **<Insert address>**, herein called the "Installer," has performed roofing and associated work ("work") on the following project:
  - 1. Owner: **<Insert name of Owner>**.
  - 2. Address: **<Insert address>**.
  - 3. Building Name/Type: **<Insert information>**.
  - 4. Address: **<Insert address>**.
  - 5. Area of Work: **<Insert information>**.
  - 6. Acceptance Date: **<Insert date>**.
  - 7. Warranty Period: **<Insert time>**.
  - 8. Expiration Date: **<Insert date>**.
- B. AND WHEREAS Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

- C. NOW THEREFORE Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
    - a. Lightning;
    - b. Peak gust wind speed exceeding 75 mph (m/s);
    - c. Fire;
    - d. Failure of system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    - e. Faulty construction of parapet walls, copings, vents, equipment supports, and other edge conditions and penetrations of the work;
    - f. Vapor condensation on back of panels.
  2. When work has been damaged by any of the foregoing causes, Warranty shall be null and void until such damage has been repaired by Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
  3. Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
  4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Installer to perform said alterations, Warranty shall not become null and void unless Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
  5. Owner shall promptly notify Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
  6. This Warranty is recognized to be the only warranty of Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of failure. Specifically, this Warranty shall not operate to relieve Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.
- E. IN WITNESS THEREOF, this instrument has been duly executed this **<Insert day>** day of **<Insert month>**, **<Insert year>**.
1. Authorized Signature: **<Insert signature>**.
  2. Name: **<Insert name>**.
  3. Title: **<Insert title>**.

**END OF SECTION 073116**

SECTION 075423

THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Mechanically fastened TPO membrane roofing system.
2. Tie-in to existing bituminous roofing.
3. Roof insulation.
4. Walkway pads.
5. Fascia system.
6. Expansion joints.

B. Related Sections:

1. Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Division 7 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, wall transition flashings, counterflashings.
3. Division 7 Section "Metal Shingles" for leaders and downspouts.
4. Division 7 Section "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
5. Mechanical Design-Builder for roof top equipment and curbs.

1.3 DEFINITIONS

- A. TPO: Thermoplastic polyolefin.
- B. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.
- C. Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," before multiplication by a safety factor.
- D. Factored Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," after multiplication by a safety factor.

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7.
  - 1. Corner Uplift Pressure: 58 lbf/sq. ft.
  - 2. Perimeter Uplift Pressure: 47 lbf/sq. ft
  - 3. Field-of-Roof Uplift Pressure: 25 lbf/sq. ft.
- D. FM Approvals Listing: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
  - 1. Fire/Windstorm Classification: Class 1A-90.
  - 2. Hail Resistance: MH.
- E. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Base flashings and membrane terminations.
  - 2. Tapered insulation, including slopes.
  - 3. Insulation fastening patterns.
  - 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- C. Qualification Data: For qualified Installer and manufacturer.
- D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system. Include manufacturer's rating of the roofing contractor.

- E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
  - 1. Submit evidence of compliance with performance requirements.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
- G. Research/Evaluation Reports: For components of membrane roofing system.
- H. Maintenance Data: For roofing system to include in maintenance manuals.
- I. Warranties: Sample of special warranties.
- J. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

**1.6 QUALITY ASSURANCE**

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- B. Source Limitations: Obtain components for membrane roofing system from or approved by roofing membrane manufacturer.
- C. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
  - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
- D. Preinstallation Roofing Conference: Conduct conference at Project site.
  - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
  - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
  - 3. Review condition of existing roofing at tie-in and compatibility of materials. Coordinate testing of existing materials if composition of existing roofing materials are not known.
  - 4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 5. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
  - 6. Review structural loading limitations of roof deck during and after roofing.

7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
8. Review governing regulations and requirements for insurance and certificates if applicable.
9. Review temporary protection requirements for roofing system during and after installation.
10. Review roof observation and repair procedures after roofing installation.

- E. Upon completion of the installation, an inspection shall be made by the system manufacturer to ascertain that the roofing system has been installed according to the applicable manufacturer's specifications and details. No "early bird" warranty will be accepted. The results of the warranty inspection shall be submitted in writing for review and shall be included in the warranty manuals.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
  1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

#### 1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

#### 1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.



1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, substrate board, roof pavers and other components of membrane roofing system.
  2. Warranty Period: 15 years from date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by on of the manufacturers specified.

### **2.2 THERMOPLASTIC POLYOLEFIN ROOFING MEMBRANE**

- A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: Uniform, flexible sheet formed from a thermoplastic polyolefin, internally fabric or scrim reinforced, and as follows:
1. Manufacturers:
    - a. Carlisle SynTec Incorporated.
    - b. Firestone Building Products Company.
    - c. GAF Materials Corporation.
    - d. GenFlex Roofing Systems.
    - e. Stevens Roofing Systems; Div. of JPS Elastomerics.
    - f. Versico Inc.
  2. Thickness: 60 mils (1.5 mm), nominal.
  3. Exposed Face Color: Light Grey.
  4. Physical Properties:
    - a. Breaking Strength: 225 lbf (1 kN); ASTM D 751, grab method.
    - b. Elongation at Break: 15 percent; ASTM D 751.
    - c. Tearing Strength: 55 lbf (245 N) minimum; ASTM D 751, Procedure B.
    - d. Brittleness Point: Minus 22 deg F (30 deg C).
    - e. Ozone Resistance: No cracks after sample, wrapped around a 3-inch- (75-mm-) diameter mandrel, is exposed for 166 hours to a temperature of 104 deg F (40 deg C) and an ozone level of 100 pphm (100 mPa); ASTM D 1149.

- f. Resistance to Heat Aging: 90 percent minimum retention of breaking strength, elongation at break, and tearing strength after 166 hours at 240 deg F (116 deg C); ASTM D 573.
- g. Water Absorption: Less than 4 percent mass change after 166 hours' immersion at 158 deg F (70 deg C); ASTM D 471.
- h. Linear Dimension Change: Plus or minus 2 percent; ASTM D 1204.

### 2.3 AUXILIARY MEMBRANE ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
  - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
  - 2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    - a. Plastic Foam Adhesives: 50 g/L.
    - b. Gypsum Board and Panel Adhesives: 50 g/L.
    - c. Multipurpose Construction Adhesives: 70 g/L.
    - d. Fiberglass Adhesives: 80 g/L.
    - e. Contact Adhesive: 80 g/L.
    - f. Other Adhesives: 250 g/L.
    - g. Single-Ply Roof Membrane Sealants: 450 g/L.
    - h. Nonmembrane Roof Sealants: 300 g/L.
    - i. Sealant Primers for Nonporous Substrates: 250 g/L.
    - j. Sealant Primers for Porous Substrates: 775 g/L.
- B. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 55 mils (1.4 mm) thick, minimum, of same color as sheet membrane.
- C. Bonding Adhesive: Manufacturer's standard water-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.
- D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- E. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.
- F. Bituminous Roofing Materials for Tie-in to Existing: Based upon identification of existing materials, provide modified bituminous membrane roofing materials compatible with existing. Extend existing roofing with new base flashing material to extend to top of expansion joint as shown.
  - 1. Provide granule surfaced flashing sheet reinforced with polyester fabric or glass fibers, suitable for application.

2. Insulation Cant Strips: Provide cant strip against roofing expansion joint for asphaltic materials, ASTM C 728, perlite insulation board or ASTM C 208 Type II , Grade 1, cellulosic fiber insulation board.

#### 2.4 ROOF INSULATION

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
  1. Manufacturers:
    - a. AlliedSignal Inc.; Commercial Roofing Systems.
    - b. Apache Products Company.
    - c. Atlas Roofing Corporation.
    - d. Carlisle SynTec Incorporated.
    - e. Celotex Corporation.
    - f. Firestone Building Products Company.
    - g. GAF Materials Corporation.
    - h. GenFlex Roofing Systems.
    - i. Hunter Panels, LLC.
    - j. Johns Manville International, Inc.
    - k. Koppers Industries.
    - l. RMAX.
  2. Minimum Thermal Resistance: R 5.5 per inch.
  3. Type VII, 60-psi (414-kPa) minimum compressive strength.
  4. Insulation Thickness: Refer to drawings.
- C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48), unless otherwise indicated.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to 1/2 inch per 12 inches slope.

#### 2.5 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
  1. Size fasteners to limit penetration of roofing deck to no more than 2" below bottom of deck where roof deck is not exposed.
  2. Where bottom of roof deck is exposed, size fasteners to limit penetration of roofing deck to top flutes only. See structural for acoustical deck locations.

2.6 ASPHALT MATERIALS

- A. Roofing Asphalt: ASTM D 312, Type III or IV.
- B. Asphalt Primer: ASTM D 41.

2.7 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads of rolls, approximately 3/16 inch (5 mm) thick by not less than 18", and acceptable to membrane roofing system manufacturer.

2.8 FASCIA SYSTEM

- A. Provide fasciae in shapes and sizes indicated. Include anchor plates; cleats or other attachment devices; concealed splice plates; and trim and other accessories indicated or required for complete installation, with no exposed fasteners.
- B. Provide exposed fascia components fabricated from the following metal:
  - 1. Formed Aluminum in thickness indicated, but not less than 0.050 inch (1.3 mm).
  - 2. Finish: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 1402, Test Method 7. Color as selected by the Architect. Refer to Division 9 Section "Color and Finish Schedule."
  - 3. Products: Available products include but are not limited to the following:
    - a. Firestone Edgegard+ System Aluminum
    - b. Hickman: Econosnap Aluminum EC-1000
    - c. Metal-Era: Permatite System 500
  - 4. Height of Fascia: Refer to drawings and provide system height shown, but not less than required to cover roof edge blocking.

2.9 EXPANSION JOINTS

- A. Deck-To-Deck and Deck-To-Wall Expansion Joints: Where indicated, provide manufacturers standard joint system consisting of expansion joint support or support sponge, anchor plates, and flashing.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

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

### 3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

### 3.3 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
  1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- G. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
  1. Fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
  2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

3.4 MECHANICALLY FASTENED MEMBRANE ROOFING INSTALLATION

- A. Mechanically fasten membrane roofing over area to receive roofing and install according to roofing system manufacturer's written instructions.
  - 1. For in-splice attachment, install membranes roofing with long dimension perpendicular to steel roof deck flutes.
- B. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Mechanically fasten or adhere membrane roofing securely at terminations, penetrations, and perimeter of roofing.
- E. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- F. In-Seam Attachment: Secure one edge of TPO sheet using fastening plates or metal battens centered within membrane seam and mechanically fasten TPO sheet to roof deck.
- G. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
  - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
  - 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
  - 3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
- H. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
- I. Install membrane roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition.
  - 1. Provide roofing expansion joint on top of wood blocking in compliance with roofing system manufacturer's details to provide transition to existing roofing.

3.5 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply solvent-based bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with sheet flashing.

- D. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings. Where counterflashings are not provided, provide a metal termination bar, fasten through membrane flashing into substrate, and then seal top of membrane at termination bar.
- F. Provide preformed "boot" flashings of type recommended by roofing system manufacturer typically for small pipe roofing penetrations. DO NOT provide "pitch pocket" type flashings for penetrations. Where "boot" type flashings cannot be provided due to multiple conduits or pipes, provide a formed metal curb and cap in compliance with SMACNA 5<sup>th</sup> Ed. Figure 4-13B or 4-14A.

### 3.6 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.
  - 1. Provide a walkway pad landing at each roof hatch equipped with a stair or ladder that is not less than 36" x 36".
  - 2. Provide a walkway path from roof hatch access point and continuously to roof top air handlers, to chillers, to makeup air units, etc. Path may route from one to the next.
  - 3. Provide not less than 36" width protection of roofing on all four sides of rooftop air handlers, chillers, and makeup air units.
  - 4. Provide one-pad width protection on all four sides of each rooftop fan.

### 3.7 FASCIA SYSTEM INSTALLATION

- A. Inspect edge of roofing prior to installation of fascia system. Do not proceed with installation until roof edge condition prevents standing water against the back of fascia. Install tapered edge stripping to achieve slope away from roof edge.
- B. Comply with manufacturer's written installation instructions. Anchor products securely to structural substrates to withstand lateral and thermal stresses and inward and outward loading pressures.
- C. Expansion Provisions: Install running lengths to allow controlled expansion for movement of metal components in relation not only to one another but also to adjoining dissimilar materials, including flashing and roofing membrane materials, in a manner sufficient to prevent water leakage, deformation, or damage.
- D. Roof Edge Scuppers: Fabricate roof edge to comply with SMACNA details, and to provide drip edge from roof where indicated. Coordinate with downspout placements.

3.8 TIE-IN AT EXISTING ROOFING SYSTEM

- A. Comply with manufacturer and NRCA recommendations for installation of flashings compatible with existing roof system, to extend cut edge of roofing to top of roofing expansion joint.

3.9 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
- C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.11 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS <Insert name> of <Insert address>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
  - 1. Owner: The County of Cheshire, New Hampshire.
  - 2. Address: 33 West Street, Keene, NH.
  - 3. Building Name/Type: Cheshire County House of Corrections.
  - 4. Address: <Insert address>.
  - 5. Area of Work: <Insert information>.
  - 6. Acceptance Date: <Insert date>.
  - 7. Warranty Period: <Insert time>.
  - 8. Expiration Date: <Insert date>.



- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
    - a. Lightning;
    - b. Peak gust wind speed exceeding 70 mph;
    - c. Fire;
    - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    - e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    - f. Vapor condensation on bottom of roofing; and
    - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
  2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
  3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
  4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
  5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
  6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this **<Insert day>** day of **<Insert month>**, **<Insert year>**.

1. Authorized Signature: **<Insert signature>**.
2. Name: **<Insert name>**.
3. Title: **<Insert title>**.

**END OF SECTION 075423**

SECTION 076200

SHEET METAL FLASHING AND TRIM

**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 sheet metal flashing and trim in the following categories:
  - 1. Metal flashing associated with roof edge scuppers.
  - 2. Copings at roofing expansion joints.
  - 3. Miscellaneous flashings associated with roof penetrations and non-exposed wall flashings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 7 Section "Metal Shingles" for metal wall shingles and flashings associated with wall shingles, for roofing downspouts and conductor heads.
  - 2. Division 7 Section: "Thermoplastic Polyolefin Roofing" for fascia system and for flashing and roofing accessories installed integral with roofing membrane as part of roofing-system work.
  - 3. Division 7 Section "Joint Sealants" for elastomeric sealants.
  - 4. Division 7 Section "Roof Accessories" for roof hatches.
  - 5. Mechanical Design/Builder for mechanical equipment curbs and cap flashings associated with mechanical equipment.

1.3 SUBMITTALS

- A. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.
- B. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.5 PROJECT CONDITIONS

- A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

## PART 2 - PRODUCTS

### 2.1 METALS

- A. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, of minimum uncoated weight (thickness) of 16 oz (0.55 mm thick); coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Revere Copper Products, Inc.; FreedomGray.

### 2.2 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Solder for Zn-Sn Alloy Coated Copper: ASTM B 32, 100 percent tin.
- B. Fasteners for Zinc-Tin Alloy-Coated Stainless-Steel Sheet: Series 300 stainless steel.
- C. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4-mm) dry film thickness per coat.
- D. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- E. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants."
- F. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.

### 2.3 FABRICATION, GENERAL

- A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's, 5<sup>th</sup> Edition, "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

- D. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- E. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- F. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
- G. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
- H. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
  - 1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

#### 2.4 SHEET METAL FABRICATIONS

- A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.
- B. Flashings: Fabricate from the following material:
  - 1. Zn-Sb Alloy Coated Copper.
  - 2. Provide two piece removable counterflashings to conform to SMACNA, 5<sup>th</sup> Edition; Modified Figure 4-3C.
    - a. Provide a bearing bar attachment to precast concrete per figure 4-5A where applicable. Provide drilled anchors at precast concrete. Do not use powder driven fasteners into masonry or precast concrete materials for flashings.
    - b. Coordinate with masonry specification for provision of counter-flashing receivers installed in masonry. Furnish counter-flashing receivers fabricated to have a 4" tall back-lip at back of masonry cavity. Furnish to mason for installation in masonry construction and in coordination with flashings provided under that Section.
- C. Equipment Support and Miscellaneous Flashings: Fabricate from the following material:
  - 1. Zn-Sb Alloy Coated Copper.
  - 2. Form to detail.

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's, 5<sup>th</sup> Edition "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.
- B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 20 feet (6 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).
- D. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm), except where pretinned surface would show in finished Work.
  - 1. Pretinching is not required for the following metals:
    - a. Alloy-coated copper.
  - 2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- E. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.
  - 1. Use joint adhesive for nonmoving joints specified not to be soldered.
- F. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- G. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.
  - 1. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.

3.3 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

- B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

**END OF SECTION 076200**





SECTION 077200

ROOF ACCESSORIES

**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 the following:
  - 1. Roof hatches.
- B. Related Sections include the following:
  - 1. Division 5 Sections for roof framing modifications.
  - 2. Division 5 Section for ladders.
  - 3. Division 6 Section "Rough Carpentry" for roof blocking.
  - 4. Division 7 Sections for roofing.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, materials, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other Work.

1.4 QUALITY ASSURANCE

- A. Standards: Comply with the following:
  - 1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

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

- a. Babcock-Davis Hatchways, Inc.
- b. Bilco Company.
- c. Dur-Red Products, Inc.
- d. Milcor, Inc.
- e. Nystrom Products Co.

## 2.2 MATERIALS, GENERAL

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.
  1. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
  2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).
- B. Insulation: Manufacturer's standard rigid or semi-rigid glass-fiber board of thickness indicated.
- C. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.
  1. Where removing exposed fasteners would afford access through the roof, provide non-removable fastener heads.
  2. Where anchoring roof hatch to roof deck, provide 1/2" expansion anchors through flange into concrete at not more than 16" on center. Roof flanges may alternatively be welded to steel embeds in concrete roof structure.
- D. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.

## 2.3 ROOF HATCHES

- A. General: Fabricate units to withstand 40-lbf/sq. ft. (1.9- kPa) external and 20-lbf/sq. ft. (0.95- kPa) internal loading pressure. Frame with integral curb height to provide not less than 8" from roofing to top of curb. Provide curb with double-wall construction with 1-1/2-inch (38- mm) insulation and cap flashing (roofing counterflashing), with welded or sealed mechanical corner joints. Provide double-wall cover (lid) construction with 1- inch- (25-mm-) thick insulation core. Provide gasketing and equip with corrosion-resistant or hot-dip galvanized hardware including pintle hinges, hold-open devices, and both interior and exterior latch handles.
  1. Fabricate hinges with non-removable hinges, compression loaded and designed to help support weight of door.
- B. Type: Single-leaf service access from ladder.
  1. For Ladder Access: 30" x 36" (760 mm by 915 mm).
  2. Material: 14 ga. galvanized steel sheet curb and cover.

3. Finish: Light gray color to be selected.
4. Basis of Design:
  - a. Bilco Type S20.
5. Latch: Provide interior hasp loop.
6. Ladder Safety Post: Manufacturer's standard ladder safety post. Post to lock in place on full extension. Provide release mechanism to return post to closed position.
  - a. Height: 42 inches (1060 mm) above finished roof deck.
  - b. Material and Finish: Steel tube, galvanized.
  - c. Diameter: Pipe with 1-5/8-inch (41-mm) OD tube.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

#### **3.2 CLEANING AND PROTECTION**

- A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

**END OF SECTION 077200**



SECTION 078413

THROUGH-PENETRATION FIRESTOP SYSTEMS

**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 through-penetration firestop systems for penetrations through, and at the top of, the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
  - 1. Walls and partitions. Refer to drawings for rated wall construction and locations. Fire stop to rating indicated.
  - 2. Smoke partitions. Refer to drawings for smoke partition locations. Provide fire stopping equal to a 1 hour rated wall or partition.
- B. Related Sections include the following:
  - 1. Division 7 Section "Joint Sealants".
  - 2. Refer to Design/Builders for fire suppression, plumbing, mechanical, and electrical system wall penetrations.

1.3 DEFINITIONS

- A. Firestops: Specially tested materials used to reestablish the integrity of a fire rated wall, floor, or other partition after the structure has been breached for the through-penetration of building.
- B. Through Penetration: Pipes, conduits, ducts, cable trays, cable, wire or other element passin completely through an opening in a fire rated barrier/assembly.
- C. Membrane Penetration: Penetration of a fire rated barrier that breaches one side, but does not pass completely through to the other side.
- D. System: The combination of specific materials and/or devices, including the penetrating item(s) required to complete the firestop, as tested by an independent third party test facility.
- E. Barrier/Assembly: A wall, floor, or other partition with a fire – smoke rating of 1, 2, or 3 hours.
- F. F-Rating: The time a firestop (penetrating item/building material/firestop material) can withstand direct flame without a burn through as tested to ASTM E814 / UL 1479.
- G. T-Rating: The amount of time a through-penetration firestop limits the temperature rise on the cold side (outside the test furnace) as tested to ASTM E814 / UL 1479.

- H. L-Rating: The L-Rating criteria determines the amount of air leakage, in cubic feet per minute, per square foot of opening (CFM/sq. ft). through the firestop system at ambient and/or 400 degrees F. air temperature at an air pressure differential of 0.30in. W.C. L-Ratings are used to determine the suitability of a firestop to stop smoke and toxic gases in accordance with NFPA Life Safety Code, 101.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
  - 1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
  - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
  - 3. Fire-resistance-rated floor assemblies.
  - 4. Non-fire resistive-rated floor assemblies shall be firestopped with 1-hour assembly tested to resist passage of smoke and other gases.
- B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
  - 1. Penetrations located outside wall cavities.
  - 2. Penetrations located outside fire-resistive shaft enclosures.
  - 3. Penetrations located in construction containing fire-protection-rated openings.
  - 4. Penetrating items larger than 4-inch- (100-mm-) diameter nominal pipe or 16 sq. in. (100 sq. cm) in overall cross-sectional area.
- D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
  - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
  - 2. For floor penetrations with annular spaces exceeding 4 inches (100 mm) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
  - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
  - 4. For firestop systems exposed to view, provide acrylic based product for compatibility with finish painting.
- E. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.5 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product indicated. Literature shall indicate product characteristics, typical uses, performance and limitation criteria, and test data.
- B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include UL Tested System designation that evidences compliance with requirements for each condition indicated.
  - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
  - 2. Engineering Judgments: Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.
- C. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems 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.
- B. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
  - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
  - 2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
    - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
    - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
      - 1) UL in "Fire Resistance Directory."
      - 2) Other testing laboratory acceptable to Code Authority Having Jurisdiction.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
- D. Special Inspections: Allow for 1 of each type of firestopping system to be removed and inspected for conformance with approved submittals. All firestopping shall be inspected prior to the installation of ceilings.

- E. Above Ceiling review: Prior to the installation of ceilings, a review of construction completion shall be done for firestopping and other items that will not be visible when the ceilings have been installed.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi-component materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

**1.8 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

**1.9 COORDINATION**

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Architect and building inspector, if required by authorities having jurisdiction, have examined each installation.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Firestop Systems Inc.
  - 2. Grace Construction Products
  - 3. Hilti Construction Chemicals, Inc.
  - 4. International Protective Coatings Corp.



5. Isolatek International.
6. 3M Fire Protection Products.
7. Nelson Firestop Products.
8. RectorSeal Corporation (The).
9. Specified Technologies Inc.

## 2.2 FIRESTOP SYSTEMS, GENERAL

- A. **Compatibility:** Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. **Accessories:** Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
  1. Permanent forming/damming/backing materials, including the following:
    - a. Slag-/rock-wool-fiber insulation.
    - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    - c. Fire-rated form board.
    - d. Fillers for sealants.
  2. Temporary forming materials.
  3. Substrate primers.
  4. Collars.
  5. Steel sleeves.

## 2.3 FILL MATERIALS

- A. **General:** Provide through-penetration firestop systems containing the types of fill materials as required by UL approved Through-Penetration Firestop System. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. **Cast-in-Place Firestop Devices:** Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. **Firestopping Track Systems:** Head-of-wall drywall track system consisting of a slip track designed to allow an inflatable bag to be filled with cementitious fireproofing material to seal the track to deck condition a top of wall.
- D. **Latex Sealants:** Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- E. **Elastomeric Spray:** Single component, water-based elastomeric compound.

- F. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- G. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- H. Intumescent Putties: Non-hardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- I. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- J. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- K. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- L. Silicone Foams: Multi-component, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
- M. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
  - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
- N. Unfaced, Slag-Wool-/Rock-Wool-Fiber Board Insulation: ASTM C 612, maximum flame-spread and smoke-developed indices of 15 and 0, respectively; passing ASTM E 136 for combustion characteristics; and of the following density, type, thermal resistivity, and fiber color:
  - 1. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).
  - 2. Color: Natural.
  - 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Fibrex Insulations Inc.
    - b. Owens Corning.
    - c. Thermafiber.

## 2.4 MIXING

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

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

#### 3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Provide through-penetration firestop systems for conditions specified whether or not firestopping is indicated.
  - 1. Through-Penetrations: Install through-penetration firestop systems in all open penetrations and in the annular space in all penetrations in fire-rated barriers.
  - 2. Membrane-Penetrations: Install through-penetration firestop systems in rated walls. Where required by code, provide products that meet the requirements of third party time/temperature testing.
  - 3. Construction Joints/Gaps: Provide through-penetration firestop systems for the following locations:
    - a. Between the edges of floor slabs and exterior walls.

- b. Between the tops of walls and the underside of floors or roofs.
  - c. In the control joints in masonry walls and floors.
  4. Smoke Stopping: Provide smoke stops for through-penetrations, membrane penetrations, and construction gaps with a material approved and tested for such applications.
- C. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- D. Install fill materials for firestop systems by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 FIELD QUALITY CONTROL

- A. Prior to installation of ceilings, inspect penetrations requiring firestopping to verify complete installation of firestopping materials. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- C. Reinstall firestopping materials that have been removed for inspection.

### 3.5 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
  1. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
  2. Contractor's name, address, and phone number.
  3. Through-penetration firestop system designation of applicable testing and inspecting agency.
  4. Date of installation.
  5. Through-penetration firestop system manufacturer's name.
  6. Installer's name.

### 3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

**END OF SECTION 078413**



SECTION 079200

JOINT SEALANTS

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes sealants for the following applications, including those specified by reference to this Section:
1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
    - a. Control and expansion joints in cast-in-place concrete.
    - b. Control and expansion joints in unit masonry.
    - c. Joints between different materials listed above.
    - d. Perimeter joints between materials listed above and frames of doors and windows.
    - e. Control and expansion joints in ceiling and overhead surfaces.
    - f. Joints at the top of reglets supporting counterflashings.
    - g. Fill under door thresholds.
    - h. Other joints as indicated.
  2. Exterior joints in the following horizontal traffic surfaces:
    - a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
  3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints of exterior openings.
    - c. Vertical control or material joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
    - d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
    - e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - f. Joints between cabinets/countertops and walls.
    - g. Other joints as indicated.
  4. Interior joints in the following horizontal traffic surfaces:
    - a. Control and expansion joints in cast-in-place concrete slabs.
- B. Related Sections include the following:
1. Division 7 Section "Through-Penetration Firestop Systems" for fire-resistant building joint-sealant systems.
  2. Division 8 Section "Glazing" for glazing sealants.
  3. Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. LEED Submittal:
  - 1. Product Data for Credit EQ 4.1: For sealants and sealant primers used inside the weatherproofing system, including printed statement of VOC content.
- C. Samples for Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- D. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution:
  - 1. Provide samples of joint sealant colors selected at each different condition to be sealed for selection verification. Provide approximately 2'-0" of sealant for each condition.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.



1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
  - 2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F (4.4 deg C).
  - 3. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
  - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
  - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
  - 3. Mechanical damage caused by individuals, tools, or other outside agents.
  - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

**PART 2 - PRODUCTS**

2.1 PRODUCTS AND MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.
- C. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
  - 1. Architectural Sealants: 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
  - 3. Sealant Primers for Porous Substrates: 775 g/L.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
- B. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that could come in contact with food, provide products that comply with 21 CFR 177.2600.
  - 1. Provide compliant sealants at food preparation work surfaces and fixtures.
- C. Single-Component Nonsag Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
  - 1. Products: Provide one of the following.
    - a. Vulkem 116; Mameco International.
    - b. Vulkem 230; Mameco International.
    - c. Sikaflex - 1a; Sika Corporation.
    - d. NP 1; Sonneborn Building Products Div., ChemRex Inc.
    - e. Dymonic; Tremco.
  - 2. Type and Grade: S (single component) and NS (nonsag).
  - 3. Class: 25.
  - 4. Applications:
    - a. In metal flashing joints between overlapped flashing materials.
    - b. Under exterior door thresholds.
- D. Multicomponent Nonsag Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
  - 1. Products: Provide one of the following:
    - a. Chem-Calk 500; Bostik Inc.
    - b. Vulkem 922; Mameco International.
    - c. Dynatrol 2; Pecora Corporation.
    - d. PSI-270; Polymeric Systems, Inc.
    - e. NP 2; Sonneborn Building Products Div., ChemRex Inc.
    - f. Sikaflex-2c, NS; Sika

- g. Dymeric 240/240FC; Tremco.
  - 2. Type and Grade: M (multicomponent) and NS (nonsag).
  - 3. Class: 25.
  - 4. Applications:
    - a. Exterior outside perimeters of steel door frames between wall and frame.
- E. Low-Modulus Neutral-Curing Silicone Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
  - 1. Products: Provide one of the following:
    - a. Dow Corning Corporation; 790.
    - b. Silpruf LM; GE Silicones.
    - c. 890; Pecora Corporation.
  - 2. Type and Grade: S (single component) and NS (nonsag).
  - 3. Class: 100/50.
  - 4. Additional Movement Capability: 50 percent movement in extension and 50 percent movement in compression for a total of 100 percent movement.
  - 5. Applications:
    - a. Exterior concrete, building stone, and masonry joints.
    - b. Exterior outside perimeters and other joints of aluminum curtainwall, storefronts, windows.
    - c. Exterior sealing joints in metal wall panels.
    - d. Interior joints in kitchen or food preparation areas including joints at perimeters of lights, registers, and other wall or ceiling mounted equipment.
- F. Mildew Resistant Silicone Sealant: Where joint sealants of this type are indicated provide products complying with the following:
  - 1. Products: Provide one of the following:
    - a. 786 Mildew Resistant; Dow Corning
    - b. Sanitary 1700; GE Silicones.
    - c. 898 Silicone Sanitary Sealant; Pecora Corporation.
    - d. PSI-611; Polymeric Systems, Inc.
    - e. Tremsil 600 White; Tremco.
  - 2. Type and Grade: S (single component), and NS (nonsag).
  - 3. Class 25
  - 4. Additional Movement Capability: 50 percent movement in extension and 50 percent movement in compression for a total of 100 percent movement.
  - 5. Applications:
    - a. Wet areas other than food preparation areas.
      - 1) Use for sealing interior joints with non-porous substrates in wet areas with ceramic tile or epoxy paint near and around sinks, and between equipment or counters and non-porous walls.
- G. Multicomponent Pourable Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
  - 1. Products: Provide one of the following:
    - a. Chem-Calk 550; Bostik Inc.
    - b. Vulkem 245; Mameco International.
    - c. NR-200 Urexpam; Pecora Corporation.
    - d. Sikaflex - 2c SL; Sika Corporation.
    - e. SL 2; Sonneborn Building Products Div., ChemRex Inc.
    - f. THC-900; Tremco.

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Applications:
  - a. Joints in exterior concrete slabs on grade.

#### 2.4 LATEX JOINT SEALANTS

- A. Latex Sealant Standard: Comply with ASTM C 834 for each product of this description indicated.
- B. Latex Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
  1. Products: Provide one of the following.
    - a. Chem-Calk 600; Bostik Inc.
    - b. NuFlex 330; NUCO Industries, Inc.
    - c. LC 160 All Purpose Acrylic Caulk; Ohio Sealants, Inc.
    - d. AC-20; Pecora Corporation.
    - e. PSI-701; Polymeric Systems, Inc.
    - f. Sonolac; Sonneborn Building Products Div., ChemRex, Inc.
    - g. Tremflex 834; Tremco.
  2. Applications:
    - a. Interior joints in field painted vertical and overhead joints not indicated otherwise.

#### 2.5 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Backer Rod: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
  1. Type C: Closed-cell material with a surface skin.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

#### 2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

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

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
    - a. Concrete.
    - b. Masonry.
    - c. Unglazed surfaces of ceramic tile.
  - 3. Remove laitance and form-release agents from concrete.
  - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
    - a. Metal.
    - b. Glass.
    - c. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where indicated and recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
  - 1. Apply primer on all porous surfaces such as exterior masonry, granite or precast concrete.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.
- E. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses provided for each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealants from surfaces adjacent to joint.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
    - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

### 3.4 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage

or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

**END OF SECTION 079200**





SECTION 081113

STEEL DOORS AND FRAMES

**PART 1 - GENERAL**

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Steel doors.
  - 2. Steel door frames.
- B. Related Sections include the following:
  - 1. Division 8 Section "Flush Wood Doors" for wood doors installed in steel frames.
  - 2. Division 8 Section "Door Hardware" for door hardware and weather stripping.
  - 3. Division 8 Section "Glazing" for glass in glazed openings in doors and frames.
  - 4. Division 9 Section "Gypsum Systems" for stud partitions in which steel door frames are mounted.
  - 5. Division 9 Section "Painting" for field painting factory-primed doors and frames.

1.2 DEFINITIONS

- A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

1.3 SUBMITTALS

- A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.
- B. Shop Drawings: Show the following:
  - 1. Elevations of each door design.
  - 2. Details of doors including vertical and horizontal edge details.
  - 3. Frame details for each frame type including dimensioned profiles.
  - 4. Details and locations of reinforcement and preparations for hardware.
  - 5. Details of each different wall opening condition.
  - 6. Details of anchorages, accessories, joints, and connections.
  - 7. Coordination of glazing frames and stops with glass and glazing requirements.
- C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

1.4 QUALITY ASSURANCE

- A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- C. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
  - 1. Doors: Provide doors as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
    - a. Clear Width: 32 inches (815 mm) with door 90 degrees open.
    - b. Maneuvering Clearances: Refer to Code for various side and approach clearances.
    - c. Double-Leaf Doorways: Provide at least one leaf that meets the clear width and maneuvering clearances.
    - d. Two Doors in Series: Provide a distance of four feet plus the width of any door swinging into the space between hinged or pivoted doors.
  - 2. Notify Architect of details or specifications not conforming to code.
- D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
- B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inch- (100-mm) high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to permit air circulation.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Steel Doors and Frames:

- a. Ceco Door Products; a United Dominion Company.
- b. Curries Company.
- c. Steelcraft; a division of Ingersoll-Rand.
- d. Overly Door Company

## 2.2 MATERIALS

- A. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.
- B. Galvanized Steel Sheets: Zinc-coated carbon steel complying with ASTM A 526 (ASTM A 526M), commercial quality, or ASTM A 642 (ASTM A 642M), drawing quality, hot-dip galvanized according to ASTM A 525, with A 60 or G 60 (ASTM A 525M, with Z 180 or ZF 180) coating designation, mill phosphatized.
- C. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 (ZF120) zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.
- D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher-leveled standard of flatness where used for face sheets.

## 2.3 DOORS

- A. General: Provide doors of sizes, thicknesses, and designs indicated.
- B. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:
- C. Level 2 (18 gage) and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).

## 2.4 FRAMES

- A. General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.
- B. Frames of 0.053-inch- (1.3-mm-) (16 gage) thick steel sheet for:
  1. Wood doors.
- C. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.
- D. Plaster/Grout Guards: Provide 0.016-inch- (0.4-mm-) thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.

- E. Supports and Anchors: Fabricated from not less than 0.042-inch- (1.0-mm-) thick, electrolytic zinc-coated or metallic-coated steel sheet. Provide anchors not more than 18" from top and bottom of frame and spaced no more than 32" on center.
  - 1. Masonry Anchors: Adjustable strap and stirrup or T-shaped anchors to suit frame size, with corrugated or perforated straps not less than 2" x 10" long. Provide strap and stirrup anchors at fire rated frames in masonry.
  - 2. Stud-wall Type: Designed to engage stud, welded to back of frames.
  - 3. Floor Anchors: Clip-type anchors with two holes to receive fasteners.
- F. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

## 2.5 FABRICATION

- A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.
- B. Interior Door Faces: Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from the following material:
  - 1. Cold-rolled steel sheet, unless otherwise indicated.
- C. Core Construction: Manufacturer's standard core construction that produces a door complying with SDI standards.
- D. Clearances for Non-Fire-Rated Interior Doors: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between pairs of doors. Not more than 3/4 inch (19 mm) at bottom. Undercut doors where scheduled to provide clear dimension indicated.
  - 1. Coordinate with thresholds for 1/4" clearance to top of threshold for exterior doors.
- E. Clearances for Fire-Rated Doors: As required by NFPA 80.
- F. Single-Acting, Door-Edge Profile: Beveled edge.
- G. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- H. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- I. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- J. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.
- K. Frame Construction: Fabricate frames to shape shown.

1. Fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
  2. Provide welded frames with temporary spreader bars.
- L. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
- M. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

## 2.6 FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products".
1. Finish steel door and frames after assembly.
- B. Metallic Coated Steel Surface Preparation: Clean surfaces with non-petroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Refer to Division 9 Section "Painting" for finish. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.
1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.
- C. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil grease or other contaminants that could impair paint bond. Remove mill scale and rust from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6 /NACE No. 3, "Commercial Blast Cleaning."
- D. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria. Provide primer that is compatible with finish coating specified in Division 9 Section "Painting".

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates, areas and conditions for compliance with requirements prior to starting work. Proceed with work only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Restore exposed finishes by grinding, filling, and dressing as required to make repaired area smooth, flush, and invisible on exposed painted surfaces.
- B. Prior to installation, verify frame squareness, alignment, twist, and plumbness to be plus or minus 1/16" across frame.

3.3 INSTALLATION

- A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.
- B. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
  - 1. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.
  - 2. In metal-stud partitions, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws.
  - 3. Provide anchor at each jamb into floor.
  - 4. For openings 90 inches (2286 mm) or more in height, install an additional anchor at hinge and strike jambs.
- C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.
  - 1. Fire-Rated Doors: Install within clearances specified in NFPA 80.
  - 2. Smoke-Control Doors (20 minute): Install to comply with NFPA 105.

3.4 ADJUSTING AND CLEANING

- A. Galvanizing Repair: Clean abraded areas and repair with galvanizing repair paint per manufacturer's written instructions.
- B. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.
- C. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

**END OF SECTION 081113**

**SECTION 081416**

**FLUSH WOOD DOORS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes the following:
  - 1. Solid-core doors with wood-veneer faces.
  - 2. Factory finishing flush wood doors.
  - 3. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Sections include the following:
  - 1. Division 8 Section "Steel Doors and Frames" for frames for wood doors.
  - 2. Division 8 Section "Door Hardware"
  - 3. Division 8 Section "Glazing" for door lights.

**1.2 SUBMITTALS**

- A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
  - 1. Indicate dimensions and locations of mortises and holes for hardware.
  - 2. Indicate dimensions and locations of cutouts.
  - 3. Indicate requirements for veneer matching.
  - 4. Indicate doors to be factory finished and finish requirements.
  - 5. Indicate fire ratings for fire doors.
- C. LEED Submittals:
  - 1. Product Data for Credit EQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.
- D. Samples for Verification:
  - 1. Faces of Factory-Finished Doors: Submit samples showing full range of finished veneer color variation for verification.

**1.3 QUALITY ASSURANCE**

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
  - 1. Quality Standard: Comply with WDMA I.S.1-A, "Architectural Wood Flush Doors".

- B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 17 and 50 percent during the remainder of the construction period.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span.
  - 1. Warranty shall also include unloading, distribution, installation, glass, glazing and finishing that may be required due to repair or replacement of defective doors.
  - 2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
    - a. Solid-Core Interior Doors: Life of installation.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Flush Wood Doors (5-ply):
    - a. Algoma Hardwoods Inc.
    - b. Eggers Industries; Architectural Door Division.
    - c. Marshfield Door Systems, Inc.
    - d. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL



- A. Doors for Transparent Finish:
  - 1. Grade: Premium, with Grade A faces.
  - 2. Species and Cut: Birch, rotary cut.
  - 3. Match between Veneer Leaves: Book match.
  - 4. Assembly of Veneer Leaves on Door Faces: Balance.
  - 5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
  - 6. Stiles: Same species as faces.

## 2.3 SOLID-CORE DOORS

- A. Particleboard Cores: Comply with the following requirements:
  - 1. Particleboard: ANSI A208.1, Grade 1-LD-2.
- B. Interior Veneer-Faced Doors:
  - 1. Core: Particleboard.
  - 2. Provide doors with structural composite lumber cores instead of particleboard cores at locations where oversized glass lites are indicated.
  - 3. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.

## 2.4 LIGHT FRAMES

- A. Wood Beads for Light Openings in Wood Doors:
  - 1. Wood Species: Same as face of door.
  - 2. Profile: Lipped tapered beads.

## 2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
  - 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.

## 2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing.
- B. Finish doors at factory.

- C. Finish doors at factory that are indicated to receive transparent finish.
- D. Finish doors at factory where indicated in schedules or on Drawings as factory finished.
- E. Transparent Finish:
  - 1. Grade: Premium.
  - 2. Finish: Manufacturer's standard finish with performance comparable to AWI System TR-4 conversion varnish or AWI System TR-6 catalyzed polyurethane.
  - 3. Staining: Semi-transparent gray color to be selected. Refer to Division 9 Section "Color and Finish Schedule".
  - 4. Effect: Open-grain finish.
  - 5. Sheen: Satin.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine doors and installed door frames before hanging doors.
  - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION**

- A. Hardware: For installation, see Division 8 Section "Door Hardware."
- B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
  - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

#### **3.3 ADJUSTING**

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

**END OF SECTION 081416**

SECTION 083113

ACCESS DOORS AND FRAMES

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following types of access doors, unless specified elsewhere:
  - 1. Wall access doors.
  - 2. Ceiling access doors.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 9 Sections for building in access doors installed in ceilings and partitions.
  - 2. Division 23 Sections for duct access doors.
  - 3. Division 9 Section "Painting" for field painting.
  - 4. Division 9 Section "Color and Finish Schedule" for paint colors.

1.3 SUBMITTALS

- A. Product data for each type of access door assembly specified, including details of construction relative to materials, individual components, profiles, finishes, and fire-protection ratings (if required).
  - 1. Include complete schedule, including types, general locations, sizes, wall and ceiling construction details, latching or locking provisions, and other data pertinent to installation.
- B. Shop drawings showing fabrication and installation of customized access doors and frames, including details of each frame type, elevations of door design types, anchorage, and accessory items.
- C. Schedule: Submit schedule of access doors with locations and sizes required.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain access doors for entire Project from one source and by a single manufacturer.
- B. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units, which may vary slightly from sizes indicated.

**1.5 COORDINATION**

- A. Each trade to determine specific locations, quantities and sizes of access doors needed to gain access to concealed equipment, and indicate on schedule specified under "Submittals" Article. Provide this information to the Contractor for coordination. Access doors and frames are to be furnished by trade required to provide access to equipment. Access door installation is to be by Division providing wall or ceiling in which panel is installed. All keying is to be matched.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
  - 1. Inryco.
  - 2. J.L. Industries.
  - 3. Karp Associates, Inc.
  - 4. Larsen's Manufacturing Co.
  - 5. Milcor, Inc.
  - 6. Nystrom, Inc.
  - 7. Peterson Enterprises
  - 8. The Williams Bros. Corporation of America.

**2.2 MATERIALS**

- A. Steel Sheet: ASTM A 366 (ASTM A 366M) commercial-quality, cold-rolled steel sheet with baked-on, rust-inhibitive primer.

**2.3 COMMERCIAL GRADE ACCESS DOORS**

- A. Flush Access Doors with Exposed Trim: Units consisting of frame with exposed trim, door, hardware, and complying with the following requirements:
  - 1. Frame: 0.0598-inch- (1.52-mm-) thick steel sheet.
  - 2. Door: 0.0747-inch- (1.90-mm-) thick steel sheet.
  - 3. Trim: Flange integral with frame, 3/4 inch (19 mm) wide, overlapping surrounding finished surface.
  - 4. Hinge: Continuous type.
  - 5. Locks: Key-operated cylinder lock (keyed alike).

**2.4 FABRICATION**

- A. General: Manufacture each access door assembly as an integral unit ready for installation.
- B. Steel Access Doors and Frames: Continuous welded construction. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

1. Exposed Flange: Nominal 1 to 1-1/4 inches (25 to 32 mm) wide around perimeter of frame.
  2. For installation in masonry construction, furnish frames with adjustable metal masonry anchors.
- C. Locking Devices: Furnish number required to hold door in flush, smooth plane when closed.
1. For cylinder lock, furnish 1 key per lock and key all locks alike.
- D. Sizes: 16 by 16 inch minimum for arm-reach access, 24 by 24 inch for arm and shoulder access. Refer to drawings and schedules for other sizes required.
- E. Finish: Factory primed for final finish under Division 9.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Advise Installers of other work about specific requirements relating to access door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices. Furnish inserts and anchoring devices for access doors that must be built into other construction. Coordinate delivery with other work to avoid delay.
- B. Provide access doors where required to access valves, controls, electrical equipment, and other items requiring access, above non-accessible ceilings and behind walls.

#### **3.2 INSTALLATION**

- A. Comply with manufacturer's instructions for installing access doors.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finished surfaces.

#### **3.3 ADJUST AND CLEAN**

- A. Adjust hardware and panels after installation for proper operation.
- B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

**END OF SECTION 083113**



SECTION 084113

ALUMINUM ENTRANCES AND STOREFRONTS

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Exterior and interior entrance systems.
  - 2. Exterior and interior storefront systems.
- B. Related sections include the following:
  - 1. Division 7 Section "Joint Sealants" for joint sealants installed as part of aluminum entrance and storefront systems.
  - 2. Division 8 Section "Glazing."
  - 3. Division 8 Section "Aluminum Windows."
  - 4. Division 8 Section "Door Hardware" for door hardware.

1.3 SYSTEM DESCRIPTION

- A. General: Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:
  - 1. Air infiltration and water penetration exceeding specified limits.
  - 2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.
- B. Glazing: Physically and thermally isolate glazing from framing members.
- C. Glazing-to-Glazing Joints: Provide glazing-to-glazing joints that accommodate thermal and mechanical movements of glazing and system, prevent glazing-to-glazing contact, and maintain required edge clearances.
- D. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.
- E. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction and International Building Code/2003, or the American Society of Civil

Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.

1. Deflection of framing members inward and outward in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch (19 mm), whichever is smaller, unless otherwise indicated.
  2. Static-Pressure Test Performance: Provide entrance and storefront systems 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.
  3. Project Design Values: As indicated on the structural drawings.
- F. Seismic Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements of authorities having jurisdiction or ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 9, "Earthquake Loads," whichever are more stringent.
1. Refer to structural drawings for applicable criteria.
- G. Dead Loads: Provide entrance- and storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.
1. Provide a minimum 1/8-inch (3.18-mm) clearance between members and top of glazing or other fixed part immediately below.
  2. Provide a minimum 1/16-inch (1.59-mm) clearance between members and operable windows and doors.
- H. Live Loads: Provide entrance and storefront systems, including anchorage, that accommodate the supporting structures' deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
1. Assume that structural design has assume 1/240 in the design of spanning members for live load, and accommodate that.
- I. Air Infiltration: Provide entrance and storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. (0.3 L/s/sq. m) of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft. (75.2 Pa).
- J. Water Penetration: Provide entrance and storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft. (299 Pa). Water leakage is defined as follows:
1. Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.
- K. Thermal Movements: Provide entrance and storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.



1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- L. Structural-Support Movement: Provide entrance and storefront systems that accommodate structural movements including, but not limited to, sway and deflection.
- M. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.1.
- N. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.63 Btu/sq. ft. x h x deg F (3.57 W/sq. m x K) when tested according to AAMA 1503.1.
- O. Dimensional Tolerances: Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

#### 1.4 SUBMITTALS

- A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- B. Shop Drawings: For entrance and storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work. Show door hardware locations, accessory framing components, and mounting details.
- C. Samples for Verification: Manufacturer's color samples showing match to color indicated. Coordinate submittal sample requirements with Division 8 Section "Aluminum Windows" and submit at same time.
- D. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of entrance and storefront systems with requirements based on comprehensive testing of current systems.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.
  1. Engineering Responsibility: Prepare data for entrance and storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Source Limitations: Obtain each type of entrance and storefront system through one source from a single manufacturer.
- C. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code-Aluminum."

- D. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
  - 1. Doors: Provide doors as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
    - a. Clear Width: 32 inches (815 mm) with door 90 degrees open.
    - b. Maneuvering Clearances: Refer to Code for various side and approach clearances.
    - c. Double-Leaf Doorways: Provide at least one leaf that meets the clear width and maneuvering clearances.
    - d. Two Doors in Series: Provide a distance of four feet plus the width of any door swinging into the space between hinged or pivoted doors.
  - 2. Notify Architect of details or specifications not conforming to code.
  
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Management and Coordination." Review methods and procedures related to glazed aluminum storefront system including, but not limited to, the following:
  - 1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
  - 2. Review structural loading limitations.
  - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review required inspecting, testing, and certifying procedures.
  - 5. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions.

## 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating systems without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

## 1.7 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
  
- B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
  - 1. Structural failures including, but not limited to, excessive deflection.
  - 2. Adhesive sealant failures.
  - 3. Cohesive sealant failures.
  - 4. Failure of system to meet performance requirements.
  - 5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

6. Failure of operating components to function normally.
  7. Water leakage through fixed glazing and frame areas.
- C. Warranty Period: 2 years from date of Substantial Completion.
- D. Warranty Period for Metal Finishes: 15 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS AND PRODUCTS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Vistawall Architectural Products.
  2. Kawneer North America
  3. EFCO Corporation
- B. Basis of Specification Products:
1. Entrances and Storefronts:
    - a. Kawneer Tri-Fab 451T thermally broken storefront, screw spline, center set.
  2. Doors:
    - a. Kawneer 500 series wide-stile door with 6.5" bottom rail

### 2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
  2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221 (ASTM B 221M).
  3. Extruded Structural Pipe and Tubes: ASTM B 429.
  4. Bars, Rods, and Wire: ASTM B 211 (ASTM B 211M).
  5. Welding Rods and Bare Electrodes: AWS A5.10.
- B. Steel Reinforcement: Complying with ASTM A 36 (ASTM A 36M) for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 (ASTM A 570M) for hot-rolled sheet and strip.
- C. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.
- D. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.

- E. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.
  - 1. Color: To be selected by Architect.
  - 2. Use neutral-cure silicone sealant with insulating-glass units.
- F. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.
- G. Aluminum Sheet Trim: 0.063" sheet aluminum finished to match framing system.
- H. Sealants and joint fillers for joints at perimeter of entrance and storefront systems as specified in Division 7 Section "Joint Sealants."
- I. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

### 2.3 GLAZING

- A. Glass and Glazing Materials: Refer to Division 8 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

### 2.4 COMPONENTS

- A. Framing: 2 -inch x 4.5-inch, center set glazed profile, typically.
  - 1. Provide 4.5" x 4.5" framing members at head and sill conditions where indicated.
- B. Doors: Provide manufacturer's 1-3/4-inch- (44.5-mm-) thick glazed doors with minimum 0.125-inch- (3-mm-) thick, extruded tubular rail and stile members. Mechanically fasten corners that incorporate concealed tie-rods.
  - 1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.
  - 2. Stile Design: Wide stile; 5 inch (125 mm) wide stiles, 5 inch (125 mm) wide top rail and with 7.5 inch (190 mm) high bottom rail.
- C. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements from stainless steel. Provide non-staining, nonferrous shims for aligning system components.
- D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
  - 1. Reinforce members as required to retain fastener threads.
  - 2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.
- E. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

- F. Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer. Provide flashing to match material and finish of storefront framing where exposed.
- G. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:
  - 1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.

## 2.5 HARDWARE

- A. General: Provide heavy-duty hardware units indicated in sizes, number, and type recommended by manufacturer for entrances indicated. Finish exposed parts to match door finish, unless otherwise indicated.
- B. Hardware: Install per Division 8 Section "Door Hardware". Coordinate for installation of hardware as scheduled. Provide manufacturer hardware where indicated.

## 2.6 FABRICATION

- A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
  - 1. Fabricate components for manufacturer's recommended frame construction and assembly.
- B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
- C. Prepare components to receive concealed fasteners and anchor and connection devices.
- D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- E. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- F. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."
- G. Storefront: Fabricate framing in profiles indicated. Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.
- H. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest

extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.

- I. Trim Enclosures: Fabricate trim enclosures indicated of aluminum sheet as shown. Provide manufacturer's design for concealed fasteners and clips to hold trim in place.

## 2.7 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. High-Performance Organic Finish: 2-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  1. Color and Gloss: Satin Gloss. Refer to Division 9 Section "Color and Finish Schedule" for color selection.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 COORDINATION

- A. Coordinate with other work which must be integrated into storefront components. Schedule sequence of assembly with the installation of other work, providing opportunities for piping, wiring, electrical devices, etc. to be installed in coordination with storefront framing and trim.

### 3.3 INSTALLATION

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight.

- B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- D. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.
- E. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
  - 1. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.
- F. Install glazing to comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.
  - 1. Remove excess sealant from component surfaces before sealant has cured.
- G. Install sunshades where indicated, equipped with color-matched end cap closures for a finished appearance.
- H. Install perimeter sealant to comply with requirements of Division 7 Section "Joint Sealants," unless otherwise indicated.
- I. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:
  - 1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
  - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm). Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).
  - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

### 3.4 ADJUSTING AND CLEANING

- A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.
- B. Remove excess sealant and glazing compounds, and dirt from surfaces.

### 3.5 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

**END OF SECTION 084113**



SECTION 085113

ALUMINUM WINDOWS

**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 the following types of aluminum-framed windows:
  - 1. Fixed windows.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 8 Section "Glazing" for reception sliding window.
  - 2. Division 7 Section "Joint Sealants" for joint sealants installed as part of glazed aluminum curtain wall system.
  - 3. Division 8 Section "Aluminum Entrances and Storefronts "
  - 4. Division 8 Section "Glazing."

1.3 DEFINITIONS

- A. AW: Architectural.
- B. Performance grade number, included as part of the AAMA/NWWDA product designation code, is actual design pressure in pounds force per square foot (pascals) used to determine structural test pressure and water test pressure.
- C. Structural test pressure, for uniform load structural test, is equivalent to 150 percent of design pressure.
- D. Minimum test size is smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of test size indicated below:
  - 1. Minimum size required by AAMA/NWWDA 101/I.S.2.

- B. AAMA/NWWDA Performance Requirements: Provide aluminum windows of the performance class and grade indicated that comply with AAMA/NWWDA 101/I.S.2.
  - 1. Performance Class and Grade: AW65.
  - 2. Exception to AAMA/NWWDA 101/I.S.2: In addition to requirements for performance class and performance grade, design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch (19 mm), whichever is less, at design pressure based on the following:
    - a. Testing performed according to AAMA/NWWDA 101/I.S.2, Uniform Load Deflection Test or structural computations.
- C. Thermal Movements: Provide aluminum windows, including anchorage, that accommodate thermal movements of units resulting from the following maximum change (range) in ambient and surface temperatures without buckling, distortion, opening of joints, failure of joint sealants, damaging loads and stresses on glazing and connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C) material surfaces.

#### 1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and maintenance instructions for each type of aluminum window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other Work, operational clearances, and the following:
  - 1. Mullion details, including reinforcement and stiffeners.
  - 2. Joinery details.
  - 3. Expansion provisions.
  - 4. Flashing and drainage details.
  - 5. Thermal-break details.
  - 6. Glazing details.
- C. Samples for Verification: Submit color chips for units with factory-applied color finishes. Coordinate this submittal with the requirements of Division 8 Section "Aluminum Entrances and Storefronts" and Section "Glazed Aluminum Curtain Walls", and submit together.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type, grade, and size of aluminum window. Test results based on use of down-sized test units will not be accepted.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Same installer as for Division 8 Section "Aluminum Entrances and Storefronts".
- B. Source Limitations: Obtain aluminum windows through one source from a single manufacturer; the same manufacturer as Division 8 Section "Aluminum Entrances and Storefronts".

- C. Product Options: Information on Drawings and in Specifications establishes requirements for aluminum windows' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
- D. Fenestration Standard: Comply with AAMA/NWWDA 101/I.S.2, "Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors," for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
  - 1. Provide AAMA-certified aluminum windows with an attached label.
- E. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

#### 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
  - 1. Failure to meet performance requirements.
  - 2. Structural failures including excessive deflection.
  - 3. Water leakage, air infiltration, or condensation.
  - 4. Faulty operation of movable sash and hardware.
  - 5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- B. Warranty Period: 2 years from date of Substantial Completion.
- C. Warranty Period for Metal Finishes: 15 years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Fixed Windows and Operable Sash:
    - a. Kawneer North America
    - b. Vistawall Architectural Products.
    - c. EFCO Corporation
- B. Basis of Specification Products:
  - 1. Fixed Windows:
    - a. Kawneer Tri-Fab 451T thermally broken (storefront material), screw spline, center set.

## 2.2 MATERIALS, GENERAL

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength, not less than 16,000-psi (110-MPa) minimum yield strength, and not less than 0.125 inch (3.2 mm) thickness at any location for the main frame and sash members.
- B. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components. Cadmium-plated steel fasteners are not permitted.
  - 1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch (3.2 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.
  - 2. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
  - 3. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated. Cadmium-plated steel anchors, clips, and accessories are not permitted.
- D. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.
- E. Reinforcing Members: Aluminum, nonmagnetic stainless steel, nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated. Cadmium-plated steel reinforcing members are not permitted.
- F. Aluminum Sheet Trim: 0.063" sheet aluminum finished to match framing system.

- G. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.
  - 1. Color: To be selected by Architect. Refer to Division 9 Section "Color and Finish Schedule."
  - 2. Use neutral-cure silicone sealant with insulating-glass units.
- H. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

### 2.3 GLAZING

- A. Glass and Glazing Materials: Refer to Division 8 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

### 2.4 FABRICATION

- A. General: Fabricate aluminum windows, in sizes indicated, that comply with AAMA/NWWDA 101/I.S.2 for performance class and performance grade indicated. Include a complete system for assembling components and anchoring windows.
- B. General: Fabricate aluminum windows, in sizes indicated, that comply with requirements and that meet or exceed AAMA/NWWDA 101/I.S.2 performance requirements for the following window type and performance class. Include a complete system for assembling components and anchoring windows.
  - 1. Fixed Windows: AW.
- C. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.
- D. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
  - 1. Provide thermal-break construction that has been in use for not less than three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show adequate strength and security of glass retention.
  - 2. Provide thermal barriers tested according to AAMA 505; determine the allowable design shear flow per the appendix in AAMA 505.
- E. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design loads of window units.
- F. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 8 Section "Glazing" and with AAMA/NWWDA 101/I.S.2.

- G. Glazing Stops: Provide snap-on glazing stops coordinated with Division 8 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.
- H. Trim Enclosures: Fabricate jamb trim enclosures indicated of aluminum sheet as shown.
- I. Sill Pan Flashings: Fabricate window sill pan flashings to form a complete three-sided, water proof pan with a 3/4" minimum edge height at back and sides. Fabricate to window size with a hemmed drip edge on the exterior open side, and with a hem at the top of the back visible edge. Fabricate of material to match finish of window units and orient so that only finished surface is exposed when installation is completed.
  - 1. Provide weep holes and internal passages to conduct infiltrating water to exterior.
  - 2. Provide of material matching window framing color and finish.

## 2.5 FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. High-Performance Organic Finish: 2-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 1. Color and Gloss: Satin Gloss. Refer to Division 9 Section "Color and Finish Schedule" for color selection.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate; coordination with wall flashings, vapor retarders, and other built-in components; operational clearances; and other conditions affecting performance of work.
  - 1. Masonry Opening: Review preparation of masonry opening for window. Include review of in wall flashings, lintels, and anchoring angles.
  - 2. Measure masonry openings prior to final fabrication of window units, and size units to fit with a perimeter sealant joint as indicated.

- a. Size units and glazing to anticipate no less than 1/4" deflection of the lintel at mid span.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components; Drawings; and Shop Drawings.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Inspect opening into which window is to be installed before starting work. Verify that flashings are completed, and that as installed, moisture will be excluded from the building interior by the combined performance of flashings and window assembly.
- D. Set extruded or fabricated pan flashings and bed of sealant. Set window units in pan flashings and seal with sealant or with gaskets, as indicated, for weathertight construction.
- E. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- F. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101/I.S.2.

### 3.3 ADJUSTING

- A. Adjust operating sashes and ventilators, screens, hardware, [operators, ]and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

### 3.4 PROTECTION AND CLEANING

- A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.
- B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.

- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

**END OF SECTION 085113**



**SECTION 087100**

**DOOR HARDWARE**

**PART 1 - GENERAL**

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Commercial door hardware for the following:
    - a. Swinging doors.
  - 2. Electrified door hardware.
  - 3. Access control low voltage wiring.
  
- B. Related Sections include the following:
  - 1. Division 8 Section "Steel Doors and Frames".
  - 2. Division 8 Section "Aluminum Entrances and Storefronts"
  - 3. Division 8 Section "Flush Wood Doors"

1.2 SUBMITTALS

- A. Product Data: Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.
  
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
  - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.
    - a. Organize door hardware sets in same order as in the Door Hardware Schedule at the end of Part 3.
  - 3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each door hardware item.
    - b. Manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - e. Explanation of abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for door hardware.
    - g. Door and frame sizes and materials.
  - 4. Submittal Sequence: Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in the Project construction schedule. Submit the final Door Hardware Schedule after Samples, Product Data,

coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.

- C. Keying Schedule: Provide within door schedule.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, indicating current products comply with requirements.
- E. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.
- F. Warranties: Special warranties specified in this Section.

### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed door hardware 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.
- B. Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
  - 1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- C. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
- D. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
  - 1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that are listed to perform electrical modifications, by a testing and inspecting agency acceptable to authorities having jurisdiction, are acceptable.
- E. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
  - 1. Door Hardware: Provide hardware as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
    - a. 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.
    - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
      - 1) Interior Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
      - 2) Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.

- 3) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
  - c. Thresholds: Not more than 1/2 inch (13 mm) high. Bevel raised thresholds with a slope of not more than 1:2.
  2. NFPA 101: Comply with the following for means of egress doors:
    - a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
    - b. Door Closers: Not more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.
      - 1) Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.
    - c. Thresholds: Not more than 1/2 inch (13 mm) high.
  3. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- F. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section " Project Management and Coordination." Review methods and procedures related to electrified door hardware including, but not limited to, the following:
1. Inspect and discuss roughing-in and other preparatory work performed by other trades.
  2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  3. Review required testing, inspecting, and certifying procedures.
- 1.4 DELIVERY, STORAGE, AND HANDLING
- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
  - B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
  - C. Deliver keys to Owner and obtain receipt for submittal to architect.
- 1.5 COORDINATION
- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
  - B. Electrical System Roughing-in: Coordinate layout of electric controlled locks with connections to security system. Wire each device to electrical room for connection by Tenant's security contractor.

1.6 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of operators and door hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- C. Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Warranty Period for Manual Closers: 10 years from date of Substantial Completion.

1.7 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

**PART 2 - PRODUCTS**

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this Section, door hardware sets indicated in door and frame schedule.
  - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturer's products or equal by a listed manufacturer.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Schedule at the end of Part 3. Products are identified by using door hardware designations, as follows:
  - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
  - 2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

2.2 BUTT HINGES

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

- a. Hager Companies (HAG).
  - b. McKinney Products Company; Div. of ESSEX Industries, Inc. (MCK).
  - c. PBB, Inc. (PBB).
  - d. Stanley Commercial Hardware; Div. of The Stanley Works (ST).
- B. Quantity: Provide the following, unless otherwise indicated:
1. Two Hinges: For doors with heights up to 60 inches (1524 mm).
  2. Three Hinges: For doors with heights 61 to 90 inches (1549 to 2286 mm).
  3. Four Hinges: For doors with heights 91 to 120 inches (2311 to 3048 mm).
  4. For doors with heights more than 120 inches (3048 mm), provide 4 hinges, plus 1 hinge for every 30 inches (750 mm) of door height greater than 120 inches (3048 mm).
  5. For Blast Resistant Door and Frame Assemblies, provide number of hinges required by manufacturer to comply with design requirements.
- C. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- D. Hinge Options: Comply with the following where indicated in the Door Hardware Schedule or on Drawings:
1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:
    - a. Outswinging exterior doors.
    - b. Outswinging corridor doors with locks.
  2. Corners: Square.
- E. Fasteners: Comply with the following:
1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
  2. Wood Screws: For wood doors and frames.
  3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
  4. Screws: Phillips flat-head screws; machine screws (drilled and tapped holes) for metal doors, wood screws for wood doors and frames. Finish screw heads to match surface of hinges.

### 2.3 BORED LOCKS AND LATCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Mechanical Locks and Latches:
    - a. Best Lock Corporation (BLC).
    - b. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).
    - c. Schlage Lock Company; an Ingersoll-Rand Company (SCH).
- B. Bored Locks: BHMA Grade 1; Series 4000.
- C. Auxiliary Locks: BHMA Grade 1.
- D. Lock Trim: Comply with the following:
1. Lever: Cast.
  2. Escutcheon (Rose): Forged.
  3. Dummy Trim: Match lever lock trim and escutcheons.

- a. Lockset Designs: Provide the lockset design designated in schedules or, if sets are provided by another manufacturer, provide designs that match those designate
- E. Lock Functions: Lock functions as indicated in the hardware schedule.
  - 1. Lock Functions: Lock functions as indicated in the hardware schedule.
- F. Lock Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:
  - 1. Deadbolts: Minimum 1-inch (25-mm) bolt throw.
- G. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

## 2.4 EXIT DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Precision Hardware, Inc. (PH).
  - 2. Sargent Manufacturing Company; Div. Of ESSEX Industries, Inc.
  - 3. Von Duprin; an Ingersoll Rand Company
- B. Standard: BHMA A156.3.
  - 1. BHMA Grade: Grade 1.
- C. Certified Products: Provide exit devices listed in BHMA's "Directory of Certified Exit Devices."
- D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- E. Fire Exit Devices: Complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.
- F. Outside Trim: Pull with cylinder; material and finish to match locksets, unless otherwise indicated.
  - 1. Match design for locksets and latchsets, unless otherwise indicated.
- G. Through Bolts: For exit devices and trim on fire-rated wood doors.

## 2.5 CYLINDERS AND KEYING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cylinders: Same manufacturer as for locks and latches.
- B. Standards: Comply with the following:
  - 1. Cylinders: BHMA A156.5.
- C. Cylinder Grade: BHMA Grade 1.

- D. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
  - 1. Number of Pins: Six.
  - 2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
  - 3. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  - 4. Bored-Lock Type: Cylinders with tailpieces to suit locks.
  
- E. Keying System: Unless otherwise indicated, provide a factory-registered keying system complying with the following requirements:
  - 1. Master Key System: Cylinders are operated by a change key and a master key.
  - 2. Keyed Alike: Key all cylinders to the same change key.
    - a. Provide one level master key.
  
- F. Keys: Provide nickel-silver keys complying with the following:
  - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
    - a. Notation: "DO NOT DUPLICATE."
  - 2. Quantity: In addition to two cut keys for each cylinder, provide the following:
    - a. Cylinder Change Keys: Three.
  - 3. Key Cutting: Final key quantities for each cut will be as determined in keying conference. Quantities above are to establish total keys to be provided only.

## 2.6 STRIKES

- A. Standards: Comply with the following:
  - 1. Strikes for Bored Locks and Latches: BHMA A156.2.
  - 2. Dustproof Strikes: BHMA A156.16.
  
- B. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
  - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
  - 2. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

## 2.7 OPERATING TRIM

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Baldwin Hardware Corporation (BH).
  - 2. Burns Manufacturing Incorporated (BM).
  - 3. Don-Jo Mfg., Inc. (DJO).
  - 4. Ives: H. B. Ives (IVS).
  - 5. Rockwood Manufacturing Company (RM).
  - 6. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
  
- B. Standard: Comply with BHMA A156.6.

- C. Materials: Fabricate from stainless steel, unless otherwise indicated.
- D. Pull Design:
  - 1. 1" diameter solid stainless steel round bar, 10" center to center, with a projection of 2-1/2", and a clearance of 1-1/2".
  - 2. Provide through bolts, one at each base, for fastening.
- E. Push Bar Design:
  - 1. 1" diameter solid stainless steel round bar with a projection of 2-1/2" and a 1-1/2" clearance.
  - 2. Bases for each push bar shall span the door width and be centered on each door stile.
  - 3. Where used on flush doors, the center to center dimensions shall be equal to the door width minus the standard lock backset for each stile.

## 2.8 CLOSERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Surface-Mounted Closers:
    - a. LCN Closers; an Ingersoll-Rand Company (LCN).
    - b. Corbin Russwin Architectural Hardware; Division of Yale Security Inc. (CR)
    - c. Sargent Manufacturing Company; Division of ESSEX Industries, Inc. (SGT)
- B. Standards: Comply with the following:
  - 1. Closers: BHMA A156.4.
- C. Surface Closers: BHMA Grade 1.
- D. Certified Products: Provide door closers listed in BHMA's "Directory of Certified Door Closers."
- E. Size of Units: Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
- F. Provide all closers by one manufacturer, with cast iron cases and full rack and pinion construction, non-handed and non-sized with adjustable back-check and full cover. Provide parallel arm closers typically.
  - 1. Closers with integral stops shall have heavy forged steel parallel arms and soffit plates attached to frames with not less than six screws. The forged steel arm shall have a positive stop bracket with an adjustable tension hold-open feature controlled with a screw permitting adjustment from no-hold-open to full restraint of door movement.

## 2.9 AUTOMATIC DOOR OPERATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Automatic Door Operators:
    - a. LCN Closers; an Ingersoll-Rand Company (LCN).
    - b. Horton Automatics, a division of Overhead Door Corporation (HA)



- B. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated; and complying with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.
  - 1. Coordinate with security system installer for control of electric latch and card reader control to disable door operator when door is locked.
  - 2. Wind Load: Provide door operators on exterior doors that will open and close doors and maintain them in fully closed position when subjected to wind load identified on structural drawings.
  - 3. Comply with BHMA A156.10
- C. Electromechanical Operating System: Self-contained unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation- and safety-device wiring, and manual operation including spring closing when power is off.
- D. Housing for Overhead Concealed Operators: Fabricated from minimum 0.125-inch- (3.2-mm-) thick, extruded or formed aluminum and extending full width of door opening including door jambs to conceal door operators and controls. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.
- E. Cover for Surface-Mounted Operators: Fabricated from 0.125-inch- (3.2-mm-) thick extruded or formed aluminum; continuous over full width of operator-controlled door opening; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.
- F. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonstaining, nonferrous shims for aligning system components.

## 2.10 PROTECTIVE TRIM UNITS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Metal Protective Trim Units:
    - a. Burns Manufacturing Incorporated (BM).
    - b. Hager Companies (HAG).
    - c. Ives: H. B. Ives (IVS).
    - d. Rockwood Manufacturing Company (RM).
- C. Standard: Comply with BHMA A156.6.
- D. Materials: Fabricate protection plates from the following:
  - 1. Stainless Steel: 0.050 inch (1.3 mm) thick; beveled top and 2 sides.

- E. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine or self-tapping screws.

## 2.11 STOPS AND HOLDERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Stops and Bumpers:
    - a. Burns Manufacturing Incorporated (BM).
    - b. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
    - c. Hager Companies (HAG).
    - d. Ives: H. B. Ives (IVS).
    - e. Rockwood Manufacturing Company (RM).
- B. Standards: Comply with the following:
  - 1. Stops and Bumpers: BHMA A156.16.
  - 2. Electromagnetic Door Holders: BHMA A156.15.
  - 3. Door Silencers: BHMA A156.16.
  - 4. Wall Stops: BHMA Grade 1. Wall type bumpers with concealed type flange shall be used where ever possible and shall of type scheduled.
- C. Floor Stops: Where wall type bumpers cannot be used, provide dome type, floor mounted stops of the proper height.
  - 1. Do not mount floor stops where they will impede traffic or endanger pedestrians.
- D. Provide matching finishes for hardware units at each door or opening, to the greatest extent possible, and except as otherwise indicated. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening. In general, match items to the manufacturer's standard finish for the latch and lock set (or push-pull units if no latch-lock sets) for color and texture.
- E. Silencers for Metal Door Frames: BHMA Grade 1; neoprene or rubber, minimum diameter 1/2 inch (13 mm); fabricated for drilled-in application to frame.

## 2.12 DOOR GASKETING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Door Gasketing:
    - a. National Guard Products, Inc. (NGP).
    - b. Pemko Manufacturing Co., Inc. (PEM).
    - c. Reese Enterprises, Inc. (RE).
    - d. Zero International, Inc. (ZRO).
  - 2. Door Bottoms:
    - a. National Guard Products, Inc. (NGP).
    - b. Pemko Manufacturing Co., Inc. (PEM).
    - c. Reese Enterprises, Inc. (RE).
    - d. Zero International, Inc. (ZRO).

- B. Standard: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
- C. Weatherstripping: Provide continuous weather-strip gasketing on exterior doors.
  - 1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
  - 2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
  - 3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

## 2.13 THRESHOLDS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Hager Companies (HAG).
  - 2. National Guard Products, Inc. (NGP).
  - 3. Pemko Manufacturing Co., Inc. (PEM).
  - 4. Reese Enterprises, Inc. (RE).
  - 5. Zero International, Inc. (ZRO).
- B. Standard: Comply with BHMA A156.21.

## 2.14 FABRICATION

- A. Manufacturer's Nameplate: Do not provide manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved by Architect.
  - 1. Manufacturer's identification will be permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.
- C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
  - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
  - 2. Steel Machine or Wood Screws: For the following fire-rated applications:
    - a. Mortise hinges to doors.
    - b. Strike plates to frames.
    - c. Closers to doors and frames.

3. Steel Through Bolts: For the following fire-rated applications, unless door blocking is provided:
  - a. Surface hinges to doors.
  - b. Closers to doors and frames.
  - c. Surface-mounted exit devices.
4. Spacers or Sex Bolts: For through bolting of hollow metal doors.
5. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."

## 2.15 FINISHES

- A. Standard: Comply with BHMA A156.18.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide the following finishes:
  1. Butts and Hinges: 26D
  2. Locks & Lock Trim: 26D
  3. Exit Devices: 32D
  4. Door Controls - Closers: Sprayed Alum. Finish
  5. Mortise Locks & Latches: 26D
  6. Door Stops 26D/32D
  7. Weatherstripping Aluminum
  8. Threshold Aluminum
  9. Kickplates 32D
  10. Pulls 32D

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 series.
  - 1. Surface-Applied Door Hardware: Drill and tap doors and frames according to SDI 107.
- B. Wood Doors: Comply with DHI A115-W series.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
  - 3. Coordinate door hardware for use. Do not place pulls in front of cylinders.
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- D. Access Control Wiring: Wire each door position switch and electric lock to the nearest tele-data closet and label for connection to access control system.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.
- B. Six-Month Adjustment: Approximately 10 months after date of Substantial Completion, Installer shall perform the following:
  - 1. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
  - 2. Consult with and instruct Owner's personnel on recommended maintenance procedures.

3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

C. Automatic Door Operators

1. Readjust automatic door operators after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).
2. Occupancy Adjustment: When requested or at 10 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DOOR HARDWARE SCHEDULE

**Knox Box**

Provide one each Knox Box Model 3271 with tamper switch. Mount where indicated at south entry of facility near main entry. Coordinate with fire system installer for contactors.

**Hardware Set 1A – Entrance Single – Auto Operator- Electric**

1 set	Hinges (incl. elec. hinge)	T4A3386 4.5 X 4.5	MC
1 each	Electric Hinge	T4A3386CC 4.5 x 4.5	MC
1 each	Exit Device	56 8804 less manual dogging	SA
1 each	Power Supply	3520	SA
2 each	Cylinder		SA
1 each	Pull	111 (mount below cylinder)	RO
1 each	Keypad/Card Reader Control		
1 each	Auto Door Operator	9542	LC
1 each	Door Actuator	853T	LC
1 each	Door Actuator	855	LC
1 each	Sequencer	8310-849	LC
1 each	Door Position Switch	1076C	SN
1 each	Threshold	513	NG
1 each	Kickplate	.050 x 5.5" x 1" LDW	RO

*Gasketing and door bottom sweep by aluminum door manufacturer.*

**Hardware Set 1B – Vestibule Single – Auto Operator**

1 set	Hinges	T4A3786 4.5 X 4.5	MC
1 each	Push/Pull	11147	RO
1 each	Auto Door Operator	9542	LC
1 each	Door Actuator	853T	LC
1 each	Kickplate	.050 x 5.5" x 1" LDW	RO

*Weatherstripping by door manufacturer.*

**Hardware Set 1C – Entrance Single – Electric**

1 set	Hinges (incl. elec. hinge)	T4A3386 4.5 X 4.5	MC
1 each	Electric Hinge	T4A3386CC 4.5 x 4.5	MC
1 each	Exit Device	55 8876 ETL less manual dogging	SA
1 each	Power Supply	3520	SA
1 each	Cylinder		SA
1 each	Keypad/Card Reader Control		
1 each	Closer	281 CPS	SA
1 each	Door Position Switch	1076C	SN
1 each	Threshold	513	NG
1 each	Kickplate	.050 x 5.5" x 1" LDW	RO

*Gasketing and door bottom sweep by aluminum door manufacturer.*

**Hardware Set 2A – Passage Set**

1 set	Hinges	TA2714 4.5 X 4.5	MC
1 each	Latchset	10U15 LL	SA
1 each	Stop	409/443	RO
1 set	Door Silencers	608	NG

**Hardware Set 2B – Office Set**

1 set	Hinges	TA2714 4.5 X 4.5	MC
1 each	Lockset	10G05 LL	SA
1 each	Cylinder Core		SA
1 each	Stop	409/443	RO
1 set	Door Silencers	608	NG

**Hardware Set 2C – Not used**

**Hardware Set 2D – Privacy**

1 set	Hinges	TA2314 4.5 X 4.5	MC
1 each	Lockset	10U65 LL	SA
1 each	Stop	409/443	RO
1 set	Door Silencers	608	NG

**Hardware Set 3A – Storeroom**

1 set	Hinges	TA2714 4.5 X 4.5	MC
1 each	Lockset	10G04 LL	SA
1 each	Cylinder Core		SA
1 each	Stop	409/443	RO
1 set	Door Silencers	608	NG

**Hardware Set 3B Storeroom – Electric**

1 set	Hinges (incl. elect. hinge)	TA2714 4.5 X 4.5	MC
1 each	Electric Hinge	TA2714CC 4.5 x 4.5	MC
1 each	Lockset	10G71 LL	SA
1 each	Deadlock	465	SA
2 each	Cylinder Core		SA
1 each	Keypad/Card Reader Control		
1 each	Closer	281 P10	SA
1 each	Stop	409/443	RO
1 set	Door Silencers	608	NG

**Hardware Set 3C – Storeroom**

1 set	Hinges	TA2714 4.5 X 4.5	MC
1 each	Lockset	10G04 LL	SA
1 each	Cylinder Core		SA
1 each	Closer	281 P10	SA
1 each	Stop	409/443	RO
1 set	Door Silencers	608	NG

**Hardware Set 4A Exit – Electric**

1 set	Hinges (incl. elect. hinge)	TA2714 4.5 X 4.5	MC
1 each	Electric Hinge	TA2714CC 4.5 x 4.5	MC
1 each	Exit Device	55 8876ETL less manual dogging	SA
1 each	Cylinder Core		SA
1 each	Keypad/Card Reader Control		
1 each	Closer	281 P10	SA
1 each	Stop	409/443	RO
1 set	Door Silencers	608	NG

**Hardware Set 5 Rated Door**

1 set	Hinges	TA2714 4.5 X 4.5	MC
1 each	Lockset	10U15 LL	SA
1 each	Deadlock	464	SA
2 each	Cylinder Core		SA
1 each	Closer	281 P10	SA
1 set	Door Silencers	608	NG

**END OF SECTION 087100**



**SECTION 088000**

**GLAZING**

**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 glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
  - 1. Commercial Glazing for Aluminum Storefronts, Aluminum Curtain Walls, and Windows, for Hollow Metal Frames and Doors, and for Wood Doors.
- B. Related Sections include the following:
  - 1. Division 8 Section "Aluminum Entrances and Storefronts"
  - 2. Division 8 Section "Aluminum Windows"
  - 3. Division 8 Section "Hollow Metal Doors & Frames"
  - 4. Division 10 Section "Vents & Louvers"

1.3 DEFINITIONS

- A. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit that contains vented space, dehydrated air or a specified gas.
- D. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or

gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

- B. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- C. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. 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 thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
  - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements or as indicated in the glazing schedules:
    - a. Specified Design Wind Loads and Factors: Refer to structural drawings.
    - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
      - 1) Load Duration: 60 seconds or less.
    - c. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch (25 mm), whichever is less.
      - 1) For monolithic-glass lites heat treated to resist wind loads.
      - 2) For insulating glass.

## 1.5 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For the following products, in the form of 4-inch- (100-mm-) square samples for glass and of 4-inch- (100-mm-) long samples for sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
  - 1. Coated glass.
  - 2. For each color (except black) of exposed glazing sealant indicated.
- C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thickness' for each size opening and location.
- D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
  - 1. Glass Design: Provide certificate and calculations indicating that glass thicknesses for this project have been analyzed for sizes shown on the drawings and are appropriate.
- E. Product Test Reports: Submit product testing data from a qualified testing agency indicating the specified products comply with requirements, based on comprehensive testing of current products.
- F. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project with minimum 5 years experience.
- B. Source Limitations for Clear Glass: Obtain clear float glass from one primary-glass manufacturer.
- C. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
- D. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
  - 1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
- E. 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.
- F. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: GANA's "Glazing Manual."
  - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For sealed insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

1.9 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 PRODUCTS AND MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following products:
  - 1. Float and Heat Treated Glass:
    - a. Ford Motor Co., Glass Div.
    - b. Globe Amerada Glass Co.
    - c. Guardian Industries Corp.
    - d. Interpane Glass Company
    - e. Pilkington Sales (North America) Limited.
    - f. PPG Industries, Inc.
    - g. Viracon, Inc.

2.2 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
  - 1. Minimum Glass Thickness for Exterior Lites: Not less than 6 mm.
  - 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
  - 1. Provide Kind FT float glass in all non-fire rated doors and within 24" of any door jamb below 5' height as required by building codes.

2.3 PRIMARY FLOAT GLASS

- A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); class as indicated in schedules at the end of Part 3.

2.4 HEAT-TREATED FLOAT GLASS

- A. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent glass, flat); Quality q3 (glazing select); class, kind, and condition as indicated in schedules at the end of Part 3.
  - 1. For uncoated glass, comply with requirements for Condition A.
  - 2. For coated vision glass, comply with requirements for Condition C (other coated glass).

2.5 Tinted Float Glass: Class 2, complying with other requirements specified.

- 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Exterior Tinted Glass Basis-of-Design Product: Subject to compliance with requirements, provide:
    - 1) PPG Industries: "Azuria"
    - 2) Tint Color: Aqua Blue

2.6 COATED GLASS:

- A. Low Emissivity Coated Glass: Manufacturer's standard durable neutral color, low emissivity metallic coating deposited on glass and surface indicated.
  - 1. Glass: 0.025" thick, clear float
  - 2. Kind: HS and FT as scheduled
  - 3. Surface Coated; 3
- B. Performance Characteristic: When used in insulating unit with clear glass: Visible light transmittance of 69 percent, summer daytime u-value of 0.29, winter nighttime U-value of 0.29, shading coefficient of 0.44. (SOLARBAN 60)

2.7 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and with requirements specified in this Article and in the Insulating-Glass Schedule at the end of Part 3.
  - 1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article. Provide Kind FT (fully tempered) where safety glass is indicated or required by code.
- B. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the Insulating-Glass Schedule at the end of Part 3 are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.

- C. Sealing System: Dual seal, with primary and secondary sealants as follows:
  - 1. Polyisobutylene and silicone.
- D. Spacer Specifications: Manufacturer's standard spacer material and construction, black color.

## 2.8 ELASTOMERIC GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
  - 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
  - 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range for this characteristic.
- B. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant in the Glazing Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
  - 1. Additional Movement Capability: Where additional movement capability is specified in the Glazing Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements in ASTM C 920 for uses indicated.

## 2.9 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  - 1. AAMA 804.3 tape, where indicated.
  - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tape: Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
  - 1. Type 1, for glazing applications in which tape acts as the primary sealant.
  - 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.10 GLAZING GASKETS

- A. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
  - 1. Neoprene.
  - 2. EPDM.
  - 3. Silicone.
  - 4. Thermoplastic polyolefin rubber.
  - 5. Any material indicated above.

2.11 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.12 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep system.
  - 3. Minimum required face or edge clearances.

4. Effective sealing between joints of glass-framing members.

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

### 3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

### 3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass and plastics, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect edges from damage during handling and installation. Remove damaged glazing from Project site and legally dispose of off Project site. Damaged glazing is glazing with edge damage or other imperfections that, when installed, could weaken glazing and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by pre-construction sealant-substrate testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for lites where the length plus width is larger than 50 inches (1270 mm) as follows:

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set lites in each series with uniform pattern, draw, bow, and similar characteristics.



- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glazing, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.5 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 PROTECTION AND CLEANING

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glazing from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glazing surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- D. Remove and replace glazing that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- E. Wash glazing on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glazing as recommended by manufacturer.

3.7 GLAZING SCHEDULE

- A. The following glazing types consist of combinations of glazing types specified above. Provide air-gap systems, laminated or combined units as complete assembly.
- B. **GL-1 – Tinted Insulating:** Where indicated, provide insulating units complying with the following:
  - 1. Overall Unit Thickness: 1 inch (25 mm).
  - 2. Indoor Lite: .250 inch (6 mm) clear float glass with low e coating (surface 3).
  - 3. Interspace Thickness and Content: 1/2 inch (13 mm) Air.
  - 4. Outdoor Lite: .25 inch (6 mm) tinted float glass.
- C. **GL-2 – Tinted Insulating Tempered:** Where indicated and where GL-2 is installed within 24” of any door jamb, provide insulating units complying with the following:
  - 1. Overall Unit Thickness: 1 inch (25 mm).
  - 2. Indoor Lite: .25 inch (6 mm) clear float glass type FT with low e coating (surface 3).
  - 3. Interspace Thickness and Content: 1/2 inch (13 mm) Air.
  - 4. Outdoor Lite: .250 inch (6 mm) tinted float glass type FT.
- D. **GL-3 – Tinted Single Tempered:** Where glass as designated below is indicated and where GL-3 is installed within 24” of any door jamb, provide Type I (transparent glass, flat), Class 1 (clear) glass lites complying with the following:
  - 1. .25 inch (6 mm) gray tinted float glass, Kind FT (fully tempered).
- E. **GL-4 – Clear Single Tempered:** Where glass as designated below is indicated, provide Type I (transparent glass, flat), Class 1 (clear) glass lites complying with the following:
  - 1. .25 inch (6 mm) clear float glass, Kind FT (fully tempered).

- F. **GL-5 – 3/8” Polycarbonate:** Where plastic glazing as designated below is indicated, provide mar resistant “MR-10” polycarbonate sheet.
1. 3/8” mar-resistant clear polycarbonate.

**END OF SECTION 088000**



SECTION 089000

LOUVERS AND VENTS

**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 the following:
  - 1. Fixed, extruded-aluminum louvers.
- B. Related Sections include the following:
  - 1. Division 7 Section "Thermal Insulation" for wall insulation.
  - 2. Division 7 Section "Metal Shingles" for wall finish and flashings associated with louver installation.
  - 3. Division 7 Section "Joint Sealants" for sealants installed in perimeter joints between louver frames and adjoining construction.
  - 4. Division 9 Section "Color and Finish Schedule" for color selection.
  - 5. Mechanical Design/Builder for mechanical requirements.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide louvers capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act on vertical projection of louvers.
  - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- B. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other

detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

C. Air-Performance, Water-Penetration, Air-Leakage, and Wind-Driven Rain Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

#### 1.5 SUBMITTALS

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

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other Work. Show blade profiles, angles, and spacing.

1. For installed louvers and vents indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

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

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver.

#### 1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.2, "Structural Welding Code--Aluminum."

C. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

#### 1.7 PROJECT CONDITIONS

A. Field Measurements: Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating louvers without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

### **PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Louvers:
    - a. Airolite Company (The).
    - b. Construction Specialties, Inc.
    - c. Nystrom Building Products.
    - d. Reliable Products; Hart & Cooley, Inc.
    - e. Ruskin Company; Tomkins PLC.
    - f. American Warming and Ventilating
- B. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.

2.2 MATERIALS

- A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T5 or T-52.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Of same basic metal and alloy as fastened metal or 300 Series stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined materials.
  - 1. Use types and sizes to suit unit installation conditions.

2.3 FABRICATION, GENERAL

- A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
  - 1. Frame Type: Channel, unless otherwise indicated.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Provide vertical mullions of type and at spacings indicated.
  - 1. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame.
- F. Provide formed pan subsills made of same material as louvers for recessed louvers designed to carry water which drains to bottom of louver out to building exterior.

- G. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer, concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

#### 2.4 FIXED, EXTRUDED-ALUMINUM LOUVERS

##### A. Stationary Louver with Fixed Drainable Type Blade:

1. Basis-of-Design Product: Ruskin Model No. ELF6375DX /ELF6375DXH or a comparable product of one of the following:
  - a. Construction Specialties, Inc.
  - b. Nystrom Building Products.
  - c. Reliable Products; Hart & Cooley, Inc.
  - d. Ruskin Company; Tomkins PLC.
  - e. Airolite Company
2. Frame: 6 inch deep channel, 0.081 inches thick 6063-T5 extruded aluminum alloy. Provide 0.125" blades as required to span widths indicated.
3. Blades: 0.081 and 0.125 inches thick 6063-T5 extruded aluminum alloy.
4. Screen: ½" removeable expanded aluminum bird screen, located on interior.
5. Size: see architectural drawings for louver size,
6. Performance Requirements: Approximately 57% free area.

#### 2.5 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish louvers after assembly.

#### 2.6 ALUMINUM FINISH

- A. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
- B. High-Performance Organic-Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  1. Fluoropolymer Two-Coat Coating System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
    - a. Color and Gloss: Color as scheduled. Manufacturer's standard semi-gloss.
    - b. Refer to Division 9 Section "Color and Finish Schedule" for color selection.

### PART 3 - EXECUTION



3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
  - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

**END OF SECTION 089000**



SECTION 092500

GYPSUM BOARD ASSEMBLIES

**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 the following:
1. Interior gypsum wallboard
  2. Vandal resistant gypsum wallboard
  3. Tile backer gypsum wallboard.
  4. Moisture and mold resistant gypsum wallboard.
  5. Non-load-bearing steel framing.
  6. Vapor Barriers/Retarders.
  7. Acoustic batt insulation.
  8. Glass mat faced gypsum board for exterior fascia, and soffits.
- B. Related Sections include the following:
1. Division 1 Section "Sustainable Design Requirements" for VOC limits, recycled content, and regionally manufactured material goals."
  2. Division 1 Section: "Construction Waste Management and Disposal" for recycling and salvage of construction waste requirements.
  3. Division 5 Section "Cold-Formed Metal Framing" for exterior soffit framing.
  4. Division 6 Section "Rough Carpentry" for wood blocking.
  5. Division 9 Section "Ceramic Tile" for tile.
  6. Division 9 Section "Painting".

1.3 DEFINITIONS

- A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
1. Submit manufacturer's data for recycled content in manufactured products.
  2. Submit manufacturers' data for adhesives used to laminate gypsum board panels to substrates, including printed statement of VOC content.

- B. Shop Drawings: Show locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of Work.
- C. Research/Evaluation Reports: Evidence of compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction that substantiate required fire-resistance rating for each gypsum board shaft-wall assembly.

#### 1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Provide assemblies complying with tested assemblies for all walls and partitions, except that walls and partitions not required to be fire or smoke rated may be caulked with acoustical sealants where UL listed penetration firestopping systems are otherwise required.
  - 2. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory" and GA-600, "Fire Resistance Design Manual."

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Steel Framing and Furring:
    - a. Dietrich Industries, Inc.
    - b. MarinoWare; Division of Ware Ind.
    - c. National Gypsum Company.
    - d. Unimast, Inc.
  - 2. Gypsum Board and Related Products:

- a. G-P Gypsum Corp.
- b. National Gypsum Company.
- c. United States Gypsum Co.

## 2.2 STEEL SUSPENDED CEILING AND SOFFIT FRAMING

- A. General: Contractor may provide either carrying channel/hat channel system or proprietary grid suspension system at interior gypsum ceilings.
- B. Components, General: Comply with ASTM C 754 for conditions indicated.
- C. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.
- D. Hangers: As follows:
  1. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch (4.12-mm) diameter.
  2. Rod Hangers: ASTM A 510 (ASTM A 510M), mild carbon steel.
    - a. Diameter: 1/4-inch (6.34-mm).
    - b. Protective Coating: ASTM A 153/A 153M, hot-dip galvanized.
  3. Flat Hangers: Commercial-steel sheet, ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized.
    - a. Size: 1 by 3/16 inch (25.4 by 4.76 mm) by length indicated.
  4. Angle Hangers: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized commercial-steel sheet.
    - a. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm).
    - b. Size: 1-5/8 by 1-5/8 inches (41.3 by 41.3 mm).
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch (1.37 mm), a minimum 1/2-inch- (12.7-mm-) wide flange, with ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized zinc coating.
  1. Depth: 1-1/2 inches (38.1 mm).
- F. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized zinc coating.
  1. Steel Studs: ASTM C 645.
    - a. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm).
    - b. Depth: 1-5/8 inches (41.3 mm), unless noted otherwise.
  2. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22.2 mm) deep.
    - a. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm).
- G. Grid Suspension System for Interior Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
  1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Armstrong World Industries, Inc.; Furring Systems/Drywall.
    - b. Chicago Metallic Corporation; Drywall Furring 640 System.
    - c. USG Interiors, Inc.; Drywall Suspension System.

2.3 STEEL PARTITION AND SOFFIT FRAMING

- A. Components, General: As follows:
  - 1. Comply with ASTM C 754 for conditions indicated.
  - 2. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized zinc coating.
- B. Steel Studs and Tracks: ASTM C 645.
  - 1. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm) (25 gage), unless noted otherwise.
  - 2. Depth: As indicated on the plans.
- C. Deep-Leg Deflection Track: ASTM C 645 top runner with 2-inch- (50.8-mm-) deep flanges.
- D. Cold-Rolled Channel Bridging: 0.0538-inch (1.37-mm) bare steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flange.
  - 1. Depth: 1-1/2 inches (38.1 mm).
  - 2. Clip Angle: 1-1/2 by 1-1/2 inch (38.1 by 38.1 mm), 0.068-inch- (1.73-mm-) thick, galvanized steel.
- E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
  - 1. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm).
  - 2. Depth: 7/8 inch (22.2 mm).
- F. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.4 INTERIOR GYPSUM WALLBOARD

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Gypsum Wallboard: ASTM C 36.
  - 1. Type X:
    - a. Thickness: 5/8 inch (15.9 mm).
    - b. Long Edges: Tapered.
    - c. Location: Vertical and horizontal surfaces, unless otherwise indicated.
- C. Moisture and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M, with moisture resistant and mold resistant core and paper surfaces.
  - 1. Type X.
    - a. Thickness: 5/8 inch (15.9 mm).
    - b. Long Edges: Tapered.
    - c. Mold Resistance: ASTM D3273, score of 10.
    - d. Location: Vertical and horizontal surfaces in shower areas and toilet rooms scheduled for paint.
- D. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Soft Body Impact Resistance: Level 2.

1. Type X.
  - a. Thickness: 5/8 inch (15.9 mm)
  - b. Long Edges: Tapered.
  - c. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
  - d. Location: Refer to wall types.

## 2.5 TILE BACKING PANELS

- A. Panel Size: Provide in minimum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Location: Provide tile backer panels as substrate for wall tile..
- C. Glass-Mat, Water Resistant Backing Board: ASTM C 1178/C 1178M.
  1. Product: Subject to compliance with requirements, provide "Dens-Shield Tile Backer" manufactured by Georgia Pacific Gypsum Corp.
  2. Core: 5/8" (15.9 mm), Type X.

## 2.6 GLASS MAT GYPSUM BOARD FOR EXTERIOR SOFFITS, AND FASCIA

- A. Location:
  1. Exterior soffits and fascia as detailed.
- B. Glass-Mat Gypsum Sheathing: ASTM C 1177/1177M.
  1. Product: Subject to compliance with requirements, provide "Dens-Glass Gold" by G-P Gypsum Corporation.
  2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
  3. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- C. Soffit Finish: Finish per manufacturer's recommendations with skim coating of chemically setting jointing compound, smooth finish without texture.

## 2.7 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
  1. Material:
    - a. Galvanized steel sheet or rolled zinc at corners.
    - b. Plastic where abutting exterior metal doors and windows and where trimming skylights.
  2. Shapes:
    - a. Cornerbead: Use at outside corners, unless otherwise indicated.
    - b. LC-Bead: J-shaped; exposed long flange receives joint compound; use at exposed panel edges or where abutting different materials.
    - c. Expansion (Control) Joint:

- 1) Metal zinc control joint: .093 by USG or Gold Bond. Use where indicated on the drawings
  - 2) Plastic E-Z Strip control joint by Gold Bond, use where not indicated on the drawings. Install over door jambs or in walls at a maximum of 30 feet on center.
- B. Exterior Trim: ASTM C 1047.
1. Material: Hot-dip galvanized steel sheet or rolled zinc.
  2. Shapes:
    - a. Cornerbead: Use at outside corners.
    - b. LC-Bead (J-Bead): Use at exposed panel edges.
    - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening. Use where indicated.

## 2.8 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:
1. Interior Gypsum Wallboard: Paper.
  2. Tile Backing panels: Fiberglass mesh.
  3. Glass Mat Gypsum Board: Fiberglass mesh.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
  2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound or drying-type, all-purpose compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  3. Fill Coat: For second coat, use setting-type, sandable topping compound or drying-type, all-purpose compound.
  4. Finish Coat: For third coat, use drying-type, all-purpose compound.
  5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
- D. Joint Compound for Exterior Applications:
1. Exterior Gypsum Soffit Board: Use setting-type taping and setting-type, sandable topping compounds.

## 2.9 ACOUSTICAL SEALANT

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Acoustical Sealant for Exposed and Concealed Joints:
    - a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
    - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
- B. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission



through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

## 2.10 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
  - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
  - 2. For fastening cementitious backer units, use corrosion resistant screws of type and size recommended by panel manufacturer.
- C. Vapor Barrier:
  - 1. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils (0.15 mm) thick, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m).
    - a. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50 respectively.
  - 2. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
  - 3. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.
  - 4. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.
- D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from glass; with maximum flame-spread and smoke-developed indices of 10 and 10, respectively; passing ASTM E 136 for combustion characteristics.
  - 1. Available Products:
    - a. CertainTeed Corporation.
    - b. Johns Manville Corporation.
    - c. Owens Corning.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLING STEEL FRAMING, GENERAL

- A. Installation Standards: ASTM C 754, and ASTM C 840 requirements that apply to framing installation.
- B. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.
  - 1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
  - 2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.
    - a. Use deep-leg deflection track, unless noted otherwise.
    - b. Use proprietary firestop track at fire rated assemblies and where indicated.

### 3.3 INSTALLING STEEL SUSPENDED CEILING AND SOFFIT FRAMING

- A. Suspend ceiling hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
  - 3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
  - 4. Secure hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 5. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
  - 6. Do not attach hangers to steel deck tabs.
  - 7. Do not attach hangers to roof deck. Attach hangers to structural members, providing trapeze members as needed to transfer the location of hangers.
  - 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- B. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member and transversely between parallel members.
- C. Sway-brace suspended steel framing, 4 feet on center, with hangers used for support.
- D. For exterior soffits and for plywood backed gypsum panel ceilings, install cross bracing and framing to resist uplift.
- E. Wire-tie furring channels to supports.

- F. Install suspended steel framing components in sizes and spacings indicated, but not less than that required by the referenced steel framing and installation standards.
  - 1. Hangers: 48 inches (1219 mm) o.c.
  - 2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
  - 3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.
- G. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- H. Gypsum board ceilings shall be supported from joist bottom chord panel point locations only. (Do not suspend ceilings at location where trussed roof joist component members together and are connected. Do not support ceilings from mid-span of individual trussed joist members.)

### 3.4 INSTALLING STEEL PARTITION AND SOFFIT FRAMING

- A. Install tracks (runners) at floors, ceilings, and structural walls and columns where gypsum board assemblies abut other construction.
- B. Installation Tolerance: Install each steel framing and furring member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by the faces of adjacent framing.
- C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate above suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board where jambs cannot be braced.
  - 1. Cut studs 1 inch (25 mm) short of full height to provide relief against roof deflection and insert in deep leg deflection track. Do not fasten studs to head track and use bracing within studs for lateral support prior to the installation of gypsum board.
  - 2. For fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid-structure surfaces to obtain ratings, utilized UL tested head track and install framing around structural and other members extending below floor/roof slabs and decks to make partitions continuous from floor to underside of solid structure.
- D. Install steel studs and furring at the following spacings:
  - 1. Single-Layer Construction: 16 inches (406 mm) o.c., unless otherwise indicated.
  - 2. Multilayer Construction: 16 inches (406 mm) o.c., unless otherwise indicated.
- E. Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.
- F. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
  - 1. Install two 0.312 inch (0.79 mm) (20 gage) studs at each jamb, unless otherwise indicated. Accommodate blocking where shown in stud layout.
  - 2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint.

3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above, or diagonally brace top of jamb studs across wall corner to adjacent partition.
- G. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

### 3.5 INSTALLATION OF ACOUSTIC BATT INSULATION

- A. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  3. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically.

### 3.6 INSTALLATION OF VAPOR BARRIERS

- A. Place vapor barriers/retarders on side of construction indicated on Drawings, but generally facing laboratory spaces. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesive, fasteners or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
  1. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
  2. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

### 3.7 APPLYING AND FINISHING PANELS, GENERAL

- A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.

- B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- D. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- G. Attach gypsum panels to framing provided at openings and cutouts.
- H. Form control and expansion joints with space between edges of adjoining gypsum panels.
- I. Cover faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.) as indicated. In chases, brace studs internally per UL design requirements.
  - 1. Fit gypsum panels around ducts, pipes, and conduits.
  - 2. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide vertical joints to install sealant. Allow 1" horizontal joints to accommodate roof and floor deflection under live load; install acoustic fill in gap and caulk with sealant. Sealant may be spray applied firestopping sealant at contractor's option.
- J. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with LC-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- K. STC-Rated Assemblies: Install all partitions and walls as STC Rated Assemblies. Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.
  - 1. Provide STC 40 rated assemblies, typically.
- L. Smoke-Rated or Fire-Rated Gypsum Board Assemblies:
  - 1. Provide all components installed per conditions of the UL design being provided, or better where specified otherwise.

2. Provide a tight, taped joint at the top of smoke-rated assemblies and around any penetrations to assemblies at both side of the assembly. Provide Firestop System with UL rating for not less than 1-Hour.
- M. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.
  1. Space screws a maximum of 12 inches (304.8 mm) o.c. for vertical applications.
- N. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.

### 3.8 PANEL APPLICATION METHODS

- A. Single-Layer Application:
  1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
  2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of board.
    - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
  3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- B. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Exterior Soffits and Ceilings: Apply glass mat faced exterior gypsum soffit board panels perpendicular to supports, with end joints staggered and located over supports.
  1. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or structural penetrations, for sealant.
  2. Fasten with corrosion-resistant screws.

### 3.9 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints at locations indicated on Drawings, or if not indicated, install control joints not over 30 feet apart and in specific locations approved by Architect for visual effect.

### 3.10 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:
  - 1. Level 1: Not used.
  - 2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges. Provide at concealed locations above ceilings, in chases, etc.
  - 3. Level 3: Embed tape and apply separate first and fill coats of joint compound to tape, fasteners, and trim. Provide in mechanical and electrical spaces not usually occupied, and where paint finishing is not indicated.
  - 4. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, and for fire-resistance-rated as required by UL design, and unless otherwise indicated. Provide at all occupied spaces and where paint finishing is indicated.
- E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board. Finish to provide smooth flat finish for paint.

### 3.11 FIELD QUALITY CONTROL

- A. Above-Ceiling Observation: Before Contractor installs gypsum board ceilings, conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.
  - 1. Complete the following in areas to receive gypsum board ceilings before gypsum:
    - a. Temporary lighting sufficient for work. Refer to Division 1 Section "Temporary Facilities and Controls".
    - b. Installation, insulation, and leak and pressure testing of water piping systems.
    - c. Installation of air-duct systems.
    - d. Installation of air devices.
    - e. Installation of mechanical system control-air tubing.
    - f. Installation of ceiling support framing.
    - g. Installation of Through Penetration Firestop Systems for other than gypsum systems.

**END OF SECTION 092500**





**SECTION 093000**

**TILING**

**PART 1 - GENERAL**

1.1 SUMMARY

A. This Section includes the following:

1. Ceramic tile.
2. Porcelain floor tile.
3. Solid polymer thresholds.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for monolithic slab finishes specified for tile substrates.
2. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
3. Division 9 Section "Gypsum Board" for tile backer units installed in gypsum wallboard assemblies.
4. Division 9 Section "Color and Finish Schedule" for color selections.
5. Division 12 Section "Entrance Floor Mats and Frames" for mats.

1.2 DEFINITIONS

- A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.
- B. Facial Dimension: Actual tile size (minor facial dimension as measured per ASTM C 499).
- C. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

1.3 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the values indicated as determined by testing identical products per ASTM C 1028.

1.4 SUBMITTALS

- A. Product Data: For each type of tile, mortar, grout, and other products specified.
- B. Shop Drawings: For the following:
  1. Schedule submittal of shop drawings to permit coordination of slab-on-grade crack control joints with tile pattern by submitting shop drawings within 6 weeks of notice to proceed.

2. Refer to structural drawings for crack control joint placement criteria and coordinate layout of tile to provide spacing and joints to meet criteria. If not indicated, crack control joints shall be provided no less than at each structural column line and at a point between each structural column line and the next. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
  3. Where tile is to be installed on existing concrete floors, survey existing conditions and submit shop drawings of proposed tile joint layout and expansion joint layout. Coordinate tile expansion joints with substrate joints. Where joints in substrate are numerous, indicate joint bridging procedure to be provided.
- C. Tile Samples for Verification: Manufacturer's samples consisting of actual tiles or sections of tiles showing the selections of tile indicated. Include Samples of accessories involving color verification.
- D. Grout Samples for Selection: Manufacturer's color charts consisting of actual sections of grout showing the full range of colors available for each type of grout indicated.
- E. Threshold Sample for Verification: Submit manufacturer's sample for verification after selection is made from product data.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties without delaying the Work.
- C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Management and Coordination."
1. Review details and components for coordination of floor slab crack control joint locations, compatibility of concrete curing compounds with ceramic tile setting materials, crack suppression at control joints.
  2. Review tile grid alignment with building elements for approval with Architect prior to placing tile.
  3. Review placement of tile in coordination with slab crack control joints, and the installation of expansion joints in finish tile layout.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

**1.7 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

**1.8 EXTRA MATERIALS**

- A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
  - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

**PART 2 - PRODUCTS**

**2.1 PRODUCTS, GENERAL**

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
  - 1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.
  - 2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting Materials" and "Grouting Materials" articles.

**2.2 UNGLAZED PORCELAIN CERAMIC TILE (CT)**

- A. Available Products: Provide the following:
  - 1. CT-1: DalTile, Keystones.
- B. Composition: Colorbody Porcelain.
- C. Module Size: 2 x 2" square
- D. Nominal Thickness: ¼-inch.
- E. Face: Plain with cushion edges.
- F. Static Coefficient of Friction for unglazed tile: Level Surfaces, minimum 0.6.

2.3 GLAZED WALL TILE (CT)

- A. Available Products: Provide the following:
  - 1. CT-2: DalTile, Matte Wall Tile.
- B. Composition: Ceramic.
- C. Module Size: 6" x 6" square.
- D. Nominal Thickness: 5/16-inch.
- E. Face: Plain with cushion edges.
- F. Accessory Base Size: 6" x 6" square with bottom cove edge.

2.7 PORCELAIN FLOOR TILE (PFT)

- A. Available Products: Provide the following:
  - 1. PFT-1: Royal Mesa "greys" (four colors random mix)
- B. Composition: Porcelain.
- C. Module Size: 24" x 24"
- D. Thickness: 3/8-inch.
- E. Face: Textured with square edges.
- G. Static Coefficient of Friction: Level Surfaces, minimum 0.6.

2.8 MISCELLANEOUS MATERIALS

- B. Trim Units for Tile: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
  - 1. Base for Thin-Set Mortar Installations:
    - a. Provide manufactured trim units as indicated for glazed wall tile.
    - b. Provide cut floor tile installed as base at paver tile, height 4".
  - 2. External Corners: Surface bullnose, same size as adjoining flat tile.
  - 3. Internal Corners: Field-buttet square corners.
- C. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

2.3 THRESHOLDS

- A. General: Fabricate to sizes and profiles required to provide ADA compliant transition from adjacent finished floor area to tile floor area.

1. Bevel edges at 1:2 slope setting lower edge of bevel at 1/4" height. Limit total height of transition to 1/2" above adjacent floor finishes.
2. Provide at toilet room doors where tile transition occurs to a different tile or to another floor finish, typically.
3. Provide at lobby doors where tile transition occurs to a different tile or to another floor finish, typically.

B. Material: Solid Polymer Thresholds: Made from homogenous solid sheets of filled plastic resin complying with material and performance requirements of ANSI Z124.3, for Type 5 or 6, without precoated finish.

1. Manufacturers include but are not limited to:
  - a. Formica Corporation
  - b. Corian, DuPont
2. Colors: Refer to Division 9 Section "Color and Finish Schedule" and drawings.
  - a. Selection will be made from price groups 1 or 2.

#### 2.4 SETTING MATERIALS

A. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.

B. Latex-Portland Cement Mortar: ANSI A118.4, composed as follows:

1. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.
  - a. For wall applications, provide nonsagging, latex-portland cement mortar complying with ANSI A118.4 for mortar of this type defined in Section F-2.1.2

#### 2.5 GROUTING MATERIALS

A. Latex-Portland Cement Grout: ANSI A118.6 for materials described in Section H-2.4, composed as follows:

1. Factory-Prepared, Dry-Grout Mixture: Factory-prepared mixture of portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to produce the following:
  - a. Unsanded grout mixture for joints 1/8 inch (3.2 mm) and narrower.
  - b. Sanded grout mixture for joints 1/8 inch (3.2 mm) and wider.

#### 2.6 ELASTOMERIC SEALANTS

A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements of Division 7 Section "Joint Sealants."

#### 2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Grout Sealer: Manufacturer's standard product for sealing grout joints that does not change color or appearance of grout.
  - 1. Available Products:
    - a. Bonsal, W. R., Company; Grout Sealer.
    - b. Bostik; CeramaSeal Grout Sealer.
    - c. Custom Building Products; Grout and Tile Sealer.
    - d. MAPEI Corporation; KER 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.

## 2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
  - 1. Verify that substrates for setting tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 series of tile installation standards for installations indicated.
  - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
  - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, repair or adjust in consultation with Architect.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Remove coatings, including curing compounds, and other substances that contain soap, wax, oil, or silicone and are incompatible with tile-setting materials by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.

- B. Verify concrete substrates for tile floors installed with dry-set or latex-portland cement mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated. Adjust as required"
  - 1. Use trowelable leveling and patching compounds per tile-setting material manufacturer's written instructions to fill cracks, holes, and depressions.
  - 2. Adjust floor drains in tile areas for flush installation with tile. Do not "dish" tile at floor drains if floor drain is depressed. Refer to plans for areas where floors slope to drains.
  - 3. Remove protrusions, bumps, and ridges by sanding or grinding.
- C. Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- D. Cracks and Control Joints for Thin-Set Tile:
  - 1. Where substrate crack control joints are located in floor slab, provide aligned sealant joint in tile grid without cutting tile.
  - 2. Install crack suppression materials a minimum of 12 inches wide over cracks and joints where approved by submittal. Install in accordance with manufacturer's instructions.

### 3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting and to minimize narrow tile pieces. Provide uniform joint widths, unless otherwise indicated.
  - 1. For tile mounted in sheets, make joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished work.
- F. Expansion Joints: Coordinate with other trades for placement of slab joints to be located in coordination with tile pattern. Locate tile expansion joints at same locations as slab crack control joints. Install expansion joints in tile to comply with TCA recommendations but with same width as tile pattern.

1. TCA recommends expansion joints at no less than 12' on center. Refer to submittals.
- G. Where applicable lay out tile wainscots or other open tile-edge installations to next full tile beyond dimensions indicated unless dimension indicated is modular.
  1. Set top of wainscot at top of mirrors, min.
- H. Grout tile to comply with the requirements of the following tile installation standards:
  1. For ceramic tile grouts (sand-portland cement, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.

### 3.4 TILE INSTALLATION

- A. General: Install tile to comply with requirements in the Ceramic Tile Floor Installation Schedule, including those referencing TCA installation methods and ANSI A108 series of tile installation standards.
- B. Joint Widths: Install tile with the following joint widths:
  1. Porcelain Tile Floors: 3/16"
  2. Ceramic Mosaic Tile Floors: 1/16"
  3. Glazed Wall Tile: 1/16"
- C. Solid Polymer Thresholds: Install thresholds typically at tile transitions to other floor finishes.
  1. Set thresholds in per manufacturer's written instructions.
- D. Install types of tile designated for wall installations to comply with requirements in the Ceramic Tile Wall Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

### 3.5 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  1. Remove latex-portland cement grout residue from tile as soon as possible.
  2. Unglazed tile may be cleaned with acid solutions only when permitted and in strict accordance with tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before cleaning. Flush with mild baking soda solution after cleaning, and then with clean water.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure tile is without damage or deterioration at the time of Substantial Completion.
  1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with carpet pad or other heavy covering during construction period to prevent staining, damage, and wear.



2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

D. Before final inspection, rinse neutral cleaner from tile surfaces.

### 3.6 CERAMIC TILE FLOOR INSTALLATION SCHEDULE

- A. Ceramic Tile Floor Installation: Where interior floor installations of this designation are indicated, comply with the following:
1. Tile Type: Paver tile or Ceramic Mosaic.
  2. Installation Method: TCA F113 (thin-set mortar bonded to concrete subfloor).
  3. Setting Bed and Grout: ANSI A108.5 with the following mortar and grout:
    - a. Latex-portland cement mortar.
    - b. Sanded latex-portland cement grout.

### 3.7 CERAMIC TILE WALL INSTALLATION SCHEDULE

- A. Ceramic Tile Wall Installation: Where interior wall installations of this designation are indicated, comply with the following:
1. Tile Type: Glazed Tile or Ceramic Mosaic.
  2. Installation Method: TCA B419 (thin-set mortar bonded to gypsum tile backer).
  3. Setting Bed and Grout: ANSI A108.4 with the following grout:
    - a. Non-sanded latex-portland cement grout.

**END OF SECTION 093000**



SECTION 095113

ACOUSTICAL PANEL CEILINGS

**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 ceilings consisting of acoustical panels and exposed suspension systems.
- B. Related Sections include the following:
  - 1. Division 1 Section "Sustainable Design Requirements" for VOC limits, recycled content, and regionally manufactured material goals."

1.3 SUBMITTALS

- A. Product Data: For each type of product specified.
  - 1. Submit manufacturer's data on recycled content.
  - 2. Submit product data for sealants including printed statement of VOC content and material data safety sheets.
- B. Samples for Verification: Full-size units of each type of ceiling assembly indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.
  - 1. 6-inch- (150-mm-) square samples of each acoustical panel type, pattern, and color.
  - 2. Set of 12-inch- (300-mm-) long samples of exposed suspension system members, including moldings, for each color and system type required.
- C. Product Test Reports: Indicate compliance of acoustical panel ceilings and components with requirements based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations for Ceiling Units: Obtain each acoustical ceiling panel from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

- C. Source Limitations for Suspension System: Obtain each suspension system from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- D. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
  - 1. Fire-response tests were performed by UL, ITS/Warnock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
  - 2. Surface-burning characteristics of acoustical panels comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.
  - 3. Products are identified with appropriate markings of applicable testing and inspecting agency.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Management and Coordination."

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel 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 at the levels indicated for Project when occupied for its intended use.

#### 1.7 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.

#### 1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
  - 1. Acoustical Ceiling Units: Full-size units equal to 2.0 percent of amount installed.

2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of amount installed.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated for each designation in the following paragraphs of Part 2.

### 2.2 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
  1. Mounting Method for Measuring Noise Reduction Coefficient: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.
- B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
  1. Where appearance characteristics of acoustical panels are indicated by referencing ASTM E 1264 pattern designations and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range of products that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.
- C. **ACT-1, ACT-3** - Water-Felted, Mineral-Base Acoustical Panels: Where this designation is indicated, provide acoustical panels complying with the following:
  1. Products: Available products include the following:
    - a. Armstrong Cortega Second Look II, 2758.
    - b. Equal by Celotex
    - c. Equal by USG
  2. Classification: Panels fitting ASTM E 1264 for Type III, mineral base with painted finish; Form 2, water felted.
  3. Pattern: Panels fitting ASTM E 1264 pattern designation (description) C (perforated, small holes); D (fissured).
  4. Color: White.
  5. Light Reflectance Coefficient: Not less than LR 0.80.
  6. Noise Reduction Coefficient: NRC 0.55.
  7. Ceiling Attenuation Class: Not less than CAC 40.
  8. Edge Detail: Tegular.
  9. Thickness: 3/4 inch (19 mm).
  10. Size: 24 by 48 inches (610 by 1220 mm).

- D. **ACT-2** – High-Density Ceramic-Base Acoustical Panels with Scrubbable Finish for Acoustical Panel Ceiling: Where this designation is indicated, provide acoustical panels, treated with antimicrobial solution, and complying with the following:
1. Products: Available products include the following:
    - a. Armstrong Ceramaguard No. 605.
    - b. Celotex Vinyl Shield A.
    - c. USG Ceramic ClimaPlus No. 3270.
  2. Classification: Panels fitting ASTM E 1264 for Type XX, other types; described as high-density, ceramic-base or vinyl faced panels with scrubbable finish, resistant to heat, moisture, and corrosive fumes.
  3. Pattern: Panels fitting ASTM E 1264 pattern designation G (smooth).
  4. Color: White.
  5. Light Reflectance Coefficient: Not less than LR 0.80.
  6. Noise Reduction Coefficient: not applicable.
  7. Ceiling Attenuation Class: Not less than CAC 40.
  8. Edge Detail: Square.
  9. Thickness: Armstrong: 5/8 inch (16 mm); USG: 1/2" (13 mm).
  10. Size: 24 by 48 inches (610 x 1220 mm).

### 2.3 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, UL certified load compliance, and finishes indicated that comply with applicable ASTM C 635 requirements.
- B. Suspension System for Acoustical Panel Ceilings: Provide acoustical panel ceiling suspension system complying with the following:
1. Products: Provide one of the following:
    - a. Prelude 15/16" Exposed Tee System; Armstrong World Industries, Inc.
    - b. S11 System; Celotex Corporation.
    - c. 1200 System; Chicago Metallic Corporation.
    - d. DX 24 System; USG Interiors, Inc.
  2. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G01 (Z001) coating designation, with prefinished 15/16-inch- (24-mm-) wide metal caps on flanges; other characteristics as follows:
    - a. Structural Classification: Intermediate-duty system.
    - b. End Condition of Cross Runners: Override (stepped) or butt-edge type, as standard with manufacturer.
    - c. Face Design: Flush face.
    - d. Cap Material: Steel sheet.
    - e. Cap Finish: Painted white.
- C. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
  - 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
  - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.
- E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- G. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.
- H. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.
  - 1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
  - 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
- I. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches (610 mm) o.c. on all cross tees.
  - 1. Available Product: UHDC by Armstrong or L15 by USG.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and other conditions affecting performance of acoustical panel ceilings.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

#### **3.3 INSTALLATION**

- A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
  - 1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
  
- B. Suspend ceiling hangers from building's 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. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 4. 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. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
  - 5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  - 6. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
  - 7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, powder-actuated fasteners, or drilled-in anchors that extend through forms into concrete.
  - 8. Do not attach hangers to steel deck tabs.
  - 9. Do not attach hangers to roof deck. Attach hangers to structural members.
  - 10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches (200 mm) from ends of each member.
  
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
  
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
  - 1. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m). Miter corners accurately and connect securely.
  - 2. Do not use exposed fasteners, including pop rivets, on moldings and trim except where required for vertical framing.



- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
  - 1. Arrange directionally patterned acoustical panels as follows:
    - a. As indicated on reflected ceiling plans.
  - 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
  - 3. Install hold-down clips within vestibules, and within 10 feet of exterior doors; space as recommended by panel manufacturer's written instructions, and elsewhere as indicated or required. Do not install hold-down clips on ceiling panels required to be removed to access valves or dampers.

### 3.4 FIELD QUALITY CONTROL

- A. Above-Ceiling Observation: Before Contractor installs acoustical panel ceilings, conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of acoustical panels until deficiencies have been corrected.
  - 1. Complete the following in areas to receive gypsum board ceilings:
    - a. Installation of 80 percent of lighting fixtures, powered for operation.
    - b. Installation, insulation, and leak and pressure testing of water piping systems.
    - c. Installation of air-duct systems.
    - d. Installation of air devices.
    - e. Installation of mechanical system control-air tubing.
    - f. Installation of through-penetration firestop systems.

### 3.5 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

**END OF SECTION 095113**



SECTION 096500

RESILIENT FLOORING AND BASE

**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 the following:
  - 1. Vinyl composition floor tile.
  - 2. Resilient wall base and accessories.
- B. Related Sections include the following:
  - 1. Division 1 Section "Sustainable Design Requirements" for VOC limits, recycled content, and regionally manufactured material goals."
  - 2. Division 9 Section "Color and Finish Schedule" for color selections.

1.3 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For flooring installed on walkway surfaces, provide products with the values indicated as determined by testing identical products per ASTM C 1028.

1.4 SUBMITTALS

- A. Product Data: For each type of product specified.
  - 1. Submit manufacturer's product data for adhesives, including printed statement of VOC content and material safety data sheets.
- B. Samples for Verification: Manufacturer's samples consisting of selections indicated.
  - 1. For resilient accessories, manufacturer's standard-size samples, but not less than 12 inches (300 mm) long, of each resilient accessory color and pattern specified.
- C. Product Certificates: Signed by manufacturers of resilient products certifying that each product furnished complies with requirements.
- D. Maintenance Data: For resilient flooring to include in the maintenance manuals specified in Division 1.

1.5 QUALITY ASSURANCE

- A. **Installer Qualifications:** Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. **Source Limitations:** Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- C. **Fire-Test-Response Characteristics:** Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. **Critical Radiant Flux:** 0.45 W/sq. cm or greater when tested per ASTM E 648.
  - 2. **Smoke Density:** Maximum specific optical density of 450 or less when tested per ASTM E 662.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F (10 and 32 deg C).
- C. Store tiles on flat surfaces. Do not stake boxes of tiles over 5 high.
- D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

**1.7 PROJECT CONDITIONS**

- A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- B. Do not install products until they are at the same temperature as the space where they are to be installed.
- C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.
- D. Install products and accessories after other finishing operations, including painting, have been completed.
- E. Where demountable partitions and other items are indicated for installation on top of resilient tile flooring, install tile before these items are installed.

- F. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test as well as acceptable pH range.

**1.8 EXTRA MATERIALS**

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
  - 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.
  - 2. Furnish not less than 10 linear feet (3 linear m) for each type, color, pattern, and size of resilient accessory installed.
  - 3. Deliver extra materials to Owner and submit signed receipt.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the following paragraphs of Part 2.

**2.2 VINYL COMPOSITION TILE (VCT)**

- A. Vinyl Composition Tile: Where this designation is indicated, provide vinyl composition floor tile complying with ASTM F 1066 and the following:
  - 1. Products: As follows:
    - a. Armstrong World Industries: Imperial Texture Standard Excelon.
    - b. Mannington Commercial: Essentials, or Designer Essentials.
  - 2. Color and Pattern: As selected by Architect from manufacturer's full range of colors and patterns produced for tile complying with requirements indicated. Refer to drawings.
  - 3. Class: Class 2 (through-pattern tile).
  - 4. Static Coefficient of Friction: Level Surfaces, minimum 0.6.
  - 5. Thickness: 1/8 inch (3.2 mm).
  - 6. Size: 12 by 12 inches (304.8 by 304.8 mm).

**2.3 RESILIENT ACCESSORIES**

- A. Rubber Base: Where this designation is indicated, provide rubber wall base complying with FS SS-W-40, Type I and the following:
  - 1. Products: As follows:
    - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
    - b. Johnsonite.
    - c. Roppe Corporation, USA.

2. Color and Pattern: As selected by Architect from manufacturer's full range of colors and patterns produced for rubber wall base complying with requirements indicated. Refer to Division 9 "Color Finish Schedule" and to Drawings.
  3. Style:
    - a. Resilient Floor Finish Areas: Cove with top-set toe.
  4. Minimum Thickness: 1/8 inch (3.2 mm).
  5. Height: 4 inches (101.6 mm).
  6. Lengths: 120 feet (36.6 m) long.
  7. Outside Corners: Job formed.
  8. Inside Corners: Job formed.
  9. Surface: Smooth.
- B. Rubber Accessory Molding: Provide rubber accessory molding complying with the following:
1. Available Products: As follows:
    - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
    - b. Johnsonite.
    - c. Roppe Corporation, USA.
  2. Color: As selected by Architect from manufacturer's full range of colors produced for vinyl accessory molding complying with requirements indicated. Refer to Division 9 Finishes, Color Finish Schedule and to Drawings.
  3. Reducer Strip between Concrete and VCT: RRS-XX-C by Johnsonite or approved substitute.

## 2.4 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  2. VCT Floor Adhesives: 50 g/L.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.

2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving resilient flooring.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
4. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
  - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) of slab area in 24 hours. Calcium chloride moisture tests shall be conducted by an independent testing agency.
  - b. Maintain a minimum temperature of 70 deg F (21 deg C) in spaces to receive flooring for at least 72 hours prior to and during the tests.
  - c. Perform calcium chloride moisture tests on concrete slabs receiving resilient flooring in accordance with ASTM F 1869-92; tests shall not deduct the area of CaCl<sub>2</sub> dish. Perform the tests at rate of not less than 1 test/1000 sq. ft. of floor area for slabs-on-grade and 1 test/ 2000 sq. ft. of floor area for elevated slabs.
5. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.
  1. Shot blast existing floor finish if adhesion cannot otherwise be assured.

### 3.3 TILE INSTALLATION

- A. General: Comply with tile manufacturer's written installation instructions.
- B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.
  1. Lay tiles square with room axis, unless otherwise indicated.

- C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles in basket-weave pattern with grain direction alternating in adjacent tiles.
  - 2. Lay tiles in pattern of colors and sizes indicated. Refer to Division 9 Section "Color and Finish Schedule".
- D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- E. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.
- G. Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.
- H. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
  - 1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Hand roll tiles according to tile manufacturer's written instructions.

### 3.4 RESILIENT ACCESSORY INSTALLATION

- A. General: Install resilient accessories according to manufacturer's written installation instructions.
- B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, locker bases, and other permanent fixtures in rooms and areas where base is required.
  - 1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
  - 2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
  - 3. Do not stretch base during installation.
  - 4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
  - 5. Form outside corners on job from straight pieces of maximum lengths possible, without whitening at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
  - 6. 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 a snug fit to substrate.



- C. Place resilient accessories so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.
  - 1. Locate reducer strips or transition strips to line up centered under doors, unless noted otherwise.

**3.5 CLEANING AND PROTECTING**

- A. Perform the following operations immediately after installing resilient products:
  - 1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
  - 2. Sweep or vacuum floor thoroughly.
  - 3. Do not wash floor until after time period recommended by flooring manufacturer.
  - 4. Damp-mop floor to remove marks and soil.
- B. Clean floor surfaces as soon as possible after installation. Clean products according to manufacturer's written recommendations.
  - 1. After cleaning, apply polish to floor surfaces to provide protective floor finish according to flooring manufacturer's written recommendations. Coordinate with Owner's maintenance program.

**END OF SECTION 096500**



SECTION 099100

PAINTING

**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 surface preparation and field painting of the following:
1. Exposed exterior items and surfaces, new and old.
  2. Exposed interior items and surfaces.
  3. Epoxy painting of utility room walls and kitchen walls.
  4. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
1. Painting includes field painting of exposed bare and covered pipes and ducts, hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment within finished rooms or where located outside.
  2. Painting includes field painting of exposed mechanical or electrical equipment except as specifically noted. Except for those items noted, paint unfinished and factory finished exposed equipment.
- C. Do not paint listed prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
1. Do not paint the following prefinished items:
    - a. Architectural woodwork and casework.
    - b. Acoustical wall panels.
    - c. Metal toilet enclosures.
    - d. Metal lockers.
    - e. Light fixtures.
    - f. Rooftop mounted factory finished Modular Outdoor Air-Handling Units.
    - g. Rooftop mounted factory finished Power Ventilators.
    - h. Ground mounted Rotary Screw Water Chillers.
  2. Do not paint concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
    - a. Foundation spaces.
    - b. Furred areas.

- c. Ceiling plenums.
- d. Utility tunnels.
- e. Pipe spaces.
- f. Duct shafts.
- g. Equipment and piping chases.
3. Do not paint finished metal surfaces include the following:
  - a. Anodized aluminum.
  - b. Stainless steel.
  - c. Chromium plate.
  - d. Copper.
  - e. Bronze and brass.
4. Do not paint operating parts include moving parts of operating equipment and the following:
  - a. Valve and damper operators.
  - b. Linkages.
  - c. Sensing devices.
  - d. Motor and fan shafts.
5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Refer to Part 3 for additional information regarding painting of components required.

E. Related Sections include the following:

1. Division 32 Section "Hot Mix Asphalt Paving" for traffic-marking paint.
2. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
3. Division 8 Section "Steel Doors and Frames" for shop priming steel doors and frames.
4. Division 9 Section "Gypsum Board Assemblies" for surface preparation for gypsum board.
5. Division 9 Section "Color and Finish Schedule".

### 1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

### 1.4 SUBMITTALS

A. Product Data: For each paint system specified. Include block fillers and primers.

1. **Material List:** Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
  2. **Manufacturer's Information:** Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
  3. **Certification** by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- B. **Samples for Selection:** Manufacturer's color chips showing the full range of colors available for each type of finish-coat material indicated. Where colors are indicated in the Color and Finish Schedule, submit matching samples for approval prior to painting Benchmark Samples.
1. After color selection, the Architect will furnish color list of color selections for surfaces to be coated.
- C. **Notification:** Notify Architect when site prepared prefinished mechanical equipment is ready for finish painting.

#### 1.5 QUALITY ASSURANCE

- A. **Applicator Qualifications:** Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. **Source Limitations:** Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.
- C. **Benchmark Samples (Mockups):** Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.
1. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted.
    - a. **Wall Surfaces:** Provide samples on at least 100 sq. ft. (9 sq. m) of wall surface.
    - b. **Small Areas and Items:** The Architect will designate an item or area as required.
  2. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface according to the Schedule or as specified. Provide required sheen, color, and texture on each surface.
    - a. After finishes are accepted, the Architect will use the room or surface to evaluate coating systems of a similar nature.
  3. Final approval of colors will be from job-applied samples.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
1. Product name or title of material.
  2. Product description (generic classification or binder type).
  3. Manufacturer's stock number and date of manufacture.
  4. Contents by volume, for pigment and vehicle constituents.

5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.
1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

#### 1.7 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F (10 and 32 deg C).
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F (7.2 and 35 deg C).
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

#### 1.8 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.
1. Quantity: Furnish the Owner with an additional 5 percent, but not less than 1 gal. (3.785 L) or 1 case, as appropriate, of each material and color applied.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available Products for Conventional Coatings: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.
1. California Paint Co. (Cal).
  2. Benjamin Moore & Co. (Moore).
  3. ICI Dulux Paints (ICI)
  4. PPG Industries, Inc. (PPG).
  5. Sherwin-Williams Co. (S-W).

- B. Available Products for High Performance Coatings: Subject to compliance with requirements, products manufactured by the following may be incorporated into the Work:
  - 1. PPG Industries, Inc. (PPG)
  - 2. DuPont.
  - 3. Tnemec (Tne)

## 2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality professional paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
  - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. Colors: Provide color selections made by the Architect. Allow for up to 15 different color selections. Refer to Division 9 Section "Color and Finish Schedule" for color range.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
  - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
  - 2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
  - 1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

### 3.2 PREPARATION FOR NEW SURFACES

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
  
- B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
  1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
  2. Be particularly wary of galvanized materials to receive paint. Clean as specified.
  
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
  1. Provide barrier coats over incompatible primers or remove and re-prime. Where factory finish is to provide base coat, scuff surface with a motorized palm sander and 60 grit sandpaper so surface is consistently de-glossed to receive finish coat.
    - a. Surface is to be thoroughly de-glossed. Do not proceed with finish painting without fully sanding surface. Notify Architect when first unit is ready for finish painting and proceed only when directed that finish is acceptable. Refer to Division 1 Section "Submittals" for notification requirements. Notify as a submittal.
  2. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
    - a. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
    - b. Clean concrete floors to be sealed or painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
  3. Previously Painted Concrete Masonry: Pressure wash at 4000 – 5000 psi with a zero-degree tip. Once cleaned, scrape surfaces to remove any non-tightly adhered material. Review prepared surfaces with paint manufacturer's representative; clean loose material or questionable material from surface as directed prior to applying new paint.
    - a. Use abrasive blast cleaning methods if recommended by paint manufacturer.
    - b. Where substrate material is exposed by cleaning processes, apply block primer according to coating manufacturer's written instructions, at a rate to ensure complete coverage with pores filled.
    - c. Inspect substrates for substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants. Do not coat surface if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
    - d. Remove incompatible primers and re-prime substrate with compatible primers as required.
    - e. Fill cracks according to manufacturer's written instructions prior to coating surfaces.
  4. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
    - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill



- holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
  - c. When transparent finish is required, back-prime with spar varnish.
  - d. Back-prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
  - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
5. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
- a. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 10.
  - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
  - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
  - d. Piece Marks: Remove piece marks or numbers and characters that identify components for erection prior to field painting. Applying a primer to cover the marks will also be acceptable.
6. Galvanized Surfaces: Clean galvanized surfaces with a palm sander and 60 grit sandpaper so surface is free of surface contaminants and surface is deglossed. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- a. Remove grease if present with mineral spirits.
7. Stair Framing, Railings, Handrails, Hollow Metal Doors, Frames, and Borrowed Lites: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand primed surfaces exposed to view smooth and dust off.
- D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
  2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
  3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint primer of colors such as reds, yellows, and oranges with a gray basecoat system designed to help provide color coverage.
1. Do not tint prime or base coat for multi-colored finishes.

### 3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.
  2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
  3. Provide finish coats that are compatible with primers used.
  4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
  5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  6. Paint interior surfaces of ducts with a flat, non-specular black paint where visible through registers or grilles.
  7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
  9. Finish interior of painted wall and base cabinets and similar field-finished casework to match exterior.
  10. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
  2. Omit primer on metal surfaces that have been shop primed and touchup painted.
  3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces. When using colors such as red, yellow or orange, an extra coat of finish may be necessary. Notify Architect when additional coats do not fix the problem.
  4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
  5. Coordinate application of high-performance interior paint finish final coat to be prior to the application of resinous flooring products.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
  2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
  3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in occupied spaces and exposed outdoor items.
  - 1. Mechanical items to be painted include, but are not limited to, the following:
    - a. Piping, pipe hangers, and supports.
    - b. Rooftop air handling units.
    - c. Fans.
    - d. Hoods.
    - e. Heat exchangers.
    - f. Tanks.
    - g. Ductwork.
    - h. Insulation.
    - i. Motors and mechanical equipment.
    - j. Accessory items.
  - 2. Electrical items to be painted include, but are not limited to, the following:
    - a. Conduit and fittings.
    - b. Switchgear.
    - c. Panelboards.
- F. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- G. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.
- H. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- I. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
  - 1. Provide satin finish for final coats.
- J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

### 3.4 FIELD QUALITY CONTROL

- A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:

1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
2. The testing agency will perform appropriate tests for the following characteristics as required by the Owner:
  - a. Quantitative material analysis.
  - b. Abrasion resistance.
  - c. Apparent reflectivity.
  - d. Flexibility.
  - e. Washability.
  - f. Absorption.
  - g. Accelerated weathering.
  - h. Dry opacity.
  - i. Accelerated yellowness.
  - j. Recoating.
  - k. Skinning.
  - l. Color retention.
  - m. Alkali and mildew resistance.
3. The Architect may direct the Contractor to stop painting if test results show material being used does not comply with specified requirements. The Painting Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

### 3.5 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
  1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

### 3.6 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
  1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

### 3.7 EXTERIOR PAINT SCHEDULE (CONVENTIONAL COATINGS)

- A. Exterior Soffit Board: Provide the following finish systems over exterior gypsum soffit board:
  1. Low-Luster Acrylic Finish: 2 finish coats over a primer.

- a. Primer: Exterior, alkyd- or alkali-resistant, acrylic-latex primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer.
    - 1) Cal: Trouble-Shooter 100% Acrylic Latex Primer 45100.
    - 2) ICI: 2000-1200, Dulux-Pro Exterior Acrylic Primer.
    - 3) Moore: Super Spec Latex Exterior Primer #169.
    - 4) PPG: 6-603 Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer.
    - 5) S-W: A-100 Exterior Latex Wood Primer B42W41 Series.
  - b. First and Second Coats: Low-luster (eggshell or satin), exterior, acrylic-latex paint applied at spreading rate recommended by the manufacturer.
    - 1) Cal: 100% Acrylic Latex House & Trim Paint, Eggshell Finish 40100.
    - 2) ICI: 2402-XXXX, Dulux Pro Exterior Latex Satin Finish.
    - 3) Moore: Super Spec Low Lustre Latex House Paint #185.
    - 4) PPG: Speedhide Exterior Satin Latex, 6-2000 Series.
    - 5) S-W: A100 Satin Exterior Latex Satin, A8 Series.
- B. Exterior Masonry: Provide the following elastomeric finish systems over exterior exposed masonry:
1. Exterior Waterborne Pigmented Elastomeric Coating: Spot-priming of exposed masonry areas, primer, and then 2 finish coats.
    - a. Crack Fillers: Elastomeric coating manufacturer's recommended, factory-formulated crack fillers or sealants, including crack filler primers, compatible with substrate and other materials indicated; VOC content complying with limits of authorities having jurisdiction.
    - b. Concrete Unit Masonry Block Filler: Elastomeric coating manufacturer's recommended, factory-formulated, high-performance latex block filler compatible with substrate and other materials indicated.
    - c. Spot-Primer and Primer:
      - 1) Elastomeric coating manufacturer's recommended, factory-formulated, alkali-resistant primer compatible with substrate and other materials indicated.
    - d. Topcoats: Minimum one coat with a total dry film thickness of 10 mils (0.18 mm), but not less than recommended by coating manufacturer.
      - 1) RD Coatings: Elastoflex
      - 2) Tnemic: 156 Envirocrete
      - 3) Benjamin Moore & Co.: Moorlastic
      - 4) ICI Paints: Decra-Flex Elastomeric Coating
      - 5) PPG Industries: Pitt-Flex Elastomeric Coating
      - 6) Sherwin Williams Company: ConFlex XL

### 3.8 EXTERIOR PAINT SCHEDULE (HIGH PERFORMANCE COATINGS)

- A. Ferrous and Zinc-Coated Metal: Provide the following finish systems over exterior ferrous and zinc-coated metals. Primer is not required on shop-primed items except as noted above.
1. Full-Gloss, Aliphatic Urethane Finish: 2 finish coats over a galvanized metal primer or compatible shop primer. Touch-up primer and finish coat to be of like but different colors.

- a. Surface Preparation: Pressure wash with Oakite LTS per manufacturer's instructions.
- b. Touch-up for Primer: Metal primer applied at spreading rate of 2.5-3 mils DFT (Dry Film Thickness).
  - 1) Tne: Tnemec Series 27 WB Typoxy
  - 2) Dupont 25P High Solids Epoxy
  - 3) PPG: Amerlock 400 Hi-Build Epoxy
- c. First and Second Coats: Full-gloss, aliphatic urethane finish applied at spreading rate of 2.5-3 mils DFT.
  - 1) Tne: Tnemec Series 73 Endura-Shield
  - 2) Dupont Imron 2.8 Urethane
  - 3) PPG: Amercoat 450H Polyurethane

### 3.9 INTERIOR PAINT SCHEDULE (CONVENTIONAL COATINGS)

- A. Concrete and Masonry (Other than Concrete Masonry Units): Provide the following paint systems over interior concrete or masonry surfaces:
  1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.
    - a. Primer: Alkali-resistant, acrylic-latex, interior primer applied at spreading rate recommended by the manufacturer.
      - 1) Cal: ProPrime Undercoater Primer-Sealer 54500.
      - 2) ICI: 3210, Ultra-Hide Aquacrylic Gripper Stain Killer Primer-Sealer.
      - 3) Moore: Super Spec Latex Enamel Undercoater & Primer Sealer #253.
      - 4) PPG: 6-603 Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer on highly alkaline surfaces.
      - 5) S-W: PrepRite Masonry Primer, B28W300 Series.
    - b. First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer.
      - 1) Cal: Premium 100% Acrylic Latex Semi-Gloss 563XX.
      - 2) ICI: 1416-XXXX, Ultra-Hide Latex Semi-Gloss.
      - 3) Moore: Super Spec Latex Semi-Gloss Enamel #276.
      - 4) PPG: Speedhide Interior Semi-Gloss Latex Enamel, 6-510 Series.
      - 5) SW: ProMar 400 Interior Latex Semi-Gloss, B31W4400 Series.
- B. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry block units except where indicated otherwise:
  1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a block filler.
    - a. Block Filler: High-performance, latex-based, block filler applied at spreading rate recommended by the manufacturer.
      - 1) Cal: Wilbur & Williams Mason-Cote Block Filler 3751.
      - 2) ICI: 3100-1200, Ultra-Hide Gripper Interior/Exterior Block Surfacer.
      - 3) Moore: Super Craft Latex Block Filler #285.
      - 4) PPG: 6-7 Speedhide Interior/Exterior Masonry Latex Block Filler.
      - 5) SW: PrepRite Block Filler B25W25 Series.
    - b. First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer.
      - 1) Cal: Premium 100% Acrylic Latex Semi-Gloss 563XX.
      - 2) ICI: 1416-XXXX Ultra-Hide Latex Semi-Gloss
      - 3) Moore: Super Spec Latex Semi-Gloss Enamel #276.
      - 4) PPG: Speedhide Interior Latex Semi-Gloss Enamel, 6-510 Series.

- 5) SW: ProMar 400 Interior Latex Semi-Gloss B31W4400 Series.
- C. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:
1. Flat Acrylic Ceiling Finish: 2 finish coats over a primer.
    - a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer.
      - 1) Cal: ProPrime Undercoater Primer-Sealer 54500.
      - 2) ICI: 1000-1200, Dulux Ultra Interior Latex Wall Primer.
      - 3) Moore: Super Spec Latex Enamel Undercoater & Primer Sealer #253.
      - 4) PPG: Speedhide Interior Latex Primer Sealer, 6-2.
      - 5) S-W: PrepRite 200 Latex Primer B28W200 Series.
    - b. First and Second Coats: Flat, acrylic-latex-based, interior paint applied at spreading rate recommended by the manufacturer.
      - 1) Cal: Premium Acrylic Latex Flat 533XX.
      - 2) ICI: 1210-XXXX, Ultra-Hide Latex Flat Interior Wall Paint.
      - 3) Moore: Super Spec Latex Flat #275.
      - 4) PPG: Speedhide Interior Flat Latex, 6-70 Series.
      - 5) S-W: ProMar 400 Latex Flat Wall Paint B30W4200 Series.
  2. Low-Luster, Acrylic-Enamel Wall Finish: 2 finish coats over a primer.
    - a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer.
      - 1) Cal: ProPrime Undercoater Primer-Sealer 54500.
      - 2) ICI: 1000-1200, Dulux Ultra Interior Latex Wall Primer.
      - 3) Moore: Super Spec Latex Enamel Undercoater & Primer Sealer #253.
      - 4) PPG: Speedhide Interior Latex Primer Sealer, 6-2.
      - 5) S-W: PrepRite 200 Latex Primer B28W200 Series.
    - b. First and Second Coats: Low-luster (eggshell or satin), acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer.
      - 1) Cal: Premium 100% Acrylic Latex Eggshell 531XX.
      - 2) ICI: 1412-XXXX, Ultra-Hide Latex Eggshell or 1414-XXXX, Ultra-Hide Satin Latex Enamel.
      - 3) Moore: Super Spec Latex Eggshell Enamel #274.
      - 4) PPG: Speedhide Interior Eggshell Latex Enamel, 6-411 Series.
      - 5) S-W: ProMar 400 Interior Latex Eggshell B20W2200 Series.

### 3.10 INTERIOR PAINT SCHEDULE (HIGH PERFORMANCE COATINGS)

- A. Gypsum Board (Epoxy Paint): Provide the following finish systems where epoxy finish is indicated, but always in kitchen and utility rooms with sinks on walls:
1. Gloss, Polyamide-Epoxy Finish: 2 finish coats over a primer.
    - a. Primer: Polyamide epoxy primer applied at a spreading rate recommended by the manufacturer:
      - 1) Tnemec: 201 Epoxoprime
      - 2) Dupont: Colar 2.1-ST
    - b. Intermediate Coat: Gloss, polyamide epoxy applied at spreading rate 8-10 mils DFT.
      - 1) Tnemec: 280 Tneme-Glaze.
      - 2) Dupont Colar 2.1-ST
    - c. Finish Coat: Gloss, urethane applied at spreading rate of 2-3 mils DFT.
      - 1) Tnemec: 297 WB Urethane.

- 2) Dupont Imron 1.5 ST-D WB Urethane.
- B. Exposed Ferrous Metals: Provide the following finish systems over interior ferrous metals:
1. Gloss, Polyamide-Epoxy Finish: 2 finish coats over a primer. Intermediate coat and finish coat to be of like but different colors.
    - a. Touch-up for Primer: High-performance, epoxy primer applied at spreading rate of 2 mils DFT.
      - 1) Primer touch-up as recommended by finish manufacturers listed below.
    - b. Intermediate Coat: Metal primer applied at spreading rate of 2.5-3 mils DFT (Dry Film Thickness).
      - 1) Tne: Tnemec Series 27 Typoxy WB
      - 2) PPG Amerlock 400
      - 3) Dupont Corlar 2.1-ST
    - c. Finish Coat: Semi - Gloss, urethane applied at spreading rate of 2-3 mils DFT.
      - 1) Tnemec: 1029 Single Component Hybrid Acrylic.
      - 2) PPG Amerlock 400
      - 3) Dupont High Solids Acrylic Coating

**END OF SECTION 099100**



**SECTION 099990**

**COLOR AND FINISH SCHEDULE**

**PART 1 - GENERAL**

1.1 REFERENCES

- A. This section applies to all other specifications as noted below. Where a color or finish is specified below which may differ from those in another section, the color or finish specified below shall be provided. Refer to individual sections for products to be provided. Where colors are indicated to be selected, they shall be selected from the full offerings of the manufacturer. Colors not indicated will be selected from manufacturer's full color offerings for specified products prior to return of submittals.
- B. Many products indicated below may be unique in color and texture, with no manufactured equivalent product. Where products cannot be matched by equivalent products by another listed manufacturer, specified products will be required without substitution. Bidders are strongly encouraged to submit proposed finish materials for pre-approval prior to bid/proposal to avoid rejection as not equivalent to the selected product below.

**PART 2 - PRODUCTS**

2.1 Schedule

Section/Division	Product	Color/Finish Selection
033000	Exposed Concrete	Natural Gray Cement Color
042000	Concrete Masonry	No color requirement. See painting.
	Mortar	No color requirement. See painting.
055000	Metal Fabrications	Refer to Division 099100 below.
055213	Pipe and Tube Railings	Refer to 099100 below.
061000	Composite Plastic Lumber	<b>To be selected.</b>
064023	Countertop Solid Surfacing	<b>To be selected.</b>
	Countertop Plastic Laminate	<b>To be selected.</b>
	Cabinet plastic laminate cabinet side panels, drawer panels, and door panels.	Plastic laminate cabinets: <b>To be selected.</b>
	Cabinet door and panel edges	PVC color: <b>To be selected by Architect.</b>
	Exposed cabinet hardware	Dull chrome or stainless steel hinges and locks.
	Cabinet pulls	Brushed Stainless Steel or Chrome
	Window Stools	Plastic Laminate: <b>To be selected.</b>
	Exposed Wood	Natural Birch with Stain and Clear Finish - Satin Gloss. <b>Color to be selected.</b>
073116	Metal Wall Shingles	Color 1: Millennium Tiles "Zalmag". Color 2: Sheffield Metals Int.: "Stone White" Color 3: Sheffield Metals Int.: "Ash Gray"

	Metal wall shingle trim and flashings.	Color 1: Millennium Tiles "Zalmag".
	Leaders and Downspouts	Color 1: Millennium Tiles "Zalmag".
075310	Metal Fascia	Match Sherwin Williams SW 7066 "Gray Matters"
076200	Sheet metal flashing and trim	Metal Flashings: Paint as indicated below.
077200	Roof Hatches	Match Sherwin Williams SW 7066 "Gray Matters"
079200	Joint sealants	<b>To be selected by Architect.</b>
081113	Steel Doors and Frames	Refer to 099100 below.
081416	Wood Doors	Natural Birch with Stain and Clear Finish. <b>Color to be selected.</b>
083113	Access Doors	Refer to 099100 below.
084113	Aluminum Entrances and Storefronts Doors and Framing	Match Kawneer Permafluor "Charcoal"
085113	Aluminum Windows	Small: Match Kawneer Permafluor "Charcoal" Medium: Match Kawneer Permafluor "Military Blue" Large: Match Kawneer Permafluor "Dove Gray"
087100	Door Hardware	Brushed Chrome, Brushed Stainless Steel or Natural Aluminum color depending upon material of manufacture.
088000	Glass	Exterior Windows: Tinted Glass: Aqua Blue
089000	Louvers	Colors: Match Kawneer Permafluor "Charcoal"
093000	Ceramic tile floor and base.  Toilet room floor tile will be three colors with field tile of color 1; 1:20 tiles of color 2, and 1:40 tiles color 3. The pattern will be random. Toilet room wall tile will have a two tile tall band of 2x2 porcelain accent color tiles. <b>Pattern and height of accent to be selected.</b>	<u>Toilet Rooms:</u> Floor tile field color: <b>To be selected.</b> Floor tile accent color: <b>To be selected.</b> Wainscot field and base: <b>To be selected.</b> Wainscot accent colors: Floor tile colors 2 and 3. Grout: <b>To be selected.</b>
	Cut floor tiles to provide 4" high base, aligned with floor tile grid.	<u>Lobby Floor and Base:</u> Royal Mesa "Greys"; four grey colors/random mix. 226 V 060060 227 V 060060 228 V 060060 229 V 060060
095113	Acoustic Panel Ceilings	White
096500/096510	Vinyl Composition Tile  <u>Corridors/Reception/Nurses</u> Provide three color VCT patterns composed of a field tile of 80% of the	<u>Corridors/Reception/Nurses:</u> <b>To be selected.</b>  <u>Offices:</u> <b>To be selected.</b>  <u>Exam Rooms:</u> <b>To be selected.</b>

	<p>floor area, and two accent colors of 15% and 10% floor area.. Place in a random pattern.</p> <p><u>Offices/Exam Rooms/ Etc.</u>                  Provide two color VCT pattern in checkerboard pattern.</p>	<p><u>Group Therapy: To be selected.</u></p> <p><u>Conference: To be selected.</u></p> <p><u>Other: To be selected.</u></p>
	Rubber base, typically.	Johnsonite, 4-inch cove base, Color: <b>To be selected.</b>
	Rubber Carpet edge/ reducer, typically.	Johnsonite, Color: <b>To be selected.</b>
099100	Interior Walls, typ.	<p>Lobby: <b>To be selected.</b></p> <p>Corridors: <b>To be selected.</b></p> <p>Exam Rooms/Doctor and Nurse Offices: <b>To be selected.</b></p> <p>Offices: <b>To be selected.</b></p> <p>Other Rooms: <b>To be selected.</b></p>
	Ceilings:	Sherwin Williams "SW7006 Extra White"
	Pipe and Tube Railing Steel.	Sherwin Williams "SW7045 Intellectual Gray"
	Interior Steel ladders	Sherwin Williams "SW7045 Intellectual Gray"
	Metal Flashings	Paint to match substrate mounted upon.
	Access doors	Paint to match color of wall or ceiling mounted in.
	Hollow metal exteriors	Sherwin Williams "SW7045 Intellectual Gray"
	Hollow metal interior frames	Sherwin Williams "SW7066 Gray Matters"
	Hollow metal interior doors:	Sherwin Williams "SW7066 Gray Matters"
	Exterior Concrete Masonry	Sherwin Williams "SW7066 Gray Matters"
	Exterior Concrete	Sherwin Williams "SW7066 Gray Matters"
	Pipe Bollards - Exterior	Hot-dipped galvanized – touch-up only, paint concrete fill where exposed with touch-up paint.
101400	Signs	<b>To be selected.</b>
102800	Toilet Accessories	Brushed Stainless Steel (#4 finish)
104400	Fire Extinguisher Cabinets	Brushed Stainless Steel (#4 finish)
107313	Awning Fabric	Sunbrella Firesist: "Regatta Tweed 82005-0000"
	Awning Framing	Match Sherwin Williams "SW7045 Intellectual Gray"
107500	Flagpoles	Natural Aluminum with Gold Finial
109500	Corner Guards	<b>To be selected.</b>
	Privacy Curtains	White
	Service Windows	Aluminum
	Handrail System	<b>To be selected.</b>
122116	Vertical Louver Blinds	<b>Off-white color to be selected by Architect.</b>
124800	Entry Mats	<p>Frames: Natural Aluminum</p> <p>Mats: Natural Aluminum</p>
129300	Bicycle Racks	Hot-dipped galvanized
	Composite Fencing	<b>To be selected.</b>
210000	Sprinkler Heads	Recessed Pendent Type: White

		Sidewall: White Exposed Standard Head: Rough Bronze
	Siamese Fitting	(Existing) Cast brass if new.
220000	Plumbing Fixtures	China Plumbing Fixtures: White Stainless Steel Sinks: Brushed (#4 finish) Faucets and Fittings (in finished areas): Bright Chrome.
230000	Temperature control device cover plates	White.
	Diffusers, registers, grilles	White
	Rooftop ventilators	Manufacturer's Gray
	Modular Outdoor Air Handling Units	Manufacturer's Gray (not green)
260000	Electrical and data device cover plates	White.
	Electrical and data devices	White, typ. Provide colored devices as specified for specific power sources. Refer to electrical specifications.
	Parking lot Pole Fixtures	Match existing poles.
	Pedestrian Pole Fixtures	Dark Bronze.
	Exterior Wall Light Fixtures	Light gray or aluminum
	Interior Light Fixtures	White.
321217	On-site Pavement Markings	White.
323115	Pipe Bollards	Refer to 099100 above.

**PART 3 – EXECUTION - (Not Used)**

**END OF SECTION 099990**

SECTION 101400

SIGNAGE

**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 the following types of signs:
  - 1. Room identification panel signs.
  - 2. Illuminated panel signs.
  - 3. Die cut letter/graphic signs.
  - 4. Dimensional letters.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 1 Section "Temporary Facilities and Controls" for temporary project identification signs.
  - 2. Division 9 Section "Color and Finish Schedule" for color selections.
  - 3. Division 23 Sections for labels, tags, and nameplates for mechanical equipment.
  - 4. Division 26 Sections for labels, tags, and nameplates for electrical equipment.
  - 5. Division 26 Section "Interior Lighting" for illuminated exit signs.

1.3 SUBMITTALS

- A. Product Data: For each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- B. Shop Drawings: Show fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.
  - 1. Provide message list for each sign required, including large-scale details of wording and lettering layout.
  - 2. Include full size templates for characters and graphic symbols.
  - 3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  - 4. Sign Schedule: Use same room and door designations indicated on Drawings.
- C. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.

1. Samples for selection of color, pattern, and texture:
  - a. Cast Acrylic Sheet and Plastic Laminate: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.
  - b. Die-cut vinyl characters and graphic symbols. Include a representative sample of surface applied graphics required in each panel. Show graphic style, colors, finishes, typestyles, and graphic symbol.
  - c. Panel sign sample.
  - d. Finish Samples: For factory finished surfaces, provide 4" square samples of applied finish for approval.

#### 1.4 QUALITY ASSURANCE

- A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.
- B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.
- C. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
  1. Interior Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
    - a. Elevator Signs: Refer to Division 14.
    - b. Rest Rooms and other Common Use Rooms
    - c. Exit Braille
  2. Notify Architect of details or specifications not conforming to code.
- D. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated. Sign units by other manufacturers may be considered provided deviations in dimensions and profiles do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.
- E. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
  1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of post and panel signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
  - a. Deterioration of material finishes beyond normal weathering.
  - b. Deterioration of embedded graphic image.

B. Warranty Period: Five years from date of Substantial Completion.

## 1.6 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Manufacturers of Panel Signs:
    - a. Best Sign Systems, Inc.
    - b. Mohawk Sign Systems.
    - c. Welch Architectural Signage.

### 2.2 MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- B. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested according to ASTM D 790, with a minimum allowable continuous service temperature of 176 deg F (80 deg C), and of the following general types:
  1. Opaque Sheet: Where sheet material is indicated as "opaque," provide colored opaque acrylic sheet in colors and finishes as selected from the manufacturer's standards.
- C. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications.
- D. Colored Coatings for Acrylic Plastic Sheet: Use colored coatings, including inks and paints for copy and background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for the application intended.

### 2.3 ROOM IDENTIFICATION PANEL SIGNS

- A. Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
  - 1. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally.
  - 2. Provide 0.25" clear face panels with backs painted. Provide 3/8" laminated material at changeable inserts, also back painted.
- B. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to conform with the following requirements:
  - 1. Edge Condition: Square cut.
  - 2. Corner Condition: Corners rounded to 1/8" radius.
- C. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.
- D. Raised Copy: Machine-cut copy characters from matte-finished opaque acrylic sheet and chemically weld onto the acrylic sheet forming sign panel face. Produce precisely formed characters with square cut edges free from burrs and cut marks. Over-routing of letters will not be acceptable.
  - 1. Panel Material: Matte-finished clear acrylic sheet.
  - 2. Raised Copy Thickness: Not less than 1/32 inch.
  - 3. Character Font: Tactile, Helvetica Medium and Helvetica Medium Condensed
  - 4. Height: 3/4" unless noted otherwise.
  - 5. Contrast to Background: Not less than 70%, typically.
    - a. Verify compliance of Architect selections with this criterion prior to fabrication.
- E. Symbols of Accessibility:
  - 1. Toilet Rooms:
    - a. Provide international symbol of accessibility.
    - b. Provide male, female and combined symbols.
- F. Provide characters complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille.

### 2.4 DIE CUT LETTER SIGNS

- A. Where 4" letters are indicated, provide black vinyl die cut letters directly adhered to the surface indicated. Mount on surface at 5'-0" above finished floor. (May be in multiple rows.)
  - 1. Font: Futura Condensed Extra Bold

### 2.5 ILLUMINATED PANEL SIGNS

- A. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
  - 1. Illuminated Panel Sign: Backlighting construction with LED lighting including transformers, insulators, and other accessories for operability, with provision for



servicing and concealing connections to building electrical system. Use tight or sealed joint construction to prevent unintentional light leakage. Space lamps apart from each other and away from sign surfaces as needed to illuminate evenly.

- a. Power: 120 V, 60 Hz, 1 phase.
2. Weeps: Provide weep holes to drain water at lowest part of exterior signs. Equip weeps with permanent baffles to block light leakage without inhibiting drainage.
3. Facing: Aluminum sheet:
  - a. Thickness: Manufacturer's standard for size of sign but not less than 0.080 inch (2.03 mm).
  - b. Cutout Characters: Sign face routed to receive push-through acrylic graphics slightly projecting from the sign panel.

## 2.6 DIMENSIONAL CHARACTERS

- A. Manufacturers:
  1. American Graphics, Inc.
  2. ASI Sign Systems, Inc.
  3. Grimco, Inc.
  4. Metal Arts; Div of H&H Manufacturing
  5. Mohawk Sign Systems.
  6. Signature Signs, Inc.
- B. Aluminum Castings: Provide aluminum casting of alloy and temper recommended by sign manufacturer for casting process used and for type of finish used.
- C. Cast Characters: Form individual letters and numbers by casting. Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, and other defects. Comply with requirements indicated for finish, style, and size.
  1. Character Height: Refer to Drawings
  2. Character Thickness: 1"
  3. Character Style: Arial
  4. Finish: Baked Enamel.

## 2.7 FINISHES

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.
- B. Aluminum Finish: Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
  1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 2 mils (0.05 mm), medium gloss.
  2. Color: Refer to Division 9 Section "Color and Finish Schedule".

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
  - 1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
- B. Coordination:
  - 1. Coordinate for backing as required to support exterior signs. Install prior to wall finish application.
  - 2. Coordinate with electrical for power requirements.
- C. Wall-Mounted Room Identification Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:
  - 1. Two-Face Tape: Mount signs to wall surfaces with two-face tape.
- D. Dimensional Characters and Illuminated Panel Signs: Mechanically fasten letters to structure with standard stand-off pin mounting. Provide protection against anodic corrosion between aluminum letters and siding components.

3.2 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

3.3 DIE CUT LETTER SIGN SCHEDULE

A.	Location:	Text:	Quantity:
	Rear Door	'Not a Public Entry'	1
	Water Room	"Sprinkler Control Valves" size for 4" letters Mount in three rows on doors as directed.	2
	Electrical	"Main Electrical Disconnect" size for 4" letters Mount in three rows on doors as directed.	1

3.4 DIMENSIONAL CHARACTERS

- A. Provide 10" letters on building: "144 Fore Street". Refer to drawings.

3.5 ILLUMINATED PANEL SIGN

- A. Refer to drawings for location. Provide sign of size indicated with text matching tenant standard graphic: "VA (logo) Department of Veterans Affairs - Portland Outpatient Services".

3.6 ROOM IDENTIFICATION PANEL SIGN SCHEDULE

A.	<u>Location:</u>	<u>Text:</u>	<u>Sizes:</u>	<u>Quantity:</u>
	Typical Door	(Room Number and Use)	8" x 6"	one for each int. door
	(All common use rooms other than electrical room doors, security equipment closet doors, telephone/data closet doors, and excluding all doors within housing units. A housing unit is a living areas which includes one dayroom, cells, multipurpose rooms, etc. secured by an internal sally port. Common use rooms are rooms not assigned to one person.)			
	Office Door	(Room No.) and Slot for Insert	8" x 6"	one for each int. door
	Mens' Restrooms	"Men" & Pictograph	8" x 6"	one for each room
	Womens' Restrooms	"Women" & Pictograph	8" x 6"	one for each room
	Staff Restrooms	"Rest Room" & Pictograph	8" x 6"	one for each room
	Patient Restrooms	"Rest Room" & Pictograph	8" x 6"	one for each room
	Exit Signs	"Exit"	3" x 1.5"	one at each lighted exit sign occurring at a door

**END OF SECTION 101400**



**SECTION 102800**

**TOILET ACCESSORIES**

**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 the following:
  - 1. Toilet accessories.
- B. Related Sections include the following:
  - 1. Mechanical Design/Builder for mop hangers provided with mop sinks.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
  - 1. Construction details and dimensions.
  - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Material and finish descriptions.
  - 4. Features that will be included for Project.
  - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
  - 1. Identify locations using room designations indicated on Drawings.
  - 2. Identify products using designations indicated on Drawings.
- C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

**1.5 COORDINATION**

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

**1.6 WARRANTY**

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 15 years from date of Substantial Completion.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.
- C. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- D. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- F. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- G. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

**2.2 WASHROOM AND SHOWER ACCESSORIES**

- A. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
  - 1. A & J Washroom Accessories, Inc.
  - 2. American Specialties, Inc.
  - 3. Bobrick Washroom Equipment, Inc.
  - 4. Bradley Corporation.

- B. Mirror Unit T1
  - 1. Basis-of-Design Product: Bobrick B-290.
  - 2. Frame: Stainless steel.
    - a. Corners: Welded and ground smooth.
  - 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
    - a. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
    - b. Size: 24" wide x 36" high.
- C. Soap Dispenser T2: Tenant Provided
- D. Towel Dispenser T3: Tenant Provided
- E. Toilet Tissue Double Roll Surface Mount Dispenser T4 :
  - 1. Basis of Design Product: Bobrick B-265
  - 2. Mounting: Wall mount with exposed fasteners.
  - 3. Material: Stainless Steel, polished.
  - 4. Double roll, controlled delivery.
- F. Grab Bars T5, T6
  - 1. Basis-of-Design Product: Bobrick B 5806 Series.
  - 2. Mounting: Flanges with concealed fasteners.
  - 3. Material: Stainless steel, 0.05 inch thick.
    - a. Finish: Smooth, No. 4, satin finish.
  - 4. Outside Diameter: 1-1/4 inches
  - 5. Configuration and Length: As indicated on Drawings.
- G. Robe Hook T7 – Provide two each where key note is shown with one mounted at 48" and one at 60":
  - 1. Basis-of Design Product: Bobrick B-76727
  - 2. Description: Double-prong unit.
  - 3. Material and Finish: Stainless steel, No. 4 finish (satin).
  - 4. Mounting: Surface.
- H. Shelf T8:
  - 1. Basis-of-Design Product: Bobrick B-296 x 18"
  - 2. Dimensions: 6" W x 1'-6"L.
  - 3. Shelf: 18-8 S, type 304, 18 gauge stainless steel with satin finish. 3/4" return edges. Front edge hemmed.
  - 4. Brackets: 18-8 S, type-304, 16 gauge stainless steel with satin finish. Welded to shelf.
  - 5. Mounting: Surface.
  - 6. Provide number of brackets as recommended by manufacturer for specified length of shelf.

## 2.3 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Key locks alike. Provide minimum of six (10) keys to Owner's representative.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

**3.2 ADJUSTING AND CLEANING**

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

**END OF SECTION 102800**



**SECTION 104400**

**FIRE PROTECTION SPECIALTIES**

**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 the following:
  - 1. Portable fire extinguishers.
  - 2. Fire-protection cabinets for the following:
    - a. Portable fire extinguishers.
  - 3. Fire-protection accessories.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
  - 1. Fire Extinguishers: Include rating and classification.
  - 2. Cabinets: Include details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Maintenance Data: For fire extinguishers and fire-protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1.5 COORDINATION

- A. Coordinate size of cabinets to ensure that type and capacity of fire extinguishers indicated and provided by Owner under separate Contract are accommodated.
- B. Coordinate size of cabinets to ensure that type and capacity of hoses, hose valves, and hose racks indicated are accommodated.

**1.6 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Portable Fire Extinguishers:
    - a. Amerex Corporation.
    - b. Badger; Div. of Figgie Fire Protection Systems.
    - c. Buckeye Fire Equipment Company.
    - d. J.L. Industries, Inc.
    - e. Kidde: Walter Kidde, The Fire Extinguisher Co.
    - f. Larsen's Manufacturing Company.
    - g. Modern Metal Products; Div. of Technico.
    - h. Potter-Roemer; Div. of Smith Industries, Inc.
  - 2. Fire-Protection Cabinets:
    - a. J.L. Industries, Inc.
    - b. Larsen's Manufacturing Company.
    - c. Potter-Roemer; Div. of Smith Industries, Inc.

**2.2 MATERIALS**

- A. Cold-Rolled Steel Sheet: Carbon steel, complying with ASTM A 366/A 366M, commercial quality, stretcher leveled, temper rolled.
- B. Stainless-Steel Sheet: ASTM A 666/A 666M, Type 302 or Type 304 alloy.

**2.3 PORTABLE FIRE EXTINGUISHERS**

- A. General: Provide fire extinguishers of type, size, and capacity for each cabinet and other locations indicated.
- B. Multipurpose Dry-Chemical Type: UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, in enameled-steel container. Maximum 5 inch diameter tank.

**2.4 COMMERCIAL GRADE FIRE-EXTINGUISHER CABINETS**

- A. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
  - 1. Cabinet Metal: Stainless-steel sheet.
  - 2. Shelf: Same metal and finish as cabinet.
- B. Cabinet Type: Suitable for the following:
  - 1. Multipurpose Dry-Chemical fire extinguisher.
- C. Cabinet Mounting: Suitable for the following mounting conditions:
  - 1. Recess Mounting.
- D. Cabinet Trim Style: No trim.
- E. Door Material: Manufacturer's standard, as follows:
  - 1. Stainless-steel sheet.
    - a. Door Glazing: None
- F. Door Style: Manufacturer's standard design, as follows:
  - 1. Solid panel without frame.
- G. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.
- H. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide handle with adjustable roller catch. Provide continuous-type hinge permitting door to open 180 degrees.
- I. Accessories:
  - 1. Door Handle: Provide manufacturer's standard surface door handle.
  - 2. Identification: Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as indicated by Architect.
    - a. Identify fire extinguisher in cabinet with the words "FIRE EXTINGUISHER" applied to door.
      - 1) Application Process: Vinyl letters.
      - 2) Lettering Color: Red.
      - 3) Orientation: Vertical.
- J. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Larsen's: Occult Series SS O-2409 and SS FS O-2409 with latch.
    - a. Provide fire-rated cabinets where recessed in fire-rated barriers.
  - 2. Equal by listed manufacturer.

## 2.5 STAINLESS-STEEL FINISHES

- A. General: Remove or blend tool and die marks and stretch lines into finish. Grind and polish surfaces to produce uniform, directionally textured polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

- B. Bright, Directional Polish: No. 4 finish.
- C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
  - 1. Remove and replace damaged, defective, or undercharged units.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing fire-protection specialties.
- B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
  - 1. Fasten cabinets to structure, square and plumb.

#### 3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust cabinet doors that do not swing or operate freely.
- B. Refinish or replace cabinets and doors damaged during installation.
- C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

#### 3.4 FIRE EXTINGUISHER SCHEDULE

- A. **Fire Extinguisher "FEC"**: Where this designation is indicated, provide a commercial grade fire extinguisher cabinet as specified herein. Provide a Multipurpose Dry-Chemical Type fire extinguisher within cabinet.

**END OF SECTION 104400**

SECTION 107313

AWNINGS

**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. Fixed awnings.
2. Railing fabric panels.

B. Related Requirements:

1. Division 5 Section "Structural Steel" for columns to support awnings.
2. Division 5 Section "Metal Fabrications" for blocking, shims, reinforcing, and supplemental support members for connecting to awning frame and anchorage.
3. Division 5 Section "Pipe and Tube Railings" for railings within which canvas panels are to be installed.
4. Division 6 Section "Rough Carpentry" for blocking, nailers, shims, reinforcing, framing, and furring for connecting to awning frame and anchorage.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include styles, material descriptions, construction details, fabrication details, dimensions of individual components and profiles, hardware, fittings, mounting accessories, features, and finishes for awnings.

B. Shop Drawings:

1. Include plans, elevations, sections, mounting heights, and attachment details.
2. Detail fabrication and assembly of awnings, including seam layout, spacing, and orientation of awning fabric.
3. Show locations for blocking, reinforcement, and supplementary structural support.
4. Show pipe railings with panels, indicating required fastening locations.

C. Samples for Verification: For the following:

1. Awning Fabric: 12-inch- (300-mm-) square section of fabric from dye lot to be used for the Work, with specified treatments applied. Mark face of fabric.
2. Seam, Edge, and Corner Condition: Not less than 12-inch- (300-mm-) long section showing seam, edge, and corner treatment.
3. Frame Finish: Not less than 6-inch (150-mm) lengths.
4. Frame Corner and Frame Intersections: Not less than 12-inch (300-mm) sections showing finished joint construction and fabric attachment to awning frame.

D. Product Schedule: For awnings. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For awnings.

1. Design Responsibility: The contractor is required to provide the complete design and detailing of the awning systems to resist specified loads within deflection limits specified. All design and detailing of steel framing is subject to approval by the Structural Engineer of record.

F. Structural Performance: Provide framing capable of withstanding design loads specified within limits specified by code and under conditions indicated.

1. Design Loads:

- a. Loads: As indicated on Drawing SG001 and specified in ASCE 7-02, "Minimum Design Loads for Buildings and Other Structures."

2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

- a. Framing: 1/240 of the member length under load.

3. Design awning system to allow for construction tolerances, and to accommodate live load movements of system.

#### 1.4 SUBMITTALS

A. Qualification Data: For professional engineer.

B. Welding certificates.

C. Product Certificates: For each type of awning fabric.

D. Evaluation Reports: For anchors and fasteners, from ICC-ES.

E. Sample Warranty: For special warranty.

F. Maintenance Data:

1. Methods for maintaining awning fabrics and finishes.

- a. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
  - 1. Fabricator is a Master Fabric Craftsman certified by the Industrial Fabrics Association International.
  - 2. Fabricator's responsibilities include fabricating and installing awnings and providing professional engineering services needed to assume engineering responsibility.
- B. Installer Qualifications: Fabricator of products.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
- D. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation.
  - 1. Build mockup of typical awning as shown on Drawings.
  - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of awnings in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Where awning installation is indicated to fit to other work, verify dimensions of other work by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for fenestration operation throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 WARRANTY

- A. Special Warranty: Manufacturer and fabricator agree to repair or replace components of awnings that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including framework.
    - b. Deterioration of fabric including seam failure.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Awning Warranty Period: Five years from date of Substantial Completion.
3. Fabric Warranty Period: Five years from date of Substantial Completion.
4. Thread Warranty Period: Five years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Source Limitations: Obtain awnings from single source from single manufacturer.

### **2.2 PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Engage a qualified professional engineer, licensed in the State of Maine, to design awnings.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- C. Regulatory Requirements: Provide awnings complying with loading requirements from wind and snow per the building code. Refer to Division 1 Section "Applicable Codes".

### **2.3 AWNING AND RAILING PANEL FABRICS**

- A. Products: Subject to compliance with requirements, provide the following:
  1. Sunbrella "Firesist"
- B. Fire-Test-Response Characteristics: Provide awning fabrics with the fire-test-response characteristics indicated, as determined by testing identical products according to test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  1. Flame-Resistance Ratings: Passes NFPA 701.
  2. Permanently attach label to each awning fabric indicating whether fabric is inherently and permanently flame resistant or is treated with flame-retardant chemicals, and whether it requires retreatment after designated time period or cleaning.
- C. Design: Refer to drawings.
- D. Thread: 100 percent bonded polyester, UV-light, mildew, and rot resistant.

### **2.4 AWNING FRAMES**

- A. Steel Frames:



1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
  2. Cold-Formed Steel Tubing: ASTM A 500/A 500M, grade as required by structural loads.
  3. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless another weight is indicated or required by structural loads.
  4. Steel Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513 or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and complying with dimensional tolerances in ASTM A 500/A 500M.
  5. Galvanizing:
  6. Steel Finish: Manufacturer's standard decorative Baked-enamel or enamel Powder-coat finish complying with finish manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
- B. Anchors, Fasteners, Fittings, Hardware, and Installation Accessories: Complying with performance requirements indicated and suitable for exposure conditions, supporting structure, anchoring substrates, and installation methods indicated. Corrosion-resistant or noncorrodible units; weather-resistant, compatible, nonstaining materials. Provide as required for awning assembly, mounting, and secure attachment. Number as needed to comply with performance requirements and to maintain uniform appearance; evenly spaced. Where exposed to view, provide finish and color as selected by Architect from manufacturer's full range.
1. Wood Screws: ASME B18.6.1.
  2. Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M).
  3. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
  4. 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 according to ASTM E 488 conducted by a qualified independent testing and inspecting agency.
    - a. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).
  5. Adhesive-Bonded 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 according to ASTM E 1512 conducted by a qualified independent testing and inspecting agency.
    - a. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).
  6. Grommets: Stainless steel, No. 2.
    - a. Grommet Spacing: 6 inches (150 mm) o.c.
  7. Lacing: 100 percent polyester, braided No. 4.

- C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.5 AWNING AND RAILING PANEL FABRICATION

- A. Fabrics: Reinforce wear points and hardware attachment points with polypropylene mesh webbing. Seam fabrics as follows:
  - 1. Fabric Edges and Seams: Manufacturer's standard hemming and seaming methods.
- B. Frames: Preassemble awning frames in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
  - 1. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
  - 2. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Fabricate slip-fit connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
  - 3. Weld corners and connections continuously. Obtain fusion without undercut or overlap. Remove welding flux immediately. At exposed corners and connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
  - 4. Provide for anchorage of type required; coordinate with supporting structure. Space anchoring devices to secure metal fabrications in place and to properly transfer loads.
- C. Colors of Metal and Plastic Components Exposed to View: Refer to Division 9 Section "Color and Finish Schedule".

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for supporting members, blocking, inserts, installation tolerances, lighting, and other conditions affecting performance of the Work.
- B. Coordination:
  - 1. Coordinate with wall attachment requirements to install blocking in wall assembly prior to wall finish application.
  - 2. Coordinate with electrical for placement of light fixture under entry canopy.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install awnings and railing panels at locations and in position indicated, securely connected to supports, free of rack, and in proper relation to adjacent construction. Use mounting methods of types described and in compliance with Shop Drawings and fabricator's written instructions.
- B. Install awnings after other finishing operations, including joint sealing and painting, have been completed.
- C. Attach fabric to frames as recommended by fabricator, using lacing method as required to conceal ends of lacing to ensure tight, wrinkle-free fit of fabric to frame.
- D. Slip fit frame connections accurately together to form hairline joints, and tighten to secure.
- E. Weld frame connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
  - 1. Field Welding: Comply with the following requirements:
    - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
    - b. Obtain fusion without undercut or overlap.
    - c. Remove welding flux immediately.
    - d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Anchoring to In-Place Construction: Use anchors, fasteners, fittings, hardware, and installation accessories where necessary for securing awnings to structural support and for properly transferring load to in-place construction.
- G. Corrosion Protection: Coat concealed surfaces of aluminum that come in contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
- H. Coordinate awning installation with flashing and joint-sealant installation so these materials are installed in sequence and in a manner that prevents exterior moisture from passing through completed exterior wall and roof assemblies.

3.3 CLEANING AND PROTECTION

- A. Galvanized Surfaces: Clean field welds, connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: Immediately after erection, clean abraded areas with galvanized finish undamaged. Paint uncoated and abraded areas with same or compatible material as used for shop-applied finish painting.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

END OF SECTION 107313

**SECTION 107500**

**FLAGPOLES**

**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 the following:
  - 1. Aluminum flagpoles.
- B. Related Sections include the following:
  - 1. Division 32 Sections for sitework coordinated with flagpole installation.
  - 2. Division 7 Section "Bituminous Dampproofing" for coating to be applied to flagpole below grade.
  - 3. Division 7 "Joint Sealants" for elastomeric sealant filling the top of the foundation tube.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide flagpoles capable of withstanding the effects of wind loads as determined according to the building code in effect for this Project or NAAMM FP 1001, "Guide Specifications for Design Loads of Metal Flagpoles," whichever is more stringent.
  - 1. Base flagpole design on maximum standard-size flag suitable for use with pole.
  - 2. Basic Wind Speed: For Project location, 90 mph (38.25 m/s).

1.4 SUBMITTALS

- A. Product Data: Include installation instructions.
- B. Shop Drawings: Show general layout, jointing, grounding method, and anchoring and supporting systems.
  - 1. Include details of foundation system for ground-set poles.
- C. Structural Calculations: For flagpoles indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each flagpole as a complete unit from a single manufacturer, including fittings, accessories, bases, and anchorage devices.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. General: Spiral wrap flagpoles with heavy craft paper or other weather tight wrapping and enclose in a hard fiber tube or other protective container.

**1.7 WARRANTY**

- A. Flagpole manufacturer shall provide at a minimum, a 20 year warranty.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. Concord Industries, Inc.
  2. Eder Flag Manufacturing Co., Inc.
  3. Ewing: John Ewing & Co. Inc.
  4. ICC Manufacturing Co.; Morgan-Francis Div.; AABEC Pole Div.
  5. Kearney-National Inc.; American Flagpole Div.
  6. Pole-Tech Co., Inc.

**2.2 FLAGPOLES**

- A. Pole Construction, General: Construct poles and ship to Project site in one piece, if possible. If more than one piece is necessary, provide snug-fitting precision joints with self-aligning, internal splicing sleeve arrangement for weather tight, hairline field joints.
- B. Aluminum Flagpoles: Fabricate from seamless, extruded tubing complying with ASTM B 241 (ASTM B 241M), alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm). Heat treat after fabrication to comply with ASTM B 597, temper T6. Exposed height:
  1. Provide one 30' high, cone-tapered aluminum flagpoles.
- C. Foundation Tube: Galvanized corrugated-steel foundation tube, 0.0635-inch (1.6-mm) minimum wall thickness, sized to suit flagpole and installation. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges all welded together. Galvanize steel parts, including foundation tube, after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.
  1. Provide aluminum base or aluminum flashing collar; finish to match flagpole.

**2.3 FITTINGS**

- A. Finial Ball: Manufacturer's standard flush-seam ball, sized to match pole-butt diameter.

1. 0.063-inch (1.6-mm) spun aluminum, gold finish.
- B. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
- C. Halyard Flag Snaps: Provide 2 swivel snap hooks per halyard, as follows:
  1. Stainless steel.

#### 2.4 MISCELLANEOUS MATERIALS

- A. Concrete: Provide concrete composed of Portland cement, coarse and fine aggregate, and water mixed in proportions to attain a 28-day compressive strength of not less than 3000 psi (20 MPa), complying with ASTM C 94.
- B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.
- C. Sand: ASTM C 33, fine aggregate.
- D. Elastomeric Sealant: Comply with requirements of Division 7 Section "Joint Sealants."

#### 2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.

### **PART 3 - EXECUTION**

#### 3.1 PREPARATION

- A. Prepare in-ground flagpoles by painting below-grade portions with a heavy coat of bituminous paint as specified in Division 7.
- B. Excavation: For foundation, excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete.
- C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure forms, foundation tube in position, braced to prevent displacement during concreting.
- D. Place concrete immediately after mixing to secure foundation tube. Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than 7 days or use a nonstaining curing compound.

- E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to base perimeter. Coordinate placement of concrete to permit fit of trim collar.

**3.2 FLAGPOLE INSTALLATION**

- A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.
- B. Foundation-Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch (50-mm) layer of elastomeric sealant and cover with flashing collar.

**END OF SECTION 107500**



SECTION 109500

MISCELLANEOUS BUILDING SPECIALTIES

**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.
- B. Related Sections include the following:
  - 1. Division 5 Section "Metal Fabrications" for bollards.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Corner Guards
  - 2. Privacy Curtains
  - 3. Service Windows
  - 4. Handrail System

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

**PART 2 - PRODUCTS**

2.1 PRODUCTS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the manufacturer listed.
  - 1. Basis-of-Design Product: The design for each accessory is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product another manufacturer. Comparable products must match materials in composition and thickness, and the product must provide equivalent features to the basis-of-design product.
- B. Surface-Mounted, Opaque-Plastic Corner Guards: Fabricated from not less than 0.08" PVC plastic, acrylic-modified vinyl sheet or opaque polycarbonate sheet; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the manufacturer listed.
  - a. American Floor Products Co., Inc.
  - b. Balco, Inc.
  - c. Construction Specialties, Inc.
  - d. Musson Rubber Company.
  - e. Pawling Corporation.
  - f. WallGuard.com.
  - g. wallProtex.
2. Gauge: .08"
3. Wing Size: Nominal 2.5" (64 mm).
4. Mounting: Double-faced adhesive foam tape.
  - 1) Color and Texture: Color to be selected. Stipple texture.

C. Privacy Curtain

1. Components
  - a. Channel Tracks (Surface Mounted Type): Extruded aluminum, ASTM B221, alloy 6063, temper T5 or T6, channel shaped, with smooth inside raceway for curtain carriers.
  - b. Tubular Track (Suspended Type): Seamless drawn aluminum tubing, ASTM B221, alloy 6061 temper T6, 25 mm (one inch) outside diameter, not less than 1.5 mm (0.060 inch) wall thickness, slotted for interior carriers.
  - c. Curtain Carriers: Nylon or delrin carriers, with either nylon or delrin wheels on metal, delrin, or nylon axles. Equip each carrier with either stainless steel, chromium plated brass or steel hooks with swivel, or nickel chromium plated brass or stainless steel bead chain and hook assembly, or delrin carriers may have moulded on delrin hooks. Hook for bead chain may be the same material and finish as the bead chain or may be chromium plated steel. Provide 2.2 carriers for every 300 mm (onefoot) of each section of each track length, plus one additional carrier.
  - d. End Stop Connectors, Ceiling Flanges and Other Accessories: Fabricate from the same material with the same finish as the tracks or from nylon.
  - e. Hangers and Fittings: Fabricate from the same material with the same finish as the tracks. Hangers may be round or square for channel tracks and round for tubular tracks. Design fittings to be compatible with design of tracks and to safely transmit the track load to the hangers.
  - f. At end of each section of track, make provision for insertion and removal of carriers. Design to prevent accidental removal of carrier. Any operating mechanism shall be removable with common tools.
2. Fabrication:
  - a. Form tracks and bends of lengths that will produce the minimum number of joints. Make track sections up to 4800 mm (16 feet) without joints. Form corner bend on a 300 mm (12 inch) radius. Form flat surface without distortion.

D. Service Windows

1. Manufacturer: Horton Automatics
2. Product: 8100 Series automatic operating, single slide window.
3. Framing: Aluminum extrusions, natural anodized finish.
4. Size: Refer to drawings.

5. Control: Provide C521 switch below countertop for receptionist operation. Provide electronic control module with fully and independently adjustable open/close speeds and close check. Provide adjustable time delay from 1 to 20 seconds and reversing circuit for opening window on contact with obstruction.
6. Electrical: 120V, 2 amp., 1/8 HP DC motor, 1800 RPM.
7. Glazing: Refer to drawings and Division 9 Section "Glazing".

E. Handrail System

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. American Floor Products Co., Inc.
  - b. Construction Specialties, Inc.
  - c. Musson Rubber Company.
  - d. Pawling Corporation.
2. Cover: Minimum 0.078-inch- (2.0-mm-) thick, extruded rigid plastic; [as follows:] [in dimensions and profiles indicated on Drawings.]
  - a. Single Handrail: Cylindrical tube profile cover with continuous retainer; with mounting brackets supporting bottom of rail.
    - 1) Tube Diameter: 1.5 inches.
  - b. Color and Texture: As selected by Architect from manufacturer's full range. Refer to Division 9 Section: "Color and Finish Schedule".
3. Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
4. Mounting Bracket: Extended mounting on injection-molded plastic mounting brackets.
5. End Caps and Corners: Prefabricated, injection-molded plastic; matching color cover; field adjustable for close alignment with snap-on cover.
6. Accessories: Concealed splices, cushions, and mounting hardware.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. General: Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

3.2 CORNER GUARD INSTALLATION

- A. Installation:
  1. Verify wall finish is complete, that wall is smooth, flat, clean, and otherwise ready to bond to adhesive.
  2. Verify corner guard will not conflict with other items installed in wall.

3. Install per manufacturer recommendations and instructions, setting bottom of guard on floor.

### 3.3 PRIVACY CURTAIN INSTALLATION

#### A. Installation:

1. Install tracks after finish painting and ceiling finishing operations are complete.
2. Install track level and hangers plumb and securely anchor to the ceiling // or suspend from above // to form a rigid installation.
3. Anchor surface mounted curtain tracks directly to exposed grid of lay-in acoustical tile ceilings with suitable fasteners, spaced approximately 600 mm (24 inches) on center.
4. Anchor surface mounted curtain tracks to concrete, plaster and gypsum board ceilings with a minimum of 3 mm (1/8-inch) diameter fastenings or concealed clips spaced not more than 900 mm (three feet) on center.
5. Securely fasten end stop caps to prevent their being forced out by the striking weight of carriers.
6. Anchor surface mounted intravenous track directly to support system above ceiling as shown.
7. Remove damaged or defective components and replace with new components or repair to the original condition.

### 3.4 SERVICE WINDOW INSTALLATION

#### A. Installation:

1. Install service windows per manufacturers instructions.

### 3.5 HANDRAIL SYSTEM INSTALLATION

#### A. Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

1. Install impact-resistant wall protection units in locations and at mounting heights indicated on Drawings or, if not indicated, at heights indicated below:
2. Handrails: 3'-0" top above finished floor.

#### B. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.

1. Provide anchoring devices to withstand imposed loads.
2. Where splices occur in horizontal runs of more than 20 feet (6.1 m), splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches (305 mm).
3. Adjust end caps as required to ensure tight seams.

### 3.4 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

**END OF SECTION 109500**



SECTION 122113

HORIZONTAL LOUVER BLINDS

**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.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 9 Section "Color and Finish Schedule".

1.2 SUMMARY

- A. This Section includes venetian blinds.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each type of horizontal louver blind specified. Include printed data on physical characteristics.
- C. Shop drawings showing location and extent of blinds. Show installation details at and relationship to adjoining work. Include elevations indicating blind units. Indicate location of blind controls.
- D. Samples for selection in the form of manufacturer's color charts showing the full range of colors available for each type of horizontal louver blind indicated.
- E. Schedule of horizontal louver blinds using same room designations indicated on Drawings.
- F. Maintenance data for horizontal louver blinds to include in the operation and maintenance manual specified in Division 1. Include the following:
  - 1. Methods for maintaining horizontal louver blinds and finishes.
  - 2. Precautions for cleaning materials and methods that could be detrimental to finishes and performance.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide horizontal louver blinds identical to those tested for the following fire-test-response characteristics as determined by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Test Method: NFPA 701.
  2. Rating: Pass.
- B. Single-Source Responsibility: Obtain each type of horizontal louver blind from one source and by a single manufacturer.

#### 1.5 PROJECT CONDITIONS

- A. Field Measurements: Check actual horizontal louver blind dimensions by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Enclosure and Environmental Limitations: Do not install horizontal louver blinds until space finish painted.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
1. Horizontal Louver Blinds:
    - a. Hunter Douglas, Inc.
    - b. Joanna Western Mills Co.
    - c. Kirsch.
    - d. Levolor Corp.
    - e. Louverdrape, Inc.
    - f. Springs Window Fashions; Bali.

#### 2.2 HORIZONTAL LOUVER BLINDS

- A. Product: Provide Hunter Douglas "Commercial Celebrity" Model CL62 or equivalent by listed manufacturer.
- B. Louvers: Manufacturer's standard as follows:
1. .006" aluminum.
  2. Nominal Louver Width: 1 inch (25 mm) (miniblinds).
  3. Painted colors.
- C. Tilt Operation: Manual with wand.
1. Position of Tilt Control: Left side, unless otherwise indicated.
  2. Tilt: Full.
- D. Cord-Lock Operation: Cord lock; locks pull cord to stop blind at any position in ascending or descending travel.
1. Position of Cord Lock: Right side, unless otherwise indicated.



- E. Cord Equalizers: Self-aligning to maintain horizontal louver blind position.
- F. Valance: Match color of louvers.
- G. Mounting: End.
- H. Colors and Patterns: Where manufacturer's standard products are indicated, provide horizontal louvers complying with the following requirements:
  - 1. Provide Architect's selections from manufacturer's full range of colors for smooth finish horizontal louver blinds of type indicated.
  - 2. Refer to Division 9 Section "Color and Finish Schedule" for selections.

### 2.3 FABRICATION

- A. Product Standard and Description: Comply with AWCMA Document 1029 for each horizontal louver blind unit consisting of louvers, rails, cord locks, tilting mechanisms, tapes, and installation hardware.
- B. Lifting and Tilting Mechanisms: Noncorrosive, self-lubricating materials.
- C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
  - 1. Blind Units Installed Outside Jambs: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- D. Installation Fasteners: Not less than 2 fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; support blind units under conditions of normal use.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of horizontal louver blinds. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install blinds level, plumb, and located so exterior louver edges in any position are not closer than 1 inch (25 mm) to interior face of glass lites.
  - 1. Head Mounted: Install headrail flush on face of metal frame x full metal frame width.
  - 2. Fix head and sill of blinds mounted to doors, where applicable.

### 3.3 ADJUSTING

- A. Adjust components and accessories for proper operation.

### 3.4 CLEANING

- A. Clean blind surfaces, according to manufacturer's instructions, after installation.
- B. Remove surplus materials, packaging, rubbish, and debris resulting from installation. Leave installation areas neat, clean, and ready for use.

### 3.5 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensure that horizontal louver blinds are without damage or deterioration at the time of Substantial Completion.

### 3.6 HORIZONTAL LOUVER BLIND SCHEDULE

- A. General: Provide horizontal louver blinds to comply with requirements in this Section and with the following schedule of blinds.
  - 1. Provide blinds in exterior building windows in rooms as follows:
    - a. At all exterior windows except in aluminum storefronts and entrances.

**END OF SECTION 122113**

SECTION 124800

ENTRANCE FLOOR MATS AND FRAMES

**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 the following:
  - 1. Entrance mats in recessed frames.
- B. Related Sections include the following:
  - 1. Division 3 Section "Cast-in-Place Concrete" for concrete work, including forming, placing, and finishing concrete floor slabs, and for concrete materials for grouting and filling around and under recessed mats and frames.
  - 2. Division 9 Sections "Tiling" and "Resilient Flooring and Base" for flooring abutting entrance mat frames
  - 3. Division 9 Section "Color and Finish Schedule" for color selections.

1.3 SUBMITTALS

- A. Product Data: Include manufacturer's specifications and installation instructions, construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of floor mat and frame specified.
- B. Shop Drawings: For floor mats and frames. Show assembly, joint locations, installation details, layout, plans, elevations, sections, details of patterns or designs, accessories, anchors, and attachments to other Work.
  - 1. Coordinate Shop Drawings showing oversized recess for deferred installation of frames with concrete work.
- C. Samples for Selection: For each type of floor mat indicated, submit full line of color options for selection and confirmation.
- D. Maintenance Data: For cleaning and maintaining floor mats to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain floor mats and frames through one source from a single manufacturer.

- B. Accessibility Requirements: In addition to requirements of authorities having jurisdiction, provide installed floor mats that comply with Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

## 1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify blocked-out openings in floors by field measurements before fabrication and indicate measurements on Shop Drawings.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating floor mats and frames without field measurements. Coordinate floor construction to ensure that actual opening dimensions correspond to established dimensions.

## 1.6 COORDINATION

- A. Coordinate size and location of oversized recesses in concrete and tile work to receive floor mats and frames. Defer frame installations until building enclosure is completed and related interior finish work is in progress. Concrete, reinforcement, and formwork requirements are specified in Division 3.
- B. Coordinate integral installation of recessed frames and anchors with placing of concrete slab and tile so frames are positioned accurately.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS AND PRODUCTS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Carpet Type Mats:
    - a. Construction Specialties "Pedigrid-SA" G8.

### 2.2 METAL FRAME MATERIALS

- A. Extruded Aluminum: ASTM B 221 (ASTM B 221M), alloy 6061-T6 or alloy 6063-T5, T6, or T52 as standard with manufacturer.

### 2.3 FLOOR MATS

- A. General: Provide profiles of materials, including metals and metal finishes indicated or specified. If not indicated, provide colors, patterns, and profiles selected by Architect from manufacturer's standards.

### 2.4 CONCRETE FILL AND GROUT MATERIALS

- A. Provide concrete grout and fill equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.

## 2.5 FABRICATION

- A. General: Where possible, verify sizes by field measurement before shop fabrication.
- B. Floor Mats: Shop fabricate units to greatest extent possible in sizes as indicated. If not otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.
- C. Recessed Metal Mat Frames: Extruded aluminum, of size and style to fit floor mat type specified, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.
  - 1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.
- D. With manufacturer's standard protective coating, coat surfaces of aluminum frames that will contact cementitious material.

## 2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## 2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Mill Finish: AA-M10 (Mechanical Finish: as fabricated; no other applied finish unless buffing is required to remove scratches, welding, or grinding produced in fabrication process).
- C. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates and floor recesses for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.
  - 1. Install necessary shims, spacers, and anchorages for proper location and secure attachment of frames.
  - 2. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.

### 3.3 PROTECTION

- A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.
- B. Defer installation of floor mats until Project is near Substantial Completion.

**END OF SECTION 124800**

SECTION 129300

SITE FURNISHINGS

**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 the following:
  - 1. Bicycle Racks
  - 2. Composite wood screen fence material
- B. Related Sections include the following:
  - 1. Division 05 Section "Metal Fabrications" for steel pipe bollards.

1.3 SUBMITTALS

- A. Product Data: For each item specified.
- B. Samples: Manufacturer's color charts showing the full range of colors available for units indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect units during storage and construction against soiling or contamination from earth and other materials.

**PART 2 - PRODUCTS**

2.1 PRODUCTS

- A. Products: Provide the following:
  - 1. Bicycle storage racks:
    - a. "Bike Hitch" by Dero Bike Racks, Co. (or equal); Tel. 1-800-891-9298;  
[www.dero.com](http://www.dero.com)
  - 2. Composite wood screen fence material:

- a. Face boards and caps for screen fences and gates to be: CorrectDeck CX composite wood decking with concealed fastening system; GAF Materials Corp.; Tel. 1-877-423-7663.
  - b. Color to be from standard manufacturer's range.
- B. Color Selections: Refer to Division 9 Section "Color and Finish Schedule" for selections.

**PART 3 - EXECUTION**

3.1 INSTALLATION, GENERAL

- A. Install all items per manufacturer's recommendations and as shown on the contract drawings.

**END OF SECTION 129300**



**SECTION 310001**

**SITE PERMIT REQUIREMENTS**

**PART 1 - GENERAL**

1.1 SUMMARY

- A. Construction of this project must meet the terms and conditions of the following:
1. City of Portland: Minor Site Plan Review approval

1.2 INSPECTING PERMIT INFORMATION

- A. Copies of the permit applications and correspondence during review of the permits may be inspected during normal business hours at the office of:
1. SMRT, Inc.  
144 Fore Street  
Portland, Maine 04104  
Tel: (207) 772 3846
  2. Contact SMRT, Inc. 48 hours prior to inspection to coordinate time of visit.

**PART 2 - PRODUCTS**

2.1 PERMITS

- A. Receipt of the city permit is pending and a copy will be issued upon receipt.

**PART 3 - EXECUTION**

3.1 CONTRACTOR RESPONSIBILITIES

- A. Certain conditions of the permits will be the responsibility of the Contractor. The Contractor shall review all permit documentation and comply with all standard conditions of approval and all conditions that apply specifically to this project. A copy of the permit approvals and the approved plans shall be kept on site for the duration of the work.
1. Local Permits: Notify the Planning and Code Enforcement Departments before construction begins.

**END OF SECTION 31001**



SECTION 311000

SITE CLEARING

**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. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Removing above- and below-grade site improvements.
4. Disconnecting, capping or sealing, removing site utilities and abandoning site utilities in place.

B. Related Sections:

1. Division 01 Section "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities.
2. Division 01 Section "Execution" for field engineering and surveying.
3. Division 02 Section "Selective Demolition" for partial demolition of buildings or structures.

1.3 DEFINITIONS

- A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- B. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
- D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings.
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

**1.4 MATERIAL OWNERSHIP**

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

**1.5 SUBMITTALS**

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
  - 1. Use sufficiently detailed photographs or videotape.
  - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

**1.6 QUALITY ASSURANCE**

- A. Preconstruction Conference: Conduct conference at Project site.

**1.7 PROJECT CONDITIONS**

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, emergency department access, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
  - 3. Temporary traffic control measures shall conform to Section 6 of the Manual on Uniform Traffic Control Devices (MUTCD) 2007 and as amended.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- D. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.

5. Impoundment of water.
  6. Excavation or other digging unless otherwise indicated.
  7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- E. Do not direct vehicle or equipment exhaust towards protection zones.
- F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- G. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Satisfactory Soil Material: Granular Fill: Granular Borrow shall be used to raise grades beneath paved areas and landscaped areas.
1. Granular Fill shall be a mixture of sand and gravel meeting the 2002 MDOT specification 703.19 "Granular Borrow."
  2. Gravel Base shall be screened or crushed aggregate meeting the 2002 MDOT specification 703.06 "Aggregate for Base and Subbase".

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag each tree trunk at 54 inches (1372 mm) above the ground.
- C. Protect existing site improvements to remain from damage during construction.
1. Restore damaged improvements to their original condition, as acceptable to Owner.

### **3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

### 3.3 TREE AND PLANT PROTECTION

- A. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
  - 1. Do not store construction materials, debris, or excavated material within drip line of remaining trees.
  - 2. Do not permit vehicles, equipment, or foot traffic within drip line of remaining trees.
- B. Do not excavate within drip line of trees, unless otherwise indicated.
- C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
  - 1. Cover exposed roots with burlap and water regularly.
  - 2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
  - 3. Coat cut faces of roots more than 1-1/2 inches (38 mm) in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
  - 4. Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.
- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.
  - 1. Employ a qualified arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
  - 2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified arborist.

### 3.4 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
  - 1. Coordinate with Owner to arrange with utility companies to shut off indicated utilities.
- B. Interrupting Existing Utilities:
  - 1. Notify Architect and Owner not less than five days in advance of proposed utility interruptions.
- C. Excavate for and remove underground utilities indicated to be removed.

3.5 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
  - 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.
- C. Where voids are created from excavation, place and compact approved fill as follows:
  - 1. Areas under pavements or slabs: Fill with gravel base to match adjacent grade and compact to 95% maximum dry density.
  - 2. Areas under planting beds: Fill with approved topsoil from approved source.
  - 3. Other areas not under structures: Fill with granular fill and compact to 90% maximum dry density.

3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.
- C. Stump grindings and brush chips may be re-used for erosion control purposes on site.

**END OF SECTION 311000**





SECTION 312000

EARTH MOVING

**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. Preparing subgrades for slabs-on-grade, walks, pavements, and plants.
2. Excavating and backfilling for structures.
3. Drainage course for concrete slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Subbase course and base course for asphalt paving.
6. Subsurface drainage backfill for walls and trenches.
7. Excavating and backfilling trenches for utilities.

B. Related Sections:

1. Division 01 Section "Construction Progress Documentation" for recording preexcavation and earth moving progress.
2. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities; also for temporary site fencing if not in another Section.
3. Division 03 Section "Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.
4. Divisions 21, 22, 23, 26, 27, 28, and 33 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.
5. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil.
6. Division 32 Section "Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  2. Final Backfill: Backfill placed over initial backfill to fill a trench.

- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices or changes in the Work.
  - 2. Bulk Excavation: Excavation more than 10 feet (3 m) in width and more than 30 feet (9 m) in length.
  - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Impervious Fill: Onsite excavation or borrow materials for a pond embankment or lining.
- I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. (0.76 cu. m) for bulk excavation or 3/4 cu. yd. (0.57 cu. m) for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
  - 1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- (1065-mm-) wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp (103-kW) flywheel power with bucket-curling force of not less than 28,700 lbf (128 kN) and stick-crowd force of not less than 18,400 lbf (82 kN) with extra-long reach boom; measured according to SAE J-1179.
  - 2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp (172-kW) flywheel power and developing a minimum of 47,992-lbf (213.3-kN) breakout force with a general-purpose bare bucket; measured according to SAE J-732.
- J. Riprap: Native angular stone or blasted ledge used for erosion or slope protection. See Division 31 Section 312002 for riprap stone specifications.
- K. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

- L. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- M. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- N. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
  - 1. Geotextiles.
  - 2. Controlled low-strength material, including design mixture.
  - 3. Geofam.
  - 4. Warning tapes.
  - 5. Drainage fabric.
  - 6. Separation fabric.
- B. Samples for Verification: For the following products, in sizes indicated below:
  - 1. Geotextile: 12 by 12 inches (300 by 300 mm).
  - 2. Warning Tape: 12 inches (300 mm) long; of each color.
  - 3. Drainage Fabric: 12 by 12 inches.
  - 4. Separation Fabric: 12 by 12 inches.
- C. Qualification Data: For qualified testing agency.
- D. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
  - 1. Classification according to ASTM D 2487.
  - 2. Sieve Analysis according to ASTM D422 Standard Test Method for Particle Size Analysis of Soils.
  - 3. Laboratory compaction curve according to ASTM D 698, ASTM D 1557.
- E. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

#### 1.5 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.
- B. Preexcavation Conference: Conduct conference at Project site.

**1.6 PROJECT CONDITIONS**

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
  - 3. Temporary traffic control measures shall conform to Section 6 of the Manual on Uniform Traffic Control Devices (MUTCD) 2007 and as amended.
- B. Perform site survey, research public utility records, and verify existing utility locations.
- C. Geotechnical Report – Refer to Division 1 Section “Existing Site Information Available”.
- D. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.
- E. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Division 31 Section "Site Clearing" and as shown on Drawings, are in place.
- F. Do not commence earth moving operations until plant-protection measures specified in Division 01 Section "Temporary Facilities and Controls" are in place.
  - 1. The following practices are prohibited within protection zones:
    - a. Storage of construction materials, debris, or excavated material.
    - b. Parking vehicles or equipment.
    - c. Foot traffic.
    - d. Erection of sheds or structures.
    - e. Impoundment of water.
    - f. Excavation or other digging unless otherwise indicated.
    - g. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- G. Do not direct vehicle or equipment exhaust towards protection zones.
- H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

**PART 2 - PRODUCTS**

**2.1 SOIL MATERIALS**

- A. Granular Fill: Granular Borrow shall be used to raise grades beneath paved areas and landscaped areas.
  - 1. Granular Fill shall be a mixture of sand and gravel meeting the 2002 MDOT specification 703.19 “Granular Borrow.”

B. Soil Borrow material may be used in place of Granular Borrow to raise grades beneath landscaped areas only where the moisture content of the material can be controlled sufficiently to achieve the required compaction. Soil Borrow shall comprise only Satisfactory Soils as described below.

1. Satisfactory Soils: Materials for backfill below subgrade and embankments shall meet ASTM D 2487 soil classification groups GW, GP, GMd, SW, SP, and SMd, or a combination of these group symbols; free of rock fragments larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
2. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, GMu, SMu, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols, and satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

C. Structural Fill: Sand and gravel material meeting the following gradation:

Sieve Size	Percent Finer by Weight
4 Inch	100
3 Inch	90-100
¼ Inch	25-90
#40	0-30
#200	0-5

\*Note: Maximum particle is limited to 3 inches within 3 feet of foundation walls, footings, and floor slabs, or if compacted by hand-guided equipment.

D. Drainage Course: For use under structures and structural slabs. Washed, narrowly graded mixture of crushed stone with 100 percent passing a 3/4- inch (19-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

E. Subbase Course: Naturally or artificially graded mixture of natural or processed gravel, or sand conforming to MDOT specification 703.06 for aggregate subbase Type D, except that the maximum particle size shall be four inches. The material shall meet the following gradation:

Sieve Size	Percent Finer by Weight
1/4 Inch	25-70
N° 40	0-30
N° 200	0-7.0

F. Base Course for Pavement: Naturally or artificially graded mixture of natural or processed gravel, or sand. Conforming to MDOT specification 703.06 for aggregate base Type A, and meet the following gradation:

Sieve Size	Percent Finer by Weight
2 inch	100
½ inch	45-70
¼ inch	30-55

N° 40	0-20
N° 200	0-5

- G. ¾-Inch Stone Pipe Bedding and Initial Backfill: Graded mixture of screened or crushed stone conforming to the following gradation:

Sieve Size	Percent Finer by Weight
1 Inch	100
¾ inch	90-100
⅜ inch	0-75
#4	0-25
#10	0-5

- H. Sand Pipe Bedding and Initial Backfill: Well graded, fine aggregate free from injurious amounts of organic impurities and conforming to the following gradation.

Sieve Size	Percent Finer by Weight
⅜ Inch	100
#4	90-100
#50	10-40
#100	3-15
#200	0-7

- I. Underdrain backfill: Granular material free from organic matter, conforming to the following gradation.

Sieve Size	Percent Finer by Weight
1 inch	95-100
½ inch	75-100
No. 4	50-100
No. 20	15-80
No. 50	0-15
No. 200	0-2

- J. Crushed Stone Base: Crushed stone shall be obtained from rock of uniform quality and shall consist of clean, angular fragments of quarried rock, free from soft or disintegrated pieces, or other objectionable matter. The stone, which shall be similar to railroad ballast shall meet the following gradation.

Sieve Size	Percent Finer by Weight
2 ½ Inch	100
2 inch	95-100
1 inch	0-30
¾ inch	0-5

- K. Impervious Fill: Clay material capable of compacting to a dense state and forming an impervious barrier that will retain water.

## 2.2 GEOTEXTILES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:
- B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:
1. Red: Electric.
  2. Yellow: Gas, oil, steam, and dangerous materials.
  3. Orange: Telephone and other communications.
  4. Blue: Water systems.
  5. Green: Sewer systems.
- C. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
1. Grab Tensile Strength: 110 lbf (490 N); ASTM D 4632.
  2. Tear Strength: 40 lbf (178 N); ASTM D 4533.
  3. Puncture Resistance: 50 lbf (222 N); ASTM D 4833.
  4. Water Flow Rate: 110-150 gpm per sq. ft. (100 L/s per sq. m); ASTM D 4491.
  5. Apparent Opening Size: No. 70; ASTM D 4751.
- D. Separation Fabric: Woven geotextile, specifically manufactured for use as a separation geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
1. Grab Tensile Strength: 200 lbf (890 N); ASTM D 4632.
  2. Tear Strength: 75 lbf (333 N); ASTM D 4533.
  3. Puncture Resistance: 90 lbf (400 N); ASTM D 4833.
  4. Water Flow Rate: 4 gpm per sq. ft. (2.7 L/s per sq. m); ASTM D 4491.
  5. Apparent Opening Size: No. 70; ASTM D 4751.

**2.3 CONTROLLED LOW-STRENGTH MATERIAL**

- A. Controlled Low-Strength Material: Self-compacting, low-density, flowable concrete material produced from the following:
  - 1. Portland Cement: ASTM C 150, Type I or Type II.
  - 2. Fly Ash: ASTM C 618, Class C or F.
  - 3. Normal-Weight Aggregate: ASTM C 33, 3/8-inch (10-mm) nominal maximum aggregate size.
  - 4. Foaming Agent: ASTM C 869.
  - 5. Water: ASTM C 94/C 94M.
  - 6. Air-Entraining Admixture: ASTM C 260.
- B. Produce low-density, controlled low-strength material with the following physical properties:
  - 1. As-Cast Unit Weight: 30 to 36 lb/cu. ft. (480 to 576 kg/cu. m) at point of placement, when tested according to ASTM C 138/C 138M.
  - 2. Compressive Strength: 80 psi (550 kPa), when tested according to ASTM C 495.
- C. Produce conventional-weight, controlled low-strength material with 80-psi (550-kPa) compressive strength when tested according to ASTM C 495.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

**3.2 DEWATERING**

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
  - 2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.



**3.3 EXPLOSIVES**

- A. Explosives: Do not use explosives.

**3.4 EXCAVATION, GENERAL**

- A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions. Unclassified excavation will be paid for under the appropriate item at the unit price included in the Contract Documents.
- B. Classified Excavation: Excavation to subgrade elevations classified as earth and rock. Classified excavation will be paid for under the appropriate item at the unit prices included in the Contract Documents.
  - 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
    - a. Intermittent drilling; blasting, ram hammering; or ripping of material not classified as rock excavation, is earth excavation.
  - 2. Rock excavation includes removal and disposal of rock.
    - a. Do not excavate rock until it has been classified and cross-sectioned by Architect.

**3.5 EXCAVATION FOR STRUCTURES**

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

**3.6 EXCAVATION FOR WALKS AND PAVEMENTS**

- A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

**3.7 EXCAVATION FOR UTILITY TRENCHES**

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
  - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

- B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) above the top of pipe or conduit, unless otherwise indicated.
  - 1. Clearance: As indicated.
- C. Trench Bottoms: Excavate trenches 6 inches (150 mm) deeper than elevation required to allow for bedding course.
  - 1. Excavate trenches 12 inches (300 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

### 3.8 APPROVAL OF SUBGRADE

- A. Notify Architect when excavations have reached required subgrade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
  - 1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect.

### 3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect.
  - 1. Fill unauthorized excavations under other construction or utility pipes as directed by Architect.

### 3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for record documents.
3. Inspecting and testing underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

**3.12 UTILITY TRENCH BACKFILL**

- A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. Backfill trenches excavated under footings and within 6 inches (150 mm) of bottom of footings; fill with concrete to elevation of bottom of footings.
- C. Place and compact initial backfill, free of particles larger than 3 inches (75 mm), to a height of 12 inches (300 mm) over the utility pipe or conduit.
  1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
- D. Coordinate backfilling with utilities testing.
- E. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.
- F. Place and compact final backfill of granular borrow, or satisfactory soil material to subgrade.
- G. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

**3.13 FILL**

- A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.
- B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- C. Place and compact fill material in layers to required subgrade elevations as follows:
  1. Under grass and planted areas, use granular borrow.
  2. Under walks and pavements, use granular borrow.
  3. Under steps and ramps, use structural fill.
  4. Under building slabs, use structural fill and drainage course.

5. Under footings and foundations, use structural fill.

### 3.14 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
  1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
  2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

### 3.15 COMPACTION OF BACKFILLS AND FILLS

- A. The building site shall be proofrolled with a heavy (10 to 14 ton) vibratory roller using at least 4 passes in each direction after thorough moisture conditioning. Proof rolling shall occur before any fill is placed in the area.
- B. Place backfill and fill materials in layers not more than 12 inches (300 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.
- C. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- D. Test subgrade soils to establish in situ maximum dry unit weight according to ASTM D-1557. Compact subgrade soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
  1. Under structures, steps, and pavements, recompact top 12 inches (300 mm) below existing subgrade and each layer of backfill or fill material at 95 percent.
  2. Under walkways, compact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill material at 92 percent.
  3. Under lawn or unpaved areas, compact each layer of backfill or fill material at 90 percent.

### 3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  1. Provide a smooth transition between adjacent existing grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Lawn or Unpaved Areas: Plus or minus 1 inch (25 mm).
  - 2. Walks: Plus or minus 1/2 inch (13 mm).
  - 3. Pavements: Plus or minus 1/2 inch (13 mm).
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

### 3.17 SUBBASE AND BASE COURSES

- A. Install separation fabric on prepared subgrade where specified according to manufacturer's written instructions, overlapping sides and ends.
- B. Under pavements and walks, place subbase and base courses on prepared subgrade and as follows:
  - 1. Place base course material over subbase to required grades, lines, cross sections and thickness.
  - 2. Compact subbase and base courses to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
  - 3. Shape subbase and base to required crown elevations and cross-slope grades.
  - 4. When thickness of compacted subbase or base course is 6 inches (150 mm) or less, place materials in a single layer.
  - 5. When thickness of compacted subbase or base course exceeds 6 inches (150 mm), place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.
- C. Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

### 3.18 DRAINAGE COURSE

- A. Under slabs-on-grade, install drainage fabric where specified on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends. Place drainage course on drainage fabric and as follows:
  - 1. Place drainage course to required cross sections and thickness and compact to 100 percent of maximum dry rodded unit weight according to ASTM C 29.
  - 2. When compacted thickness of drainage course exceeds 6 inches (150 mm), place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.

3.19 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
  - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
  - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet (30 m) or less of wall length, but no fewer than two tests.
  - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet (46 m) or less of trench length, but no fewer than two tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.20 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and re-compact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

**END OF SECTION 312000**





SECTION 321216

HOT MIX ASPHALT PAVING

**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.
- B. Maine Department of Transportation, Standard Specification for Highways and Bridges, latest revision, hereafter designated as MDOT Specifications.
- C. Special Provisions Section 401, Plant Mix Pavements, is incorporated and made a part of this specification.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Hot-mix asphalt paving.
  - 2. Hot-mix asphalt patching.
  - 3. Hot-mix asphalt overlays.
- B. Related Sections include the following:
  - 1. Division 31 Section "Earth Moving" for aggregate subbase and base courses.

1.3 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt pavement according to the materials, workmanship, and other applicable requirements of this standard.
- B. Section and paragraph numbers in this specification refer to those in the MDOT Standard Specifications for Highway and Bridges, Revisions of April 1995 and Special Provision, Section 401.

Section 403 of the Standard Specifications is hereby modified.

Subsection 403.02 General is deleted and replaced by the following:

403.02 General. The materials and their use shall conform to the requirements of Special Provision, Section 401, Plant Mix pavements.

The first paragraph of Subsection 403.03 General is deleted and replaced by the following:

403.03 General. The construction requirements shall be specified in Special Provision, Section 401, Plant Mix Pavements.

#### 1.4 SUBMITTALS

- A. All submittals required in the Special Provision 401.
- B. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Manufacturer Qualifications: Engage a firm experienced in manufacturing hot-mix asphalt similar to that indicated for this Project and with a record of successful in-service performance.
- C. Testing Agency Qualifications: Demonstrate to Architect's satisfaction, based on Architect's evaluation of criteria conforming to ASTM D 3666, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- D. Prepaving Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Management and Coordination".

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if substrate is wet or excessively damp or if ambient temperature is less than specified in Section 401.07.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F (4 deg C) for oil-based materials, 50 deg F (10 deg C) for water-based materials, and not exceeding 95 deg F (35 deg C).

### PART 2 - PRODUCTS

- 2.1 Paving materials shall be as specified in the Special Provision – Section 401.

**2.2 AUXILIARY MATERIALS**

- A. Herbicide: Commercial chemical for weed control, registered by Environmental Protection Agency (EPA). Provide granular, liquid, or wettable powder form.
- B. Pavement-Marking Paint: Paint for final and temporary pavement marking shall meet the requirements of AASHTO M-248, Type N.
- C. Glass Beads: Glass Beads shall meet the requirements of AASHTO M-247.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
- B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
- C. Notify Construction Manager in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily corrected.

**3.2 FULL DEPTH RECLAMATION**

- A. Pulverize existing pavement within plan limits shown to a depth of 4 inches minimum below pavement, and in accordance with MDOT Section 307 – FULL DEPTH RECYCLED PAVEMENT.
  - 1. Repair or replace curbs, manholes, and other construction damaged during reclamation.
  - 2. Provide new gravel base material to shim grades and incorporate in pulverized pavement to create a homogeneous blend with 100% passing the 50 mm (2-inch) sieve.
  - 3. Compact shimmed blend to specified base density to receive new HMA paving.

**3.3 PATCHING AND REPAIRS**

- A. Patching: Saw cut perimeter of patch and excavate existing pavement section to sound base. Recompact new subgrade. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically.
  - 1. Tack coat faces of excavation and allow to cure before paving.
  - 2. Fill excavation with dense-graded, hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.
  - 3. Partially fill excavation with dense-graded, hot-mix asphalt base mix and compact while still hot. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.4 HOT-MIX ASPHALT

- A. Place and compact hot-mix asphalt mix on prepared surface in accordance with the construction requirements of Special Provision – Section 401

3.5 JOINTS

- A. Construct joints to ensure continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

3.6 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to cure for 30 days before starting pavement marking.
- C. Surface Preparation: Sweep and clean surface to eliminate loose material and dust. Immediately before applying the pavement marking paint to the pavement or curb, the surface shall be dry, clean and entirely free from dirt, grease, oil, or other foreign matter.
- D. Testing: Prior to applying paint for final pavement lines the Contractor shall perform a test for paint thickness by furnishing and placing a piece of smooth, clean metal with an area of at least 144in<sup>2</sup> in the path of the striping truck. The striping truck shall be passed over the piece of metal, painting the surface as it passes, without applying beads. The result of this test shall be used to determine the pressure setting and speed of the truck when applying paint to the specified thickness.
- E. Application: Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of at least 16 mils (0.4 mm).
  - 1. Broadcast glass spheres uniformly into wet pavement markings at a rate of 4.5 lb/gal. Of paint and in sufficient quantity to assure complete and uniform coverage of hand painted surfaces.
- F. At locations where existing pavement markings are to be removed, the method chosen must be capable of completely eradicating or masking the line or marking without damage to the pavement. Burning and grinding to remove markings from existing pavement not to be re-surfaced will not be permitted.
- G. The transverse lines, established by the Contractor for control of striping, shall be chalked as a guide and shall be approved by the Owner's Representative before the application of any striping. The length of line shall be measured and marked by the Contractor for the locations listed below. All pavement markings shall be in accordance with the applicable sections of the Manual of Uniform Traffic Control Devices for Streets and Highways, 1978 edition and FAA AC 150/5390-2B:

1. Parking stall lines shall be four (4) in. wide solid white lines.

### 3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform field inspections and tests and to prepare test reports.
  1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
- B. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

## SPECIAL PROVISION

### SECTION 401

#### PLANT MIX PAVEMENTS

401.01 Description. This work shall consist of furnishing and placing one or more courses of Hot Mix Asphalt Pavement on an approved base in accordance with these specifications and the specific requirements of the type of mixture under contract and in reasonably close conformity with the lines, grades, thickness' and typical cross sections shown on the plans or established. The work will be accepted under Quality Assurance (QA) provisions in accordance with these specifications and the requirements of Section 106.

#### **Materials**

401.02 Composition of Mixtures. The Hot Mix Asphalt Pavement shall be composed of aggregate, filler if required and Performance Graded Asphalt Binder. The aggregate fractions shall be sized, uniformly graded and combined in proportions that will provide a mixture meeting the grading requirements of the job-mix formula. A maximum of 20 percent reclaimed asphalt pavement may be used in any binder courses (19 mm) and a maximum of 20 percent reclaimed asphalt pavement may be used in any wearing course placed on shoulders only.

The Contractor shall submit for approval at least 15 calendar days prior to production, a job-mix formula for each mixture to be supplied. The job-mix formula shall be used to establish a single percentage of aggregate, passing each required sieve size which shall fall within the limits shown in Table 1, as well as the proposed binder content. The general composition limits given in Table 1 indicate target value ranges of mixtures permissible under this specification. It shall state the source, gradation and percentage to be used of each portion of the aggregate, and filler if required. It shall also state the name and location of the refiner and the supplier for each source of the Performance Graded Asphalt Binder submitted for approval.

In addition, the Contractor shall be required to provide the following information, which shall accompany/be included with the proposed Job-mix formula:

- Superpave Average Washed Gradation Summary
- Superpave Stockpile Gradation Summary
- Superpave Design Aggregate Structure Consensus Property Summary
- Superpave Design Aggregate Structure Composite Gradation Summary
- Superpave Design Aggregate Structure Trial Blend Gradation Plots
  - Performance Graded Binder Temperature Viscosity Charts (Or recommended Mixing Temperature from Manufacturer if Chart is not applicable for Modified Binders).
  - Maximum Specific Gravity of Superpave Hot Mix Asphalt (SHMA) Mixtures
  - Superpave Design Aggregate Structure Compacted SMHA Specimen Volumetric Property Summary
  - Superpave Design PGB Content Compacted SHMA Specimen Volumetric Property Summary

**Table 1: COMPOSITION OF MIXTURES – TARGET VALUE RANGES**

SIEVE SIZE	GRADING			
	TYPE 25 mm	TYPE 19 mm	TYPE 12.5 mm	TYPE 9.5 mm
	PERCENTAGE	BY WEIGHT	PASSING – COMBINED	AGGREGATE
37.5 mm	100			
25 mm	90-100	100		
19 mm	-90	90-100	100	
12.5 mm	-	-90	90-100	100
9.5	-	-	-90	90-100
4.75	-	-	-	-90
2.36 mm	15-41	23-49	28-58	32-67
1.18 mm	-	-	-	-
0.60 mm	-	-	-	-
0.30 mm	-	-	-	-
0.075 mm	1-7	2-8	2-10	2-10

SIEVE SIZE	RESTRICTED ZONES			
	TYPE 25 mm	TYPE 19 mm	TYPE 12.5 mm	TYPE 9.5 mm
	PERCENTAGE	BY WEIGHT	PASSING – COMBINED	AGGREGATE
37.5 mm	-	-	-	-
25 mm	-	-	-	-
19 mm	-	-	-	-
12.5 mm	-	-	-	-
9.5 mm	-	-	-	-
4.75 mm	39.5	-	-	-
2.36 mm	26.8-30.8	34.6	39.1	47.2
1.18 mm	18.1-24.1	22.3-28.3	25.6-31.6	31.6-37.6
0.60 mm	13.6-17.6	16.7-20.7	19.1-23.1	23.5-27.5

SIEVE SIZE	RESTRICTED ZONES			
	TYPE 25 mm	TYPE 19 mm	TYPE 12.5 mm	TYPE 9.5 mm
0.30 mm	11.4	13.7	15.5	18.7
0.075 mm	-	-	-	-

At the time the job-mix formula is submitted, the Contractor shall indicate and make available for sampling and testing at the plant site, the stockpiles of all aggregates proposed for use. The Contractor shall also make available to the Architect the PG graded asphalt binder proposed for use in the mix in sufficient quantity to test the properties of the asphalt, and to produce samples for testing of the mixture. Prior to the start of paving, a production sample shall be submitted and evaluated by the Architect. If the sample is found acceptable paving may commence. If the Contractor desires, this sample may be split and the results compared so that any variations between Contractor's methods and results VS. the Architect's can be taken into account for Quality Control during production.

The Architect shall determine whether the proposed Job Mix Formula meets the requirements for the particular grade of mix. A notation shall be made for each new Performance Graded Asphalt Binder added to a job-mix formula already approved, showing the material source and the adjusted mixing temperature, if necessary.

After the job-mix formula is established, the temperatures of the mixture shall conform to the following tolerances:

In the truck at the mixing plant      ±10 °C  
 At the Paver                                      ±10 °C

If there is a change in sources of aggregates or filler, a new job-mix formula shall be established before the new material is used. When unsatisfactory results or other conditions make it necessary, a new job-mix formula may be established. Approved changes in target values will not be applied retroactively for acceptance or payment.

The job-mix formula (as well as the mix subsequently produced) shall meet the following volumetric criteria. The Architect reserves the right to sample and test the composite aggregate for any of the following properties at any time.

**Table 2: VMA Criteria (Minimum)**

Estimated Traffic million 80 kN ESALs	Voids in Mineral Aggregate Criteria Nominal Maximum Sieve Size			
	TYPE 25mm	TYPE 19mm	TYPE 12.5mm	TYPE 9.5mm
<0.3				
<1				
<3				
<10	12.0%	13.0%	14.0%	15.0%
<30				
<100				
≥100				

**Note: Based on the Asphalt Institutes Recommendation at 4.0% V<sub>A</sub>.  
 (VMA = volume or air plus volume of effective asphalt)**

**Table 3: VFA Criteria**

<b>Voids Filled with Asphalt Criteria</b>		
	<b>Range</b>	
<b>Estimated Traffic million 80 kN ESALS</b>	<b>Minimum</b>	<b>Maximum</b>
<0.3	70	80
<1	65	78
<3	65	78
<10	65	75
<30	65	75
<100	65	75
≥100	65	75

**Table 4: F/Pbe Ratio based on effective asphalt binder content**

<b>Fines to Effective Asphalt Ratio Criteria</b>		
	<b>Range</b>	
<b>Estimated Traffic million 80 kN ESALS</b>	<b>Minimum</b>	<b>Maximum</b>
<0.3		
<1		
<3		
<10	0.6	1.2
<30		
<100		
≥100		

401.03 Aggregates. Fine aggregate, that material passing the 2.36 mm sieve, shall not exceed an absorption 3.0 percent by weight as determined by AASHTO T84. The composite blend, minus any reclaimed asphalt pavement used, shall have a minimum degradation value of 30. The degradation value shall be determined by the Washington State Degradation test of 1967.

Aggregates shall also meet the following consensus properties.



**Table 5: Course Aggregate Angularity Criteria, (Plus 4.75 mm)  
 (Minimum)**

*ASTM D 5821*

<b>Coarse Aggregate Angularity Criteria (Minimum)</b>		
<b>Estimated Traffic million 80 kN ESALS</b>	<b>Depth from Surface</b>	
	<b>&lt;100 mm</b>	<b>&gt;100 mm</b>
<0.3	60/60	60/60
<1	65/60	60/60
<3	75/60	60/60
<10	85/80	60/60
<30	95/90	80/75
<100	100/100	95/90
≥100	100/100	100/100

*Note: "85/80" denotes that 85% of the course aggregate has one fractured face and 80% has two fractured faces.*

**Table 6: Fine Aggregate Angularity as Determined by:  
 Uncompacted Void Content of Fine Aggregate  
 (Minimum)  
 (AASHTO TP33) – (Method A)**

<b>Estimated Traffic million 80 kN ESALS</b>	<b>Depth from Surface</b>	
	<b>&lt;100mm</b>	<b>&gt;100mm</b>
<0.3	-	-
<1	40	-
<3	40	40
<10	45	40
<30	45	40
<100	45	45
≥100	45	45

*Note: "Criteria are presented as percent air voids in loosely compacted fine aggregate, (U).*

**Table 7: Flat, Elongated Particles Criteria  
 Particles in Course Aggregates, ASTM D 4791 (8.4)**

**Flat, Elongated Particles Criteria  
 (Maximum)**

Estimated Traffic million 80 kN ESALS	Percent Maximum
<0.3	
<1	
<3	
<10	10
<30	
<100	
≥100	

Note: Criteria are presented as maximum percent by weight flat and elongated particles (5:1 ratio).

**Table 8: Clay Content as determined by:  
 Sand Equivalent Test**

**AASHTO T 176  
 Clay Content Criteria (Minimum)**

Estimated Traffic million 80 kN ESALS	Sand Equivalent (SE) Maximum
<0.3	4.5
<1	
<3	
<10	
<30	50
<100	
≥100	

401.04 and 401.05 Vacant

401.06 Bituminous Materials. The type and grade of bituminous material will be PG 64-22, PG 64-28, or as specified. The Performance Graded Asphalt Binder shall meet the applicable requirements of AASHTO MPI - Standard Specifications for Performance Graded Binders. The Contractor shall provide the Architect with a copy of a Quality Control Plan for Performance Graded Asphalt Binder in accordance with AASHTO PP-26.

## CONSTRUCTION REQUIREMENTS

401.07 Weather and Seasonal Limitations. For weather limitations the State will be considered to be divided into 2 paving zones:

- (a) Zone 1. All area north of US Route 2 from Gilead to Bangor and north of Route 9 from Bangor to Calais.
- (b) Zone 2. All area south of Zone 1 including the US Route 2 and Route 9 boundaries.

Hot Mix Asphalt Pavement for use other than traveled way wearing course may be placed in either zone between the dates of April 15th and November 15th, provided that the air temperature as determined by an approved thermometer placed in the shade at the paving location is 2°C or higher and the area to be paved is not frozen. Hot Mix Asphalt Pavement to be placed as traveled way wearing course may be placed in Zone 1 between the dates of May 1st and the Saturday following October 1st and in Zone 2 between the dates of April 15th and the Saturday following October 15th provided the air temperature determined as above is 10°C or higher. The traveled way as used herein shall also include truck lanes, ramps, approach roads and auxiliary lanes.

Hot bituminous mixtures used for curb, driveways, sidewalks, islands or other incidentals are not subject to seasonal limitations, except that weather conditions shall be satisfactory for proper handling and finishing of the mixture. Unless otherwise specified, bituminous plant mix shall not be placed on a wet surface or a frozen surface. The air temperature shall be 2°C or higher.

When it is in the public interest for service to traffic, the Architect may authorize construction of Hot Mix Asphalt Pavements at lower atmospheric temperatures than those specified or extend the dates of the paving season.

### 401.08 Bituminous Mixing Plant.

401.081 General Requirements. Mixing plants shall conform to AASHTO M 156. An efficient dust collecting system shall be provided to prevent the loss of fine material. The material collected may be returned to the mixture at a uniform rate or discarded.

Prior to placing of any mix, a Pre-paving conference shall be held to discuss and approve the paving schedule, source of mix, type and amount of equipment to be used, sequence of paving pattern, rate of mix supply, and traffic control. All field and plant supervisors shall attend this meeting.

- (a) Truck Scales. When the bituminous mixture is weighed on scales meeting the requirements of Section 109 - Measurement and payment, the scales shall be inspected and sealed by the State Sealer as often as the Architect deems necessary to assure their accuracy.
- (b) Safety Requirements. Adequate and safe stairways to sampling points shall be provided and guarded ladders to other plant units shall be placed at points where accessibility to plant operations is required. Accessibility to the top of truck bodies shall be provided by a platform or other suitable device placed in an acceptable location near the testing laboratory to enable the Architect to obtain samples and mix temperature data.

Clear and unobstructed passage shall be maintained at all times in and around the truck loading area. This area shall be kept free of drippings from the mixing platform.

All gears, pulleys, chains, sprockets and other dangerous moving parts shall be thoroughly guarded and protected

- (c) Performance Graded Asphalt Binder. A valve for sampling the bituminous material shall be provided and located in a circulating feed line connecting the storage tank with the mixing plant or in a line of the storage circulation system. The valve shall be placed in a readily accessible location offering protection from damage and shall be maintained in a workable condition. A drainage receptacle shall be provided.

401.082 Vacant.

401.083 Automation of Batching. All batch plants shall be required to be automated to the point where the weighing, recycling and monitoring system shall be utilized. In the case of a breakdown of the printing system the requirements of Subsection 109.013C will apply.

The system shall include components for accurately proportioning the various materials for the mixture in the proper order by weight. The entire batching and mixing cycle shall be continuous and shall not require any manual operations. There shall be auxiliary interlock circuits to trigger an audible alarm whenever an error exceeding the acceptable tolerance occurs. Also, along with the alarm, the printer shall print an asterisk on the delivery slip. The asterisk shall be placed beside the out-of-tolerance weight or either at the beginning or end of the row containing the out-of-tolerance weight. The automatic proportioning system shall be capable of consistently delivering material within the full range of batch sizes.

All tolerances are based on the total batch weight of the Hot Mix Asphalt pavement. The system shall be able to automatically or manually adjust for all desired batch sizes. The first or last bin drawn shall be the sand bin. The following shall be the allowable tolerances:

**Each aggregate component  $\pm 2.5$  percent from the cumulative:**

	target, each bin
Last Bin Drawn	$\pm 1.5$ percent
Mineral Filler	$\pm 0.5$ percent
Performance Graded Asphalt Binder	$-0.15, +0.25$ percent
Zero Return (aggr)	$\pm 0.5$ percent
Zero Return (bit. material)	$\pm 0.1$ percent

All plants shall be equipped with an approved digital recording device. The delivery slip load ticket shall contain information required under Section 109.01(f), 1 to 4 and 109.012, (a) and (b).

401.084 Vacant.

401.085 Drum Plant Recordation of Proportions. The plant shall be equipped with a recordation system and it shall be utilized. In the case of a malfunction of this recordation system, two working days will be allowed for the system to be repaired before shutdown will be required. The recorder shall be capable of simultaneously recording the accumulated weights of the dry aggregates, the mineral filler if added separately and the Performance Graded Asphalt Binder, all at 5 minute intervals during production and on demand, or by another method approved by the Architect. The printed record shall include the actual Performance Graded Asphalt Binder content quantity as a percentage of the total mixture weight. The

maximum resolution shall be 90 kg of dry aggregate, 9 kg of mineral filler if added separately, 9 kg of Performance Graded Asphalt Binder, and 0.1 percent for Performance Graded Asphalt Binder content. The printout shall indicate the amount of moisture programmed into the moisture compensation by total weight. All printed records shall show the day, month, year and the time to the nearest minute when the printout was generated. The Architect shall be provided with a clear and legible copy of the recordings at the end of each day.

- (a) Production Rate. Allowable production rates will be determined for each plant. The maximum megagrams per hour rating will be established by the manufacturers' rating. The minimum production rate will be 35 percent of the maximum rating.
- (b) Production Rate Change. When the production rate is adjusted, a single control shall be capable of increasing or decreasing all feed rates simultaneously.

401.09 Hauling Equipment. Trucks for hauling Hot Mix Asphalt Pavement shall have tight, clean, smooth metal bodies which have been thinly coated with a small amount of lime solution or an approved soap solution or detergent to prevent the mixture from adhering to the bodies.

All trucks shall have a cover of canvas or other water repellent material capable of heat retention and of such size to completely cover the mixture. The cover shall be securely fastened on the loaded truck at all times except when unloading.

All truck bodies shall have an opening on both sides which will accommodate a thermometer stem. The opening shall be located at the midpoint of the body, at least 300 mm above the bed.

401.10 Pavers. Pavers shall be self-contained, self-propelled units, equipped with an activated screed, heated if necessary and capable of spreading and finishing courses of bituminous plant mix material in lane widths to the specified typical section and thickness' shown on the plans. Pavers used for shoulders and similar construction shall be capable of spreading and finishing courses of Hot Mix Asphalt Pavement in widths shown on the plans.

The Hot Mix Asphalt Pavement placed on the main line shall be placed by a paver equipped with an automatic grade and slope controlled screed, unless otherwise directed by the Architect. The controls shall automatically adjust the screed and increase or decrease the layer thickness to compensate for irregularities in the preceding course. The controls shall be capable of maintaining the proper transverse slope and be readily adjustable so that transitions and superelevated curves can be properly paved. The controls shall be operated from a fixed or moving reference such as a grade wire or ski type device (floating beam) with a minimum length of 30 ft. (9 M). A 40 ft. (12.2 M) ski shall be required on Interstate projects.

Pavers with extendible screeds shall have auger extensions and tunnel extenders as necessary.

The paver shall have a receiving hopper with sufficient capacity for a uniform spreading operation and a distribution system to place the mixture uniformly and without segregation in front of the screed.

The screed assembly shall produce a finished surface of the required evenness and texture without tearing, shoving or gouging the mixture.

The paver shall be operated at speeds that produce a uniform mat.

Pavers shall be at the project site sufficiently ahead of the start of paving operations to be inspected and approved. Any paver found worn or defective either before or during its use shall be replaced or repaired to the satisfaction of the Architect.

401.11 Rollers. Rollers shall be either static steel, pneumatic tire or approved vibrator type. Rollers shall be in good mechanical condition, capable of starting and stopping smoothly without jerking and also be free from backlash when reversing direction. They shall be equipped and operated in such a way as to prevent the picking up of hot mixed material by the tires or roller surface. Use of rollers which result in crushing of the aggregate or displacement of the mixture will not be permitted. Any Hot Mix Asphalt Pavement that becomes loose, broken, contaminated, shows an excess or deficiency of Performance Graded Asphalt Binder, or is in any way defective, shall be removed and replaced at no additional cost with fresh Hot Mix Asphalt Pavement which shall be immediately compacted to conform with the surrounding area.

The type of rollers to be used and their relative position in the compaction sequence shall generally be the Contractor's option, provided specification densities are attained and with the following stipulations:

- 1) At least one roller shall be pneumatic-tired on bridges and variable depth courses as well as the first lift of pavement over gravel or a reclaimed pavement or other irregular surface.
- 2) Coverage with a vibratory or steel wheel roller precedes pneumatic-tired rolling, unless otherwise agreed by the Contractor and the Construction Manager.
- 3) Vibratory rollers shall not be opened in the vibratory mode under the following conditions; when checking or cracking of the mat occurs and on bridge decks.
- 4) Any method which results in cracking or checking of the mat will be discontinued, and corrective action taken.

The maximum operating speed for a steel wheel roller shall not exceed the manufacturer's recommendations.

401.111 and 401.112 Vacant

401.12 Conditioning of Existing Surface. The surface upon which Hot Mix Asphalt Pavement is to be placed shall be thoroughly cleaned all objectionable material. When the surface of the existing base or pavement is irregular, it shall be brought to uniform grade and cross section as directed.

401.13 Bituminous Material Documentation. The Contractor shall determine with the Architect the amount of Hot Mix Asphalt Pavement used each day on a specific contract.

401.14 Preparation of Aggregates. The aggregates for the mixture shall be dried and heated to the required temperature. Flames used for drying and heating shall be properly adjusted to avoid physical damage to the aggregate and to avoid depositing soot on the aggregate.

401.15 Mixing.

The dried aggregate shall be combined in the mixer in the amount of each fraction of aggregate required to meet the job mix formula. The Performance Graded Asphalt Binder shall be measured or gauged and introduced into the mixer in the amount specified by the job mix formula.

For Hot Mix Asphalt Pavement the mixture shall be produced at the temperature established by the job-mix formula.

The aggregate shall be sufficiently dried so that the mixture will not flush, foam excessively or displace excessively under the action of the roller. It shall be introduced into the mixer at a temperature of not more than 14°C above the temperature at which the viscosity of the bituminous material being used is 150 centistokes.

The Performance Graded Asphalt Binder shall be stored and introduced into the mixer at a uniformly maintained temperature which shall be within the limits at which the viscosity of the material is between 150 and 300 centistokes.

The material shall have a complete and uniform coating of the particles and a thorough distribution of the bituminous material throughout the aggregate. Wet mixing time will be determined by the Contractor and approved by the Architect for each plant and for each type of aggregate used.

#### 401.16 Spreading and Finishing.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the mixture shall be spread, raked and luted with hand tools. For such areas the mixture shall be dumped, spread and screeded to give the required compacted thickness.

When production of the mixture can be maintained and when practical, pavers shall be used in echelon to place the course in adjacent lanes.

On roads opened to two way traffic,, the placement of each course shall be completed over the full width of the traveled way section being paved on each days run unless otherwise approved.

401.17 Compaction. Immediately after the Hot Mix Asphalt Pavement has been spread, struck off and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling.

The surface shall be rolled when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking, or shoving. The Contractor shall prevent adhesion of the mixture to the rollers or vibrating compactors. Oil will not be permitted.

Any displacement occurring as a result of the reversing of the direction of a roller or from other causes, shall be corrected at once to the satisfaction of the Architect.

Along forms, curbs, headers, walls, and other places not accessible to the rollers, the mixture shall be thoroughly compacted with mechanical vibrating compactors. Hand tamping will be permitted only for areas inaccessible to other compaction equipment. On depressed areas, a trench roller may be used or cleated compression strips may be used under the roller to transmit compression to the depressed area.

Mixture that becomes loose and broken, mixed with dirt, or is in any way defective, shall be removed and replaced at no additional cost with fresh, hot mixture, which shall be compacted to conform with the surrounding area. Mixture showing an excess or deficiency of bituminous material shall be removed and replaced at no additional cost.

401.18 Joints. Wearing course transverse joints shall be constructed using shims equal to the depth allowed for compaction.

The paver shall always maintain a uniform head of material during the joint construction. The bituminous mix shall be free of segregation and meet temperature requirements.

Transverse joints of the wearing course shall be straight and neatly trimmed. A vertical face exposing the full depth of the course may be formed by inserting a header, by breaking the bond with the underlying course, or by cutting back with hand tools. Feathered or "lap" joints may be permitted on lower courses or when matching existing low type pavements. Edges of joints that are to form longitudinal joints shall be maintained vertically.

A coating of emulsified asphalt shall be applied each day prior to paving to all joints except those formed by pavers operating in echelon. The application shall be by an approved spray apparatus designed for covering a narrow surface. Application of this material by a brush may be approved for small surfaces or in the event of a malfunction of the spray apparatus, but for a period of not more than one working day.

Where pavement under this contract joins an existing pavement, and when directed, the existing pavement shall be cut along a smooth line and to a neat, even vertical joint. Broken or raveled edges will not be permitted. All work necessary for the preparation of this joint will be considered as incidental to the related contract items.

#### 401.19 Quality Control Method A & B.

The Contractor shall operate in accordance with a Quality Control Plan, hereinafter referred to as the "plan", sufficient to assure a product meeting the contract requirements. The plan shall meet the requirements of 106.031 and these special provisions. No work shall occur until this plan is approved in writing by the Architect.

The Plan shall address all elements which affect the quality of the Plant Mix Pavement including, but not limited to, the following:

- (a) Job mix formula(s)
- (b) Hot asphalt mix plant details.
- (c) Stockpile Management
- (d) Make & type of paver(s)
- (e) Make & type of rollers including weight, weight per inch of steel wheels, average ground contact pressure for pneumatic tired rollers.
- (f) Name of Plan Administrator.
- (g) Name of Process Control Technician(s)
- (h) Name of Quality Control Technician(s)
- (i) Mixing & Transportation.
- (j) Frequency and tests for Quality Control.

The plan shall include the following technicians with these minimum requirements and qualifications:

- (a) Plan Administrator – The Plan shall be administered by a qualified individual. The Plan Administrator must be a full time employee of or a consultant engaged by the Contractor. The Plan Administrator shall have full authority to institute any and all actions necessary for the successful operation of the Plan. The Plan Administrator (or their assistant in the Plan Administrator's absence) shall be available to communicate with the Architect or representative, at all times. The plan Administrator shall be certified as a Plant



Technician or Paving Technician certified by the New England Transportation Technician Certification Program.

- (b) Process Control Technician(s) (PCT) shall utilize test results and other quality control practices to assure the quality of aggregates and other mix components and control proportioning to meet the job mix formula(s). The PCT shall periodically inspect all equipment used in the mixing to assure it is operating properly and that mixing conforms to the mix design(s) and other contract requirements. The Plan shall detail how these duties and responsibilities are to be accomplished and documented and whether more than one PCT is required. The Plan shall include the criteria utilized by the PCT to correct or reject unsatisfactory materials. The PCT shall be certified as a Plant Technician by the New England Transportation Technician Certification Program.
- (c) Quality Control Technician(s)(QCT) shall perform and utilize quality control tests at the job site to assure that delivered materials meet the requirements of the job mix formula(s). The QCT shall inspect all equipment utilized in transporting, laydown, and compacting to assure it is operating properly and that all laydown and compaction conform to the contract requirements. The plan shall detail how these duties and responsibilities are to be accomplished and documented, and whether more than one QCT is required. The Plan shall include the criteria utilized by the QCT to correct or reject unsatisfactory materials. The QCT shall be certified as a Paving Technician by the New England Transportation Technician Certification Program.
- (d) The plan shall detail the coordination of the activities of the Plan Administrator, the PCT and the QCT.

Asphalt pavement shall be sampled, tested, and evaluated by the Contractor in accordance with the following minimum quality control Frequencies:

**Table 9: Minimum Quality Control Guidelines**

Test of Action	Frequency	Test Methods
Temperature of Mix	6 per day at street and plant	-
Temperature of Mat	4 per day	-
Density (Surface)	1 per 125 Mg	ASTM D-2950
Density (Base)	1 per 500 Mg	AASHTO T-230
Fines/Effective Binder	1 per 1500 Mg	AASHTO T-4
Gradation	1 per day min.	AASHTOT-30or
Asphalt	1 per 750 Mg	AASHTO T-164 or AASHTO T-287
Voids at $N_d$	1 per 750 Mg	AASHTO TP-4
Voids in Mineral Aggregate at $N_d$	1 per 750 Mg	AASHTO TP-4
Rice Specific Gravity	1 per 750 Mg	AASHTO T-209
Course Aggregate Angularity	1 per 5000 Mg	ASTM D-5821
Flat and Elongated Particles	1 per 5000 Mg	ASTM D-4791

The Contractor may utilize innovative equipment or techniques not addressed by the specifications or these provisions to produce or monitor the production of the mix, subject to approval by the Architect. All test results will be recorded in writing and presented to the Construction Manager by 10:00 AM the next working day. Densities, sampled randomly shall be recorded in writing and shall be available to the Construction Manager or his representative at the paving location and summaries of each days results shall be presented to the Construction Manager by 10:00 AM the next working day.

The Contractor shall have at the plant site a testing lab. The lab shall be equipped with testing equipment to complete all the tests required in Table 9. An approved SHRP Gyratory Compactor shall be located within 30 minutes of the plant site.

All holes in the pavement resulting from cutting cores by the Architect or by the Contractor shall be filled with acceptable mixture no later than the following work day. Before filling, the holes shall be carefully cleaned and coated with emulsified asphalt. On surface courses cores shall not be allowed except for calibration of the Nuclear Density Gauge. On a daily basis the Contractor shall perform nuclear density testing across the mat being placed, every foot. If the values consistently vary more than 2.5% adjustments shall be made to the screed, rolling operation, etc. until the inconsistencies are remedied.

The Contractor shall monitor plant production test results indicate a production problem, the Architect shall be notified and corrective action taken that is acceptable to the Architect. Charts shall be kept up to date and shall be available for review by the Construction Manager or his representative.

401.20 Surface Tolerances. The surface shall be tested by the Contractor in the presence of the Owners Representative with a 4.9 m straightedge or string line placed parallel to the centerline of pavement and with a 3 m straightedge or string line placed transversely to the centerline of pavement. Variations exceeding 6 mm shall be corrected by removing defective work and replacing with new material as directed. A 3 m straightedge shall be furnished by the paving contractor.

401.21 Quality Assurance

Method B

This Method utilizes Product Verification testing to validate the quality of the material incorporated into the project. The Superpave Asphalt Pavement shall meet the gradation and volumetric properties shown in tables 1 through 8. Aggregates and Mix shall meet the Consensus and volumetric properties shown in tables B and C utilizing the testing methods and sampling procedures in table A.

**Table A: ACCEPTANCE GUIDELINES**

PROPERTIES	POINT OF SAMPLING	LOT SIZE
Gradation <sup>(1)</sup>	Truck body	AASHTO T-30
Asphalt cement <sup>(1)</sup> content	Truck body	AASHTO T-287
Density	Mat behind all rollers	ASTM-2950 or AASHTO T-230
Air Voids at N <sub>d</sub>	Truck body	AASHTO TP-4
Voids in Mineral Aggregate at N <sub>d</sub>	Truck body	AASHTO TP-4
Fines to Effective Binder	Truck body	AASHTO TP-4

**Table B: GRADATION, VOLUMETRICS, CONSENSUS PROPERTIES AND PERFORMANCE GRADED ASPHALT BINDER ACCEPTANCE LIMITS**

<b>Property</b>	<b>USL and LSL</b>
Passing 4.75 mm and larger sieves	Target± 5 percent
Passing 2.36 mm to 1.18 mm sieves	Target± 4 percent
Passing 0.60 mm	Target ± 3 percent
Passing-0.30 mm to .075 mm sieve	Target ± 2 percent
Performance Graded Asphalt Bindert	Target ± 0.3 percent
Air Voids	4.5% ± 1.5 percent
Voids in Mineral Aggregate	Table 2 (LSL Only)
Density (Other than over Gravel Shoulders)	94.5% ± 2.5%
Density (Over Gravel Shoulders)	93.5% ± 3.5%
Fines to Effective Binder	Target ± 0.2 percent

**Table C: CONSENSUS PROPERTY ACCEPTANCE LIMITES**

<b>Property</b>	<b>USL and LSL</b>
Course Aggregate Angularity	Table 5 (LSL Only)
Fine Aggregate Angularity	Table 6 (LSL Only)
Sand Equivalent	45 minimum (LSL Only)
Fines to Effective Asphalt	0.6 to 1.2
Washington State Degradation	30 minimum
Flat and Elongate Particles	Table 7 (USL Only)

Rejection by Architect.

Verification tests may be run on random samples (2) on projects with small quantities (Method B).

As soon as practical after paving, a random location will be determined and two cores cut by the contractor and tested by an independent laboratory according to AASHTO T-230. If the density for both falls within the limits in Table B, the material shall be accepted. If one of the results is within the Spec. limits in Table B and one is outside, the two will be averaged and that value will be used to determine acceptance. If both results fall outside the Spec. Limits in Table B, the material shall be completely removed and replaced with mix meeting the contract requirements at no additional expense to the Owner.

The Architect will also, at regular intervals, take samples from the source of production for the properties shown in Table C.

For material represented by a verification test (Method B) with test results exceeding the specification limits in Table B (except for density), the Construction Manager will:

- 1) Require complete removal and replacement with mix meeting the contract requirements at no additional expense to the Owner; or
- 2) Require corrective action to the satisfaction of the Construction Manager at no additional expense to the Owner.

For material represented by a verification test (Method B) with test results exceeding the specification limits in Table B for density, if the results are lower than 90% or higher than 98% the Construction Manager will direct that the material be completely removed and replaced with mix meeting the contract requirements at no additional expense to the Owner.

401.22 Method of Measurement. Plant mix pavement will be measured by the megagram in accordance with Section 109 -- Measurement and Payment.

401.23 Basis of Payment. All work performed and measured as prescribed above will be paid for as provided in respective sections for each type specified.

Work specified in Subsection 401.12 will be paid for at the contract unit prices for the material used except that cleaning objectionable material from the pavement and furnishing and applying bituminous material to joints and contact surfaces will be incidental.

Implementation of the Quality Control Plan and costs associated with obtaining core samples for acceptance testing shall be incidental.

**END OF SECTION 321216**

SECTION 329300

PLANTS

**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. Plants.
- 2. Planting soils.

B. Related Sections:

- 1. Division 01 Section "Temporary Facilities and Controls" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
- 2. Division 31 Section "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
- 3. Division 31 Section "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.
- D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of plant required.
- E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when

removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

- F. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- G. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.
- H. Finish Grade: Elevation of finished surface of planting soil.
- I. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- J. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- K. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- L. Planting Area: Areas to be planted.
- M. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- N. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- O. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- P. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- Q. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- R. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- S. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated, including soils.
  - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
  - 2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
- B. Samples for Verification: For each of the following:
  - 1. Organic Compost and Mulch: 1-pint (0.5-liter) volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
- C. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
  - 1. Manufacturer's certified analysis of standard products.
  - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- E. Material Test Reports: For existing native surface topsoil and imported or manufactured topsoil.
- F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.
- G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.
  - 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
  - 2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
  - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
    - a. Certified Landscape Technician - Exterior, with installation and maintenance specialty area(s), designated CLT-Exterior.

- b. Certified Landscape Technician - Interior, designated CLT-Interior.
  - c. Certified Ornamental Landscape Professional, designated COLP.
5. Pesticide Applicator: State licensed, commercial.
- B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.
- 1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
  - 2. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
  - 3. Report suitability of tested soil for turf growth.
    - a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    - b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
- D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- E. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
- 1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
  - 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- F. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.



1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.
- B. Bulk Materials:
  1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
  2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.
- C. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.
- D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- E. Handle planting stock by root ball.
- F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.
- G. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
  1. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.
  2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
  3. Do not remove container-grown stock from containers before time of planting.
  4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:
  - 1. Notify Architect, Construction Manager and Owner no fewer than three days in advance of proposed interruption of each service or utility.
- C. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
  - 1. Spring Planting: beginning April 15
  - 2. Fall Planting: ending November 15.
- D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
  - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.8 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
    - b. Structural failures including plantings falling or blowing over.
  - 2. Warranty Periods from Date of final acceptance and shall extend for a period of 12 months.
  - 3. Include the following remedial actions as a minimum:
    - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.

- b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
- c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
- d. Provide extended warranty for period equal to original warranty period, for replaced plant material.
- e. If replacement plant fails during second warranty period, assess circumstances to determine cause and repeat replacement/warranty if, to the satisfaction of Owner and Contractor, unique planting conditions or other circumstances beyond their reasonable control are not the cause for the failure.

#### 1.9 MAINTENANCE SERVICE

- A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until final acceptance.

### PART 2 - PRODUCTS

#### 2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
  - 1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots will be rejected.
  - 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
  - 1. Class: O, with a minimum of 95 percent passing through No. 8 (2.36-mm) sieve and a minimum of 55 percent passing through No. 60 (0.25-mm) sieve.
  - 2. Provide lime in form of ground dolomitic limestone.
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (0.425-mm) sieve.
- C. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 (0.30-mm) sieve.
- D. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

2.3 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch (12.5-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  - 1. "Superhumus" by New England Organics, 5 Fundy Road, Falmouth, ME (800-933-6474)

2.4 FERTILIZERS

- A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 10 percent phosphoric acid.
- B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
- C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
  - 1. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
  - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
  - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

## 2.5 PLANTING SOILS

- A. Planting Soil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
  1. Supplement with planting soil when quantities are insufficient.
  2. Mix existing, native surface topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
    - a. Ratio of Loose Compost to Topsoil by Volume: 1:4.
    - b. Weight of Lime per 1000 Sq. Ft. (92.9 Sq. m): As recommended by soil analysis.
    - c. Weight of Sulfur per 1000 Sq. Ft. (92.9 Sq. m): As recommended by soil analysis.
    - d. Weight of Agricultural Gypsum per 1000 Sq. Ft. (92.9 Sq. m): As recommended by soil analysis.
    - e. Weight of Bonemeal per 1000 Sq. Ft. (92.9 Sq. m): As recommended by soil analysis.
    - f. Weight of Superphosphate per 1000 Sq. Ft. (92.9 Sq. m): As recommended by soil analysis.
    - g. Weight of Commercial Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): As recommended by soil analysis.
    - h. Weight of Slow-Release Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): As recommended by soil analysis.
- B. Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. If existing on-site topsoil quantity is insufficient, obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes.
  1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch (25 mm) or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and brome grass; not infested with nematodes, grubs, other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled, pore-space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
  2. Mix imported topsoil or manufactured topsoil with the following soil amendments, fertilizers, and compost in quantities as recommended by soil analysis and as specified above to produce planting soil.

2.6 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
1. Type: Ground or shredded pine or hemlock bark.
  2. Size Range: 3 inches (76 mm) maximum.
  3. Color: Natural.

2.7 PESTICIDES

- A. General: Pesticide and herbicides, registered and approved by EPA, acceptable to Owner and authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction. Use of pesticides and herbicides shall be avoided to the greatest extent practicable.
- B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.8 TREE STABILIZATION MATERIALS

- A. Stakes and Guys:
1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated, pointed at one end.
  2. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch (2.7 mm) in diameter.
  3. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
  4. Guy Cables: Five-strand, 3/16-inch- (4.8-mm-) diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches (75 mm) long, with two 3/8-inch (10-mm) galvanized eyebolts.
  5. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.
  6. Proprietary Staking-and-Guying Devices: Proprietary stake and adjustable tie systems to secure each new planting by plant stem; sized as indicated and per manufacturer's written recommendations may be submitted and used as approved.

2.9 MISCELLANEOUS PRODUCTS

- A. Wood Pressure-Preservative Treatment: AWWPA C2, with waterborne preservative for soil and freshwater use, acceptable to authorities having jurisdiction, and containing no arsenic; including ammoniacal copper arsenate, ammoniacal copper zinc arsenate, and chromated copper arsenate.

- B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- C. Burlap: Non-synthetic, biodegradable.
- D. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
  - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
  - 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
  - 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
  - 4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

#### **3.2 PREPARATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Lay out plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

- E. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
  - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- F. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

### 3.3 PLANTING AREA ESTABLISHMENT

- A. Loosen subgrade of planting areas to a minimum depth of 6 inches (150 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  - 1. Apply fertilizer directly to subgrade before loosening.
  - 2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
    - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    - b. Mix lime with dry soil before mixing fertilizer.
  - 3. Spread planting soil to a depth of 6 inches (150 mm) but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
    - a. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil.
- B. 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.
- C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- D. Application of Mycorrhizal Fungi: At time approved by Architect, apply dry product uniformly over prepared soil at recommended application rate.

### 3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.



1. Excavate approximately two times as wide as ball diameter for balled and burlapped and container-grown stock.
  2. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
  3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
  4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
  5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
  6. Maintain supervision of excavations during working hours.
  7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
  8. If drain tile is shown on Drawings or required under planting areas, excavate to top of porous backfill over tile.
- B. Subsoil and topsoil removed from excavations may be used as planting soil within the provisions herein.
- C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.
- 3.5 TREE, SHRUB, AND VINE PLANTING
- A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare at same elevation relative to adjacent finish grades as it was grown.
1. Use planting soil for backfill.
  2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
  5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Set container-grown stock plumb and in center of planting pit or trench with root flare at same elevation relative to adjacent finish grades as it was grown.
1. Use planting soil for backfill.
  2. Carefully remove root ball from container without damaging root ball or plant.
  3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
  5. Continue backfilling process. Water again after placing and tamping final layer of soil.

### 3.6 TREE, SHRUB, AND VINE PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.
- C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

### 3.7 TREE STABILIZATION

- A. Install trunk stabilization as follows unless otherwise indicated:
  1. Upright Staking and Tying: Stake trees of 2- through 5-inch (50- through 125-mm) caliper. Stake trees of less than 2-inch (50-mm) caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches (450 mm) below bottom of backfilled excavation and to extend to the dimension shown on Drawings above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
  2. Use two stakes for trees up to 12 feet (3.6 m) high and 2-1/2 inches (63 mm) or less in caliper; three stakes for trees less than 14 feet (4.2 m) high and up to 4 inches (100 mm) in caliper. Space stakes equally around trees.
  3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

4. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
5. Proprietary Staking and Guying Device (as approved): Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

### 3.8 GROUND COVER AND PLANT PLANTING

- A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.
- B. Use planting soil for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.
- E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

### 3.9 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
  1. Trees in Turf Areas: Apply organic mulch ring of 3-inch (75-mm) average thickness. Do not place mulch within 3 inches (75 mm) of trunks or stems.
  2. Organic Mulch in Planting Areas: Apply 3-inch (75-mm) average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches (75 mm) of shrub trunks or stems.

### 3.10 EDGING INSTALLATION

- A. Shovel-Cut Edging: Separate mulched areas from turf areas, curbs, and paving with a 45-degree, 4- to 6-inch- (100- to 150-mm-) deep, shovel-cut edge as shown on Drawings.

### 3.11 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or

vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

- B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

### 3.12 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

### 3.13 CLEANUP AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- C. After installation and before Substantial Completion remove, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site. Retain nursery tags until after final acceptance.

### 3.14 DISPOSAL

- A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

**END OF SECTION 329300**