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HFR-98
(Part I)

NATIONAL PARK SERVICE
United States Department of the Interior

Harpers Ferry National Historical Park
Harpers Ferry, West Virginia

EXTERIOR RESTORATION
and
INTERIOR REHABILITATION

Buildings 32, 33, 33A, 34-35, 34A, and 36;
Package No. HAFE 116

SPECIFICATIONS

50% SUBMISSION
30 MARCH 1993

GRIEVES WORRALL WRIGHT & O'HATNICK, INC
5 EAST READ STREET
BALTIMORE, MARYLAND 21202
410-332-1009

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HARPERS FERRY NATIONAL HISTORIC PARK
HAFE-116
TITLE OF PROJECT _____

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PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION:

A. The work of this contract consists of the general construction of exterior restoration and interior alterations to Buildings 32, 33, 33A, 34-35, 34A and 36 at Harpers Ferry National Historical Park, Harpers Ferry, W.V., as shown on Contract Documents prepared by Grieves, Worrall, Wright & O'Hatnick, Inc., Architects, dated _____ , 1993.

B. The Work consists of the exterior restoration and interior renovations and alterations of existing buildings. Landscape development, utility development, paving and other site improvements are required as part of the Work.

1. The Work includes modification to, and in some cases stabilization of, existing material of significant architectural, cultural, and historical value. Extreme care must be exercised by the Contractor in order that unnecessary damage to, or loss of, existing material does not occur.

2. The Work includes but is not limited to the following new and existing materials or assemblies: concrete, masonry and stone walls, structural steel, metal deck, architectural woodwork, waterproofing, slate roofing, roof accessories, wood doors and frames, wood windows, hardware, glazing, interior finishes and furnishings including appliances, elevators, plumbing, fire protection, heating-ventilating-air conditioning, electrical systems, lighting, and communication-alarm-signal systems.

C. All work will be performed under a single contract.

1.3 CONTRACTOR'S USE OF PREMISES:

A. Use of the Project Site:

1. General: During the construction period the Contractor shall have full use of the premises for

construction operations, including use of the site as defined within the Construction Documents. The Contractor's use of the premises is limited only by the Government's right to perform construction operations with its own forces or to employ separate contractors on portions of the project.

2. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed. Keep premises neat and clean.

3. Keep roadways and entrances serving the premises clear and available to the Government, the Public, and the Government's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site. Parking within the contract site is not allowed.

4. Contractor shall at all times conduct his operations to ensure the least inconvenience to the public. Road closures will be permitted, when required, upon specific approval of Contracting Officer.

5. Existing site features, including walls, walks, fences, paving, and other construction, not scheduled for work, are to be protected as necessary so as not to be damaged due to the contractors activity. Any damage that does occur to these areas must be returned to the pre-contract condition as part of this contract at no additional cost to the Government. Local patching to correct damage will not be acceptable in cases where such patching will be recognized. Entire regional replacement/ restoration will be required.

6. Confine storage of materials to the areas designated.

7. Preservation of Natural and Historical Features: Confine all operations to work limits of the project. Prevent damage to natural or historical surroundings. Restore damaged areas, repairing or replacing damaged trees and plants, at no additional expense to the Government.

   a. Provide temporary barriers to protect existing trees and plants and root zones.

   b. Do not remove, injure, or destroy trees or other plants without prior approval. Consult with Contracting Officer and remove agreed-on roots

and branches that interfere with construction.

c. Do not fasten ropes, cables, or guys to existing trees.

d. Carefully supervise excavating, grading, filling, and other construction operations near trees to prevent damage.

8. Existing Utilities: Notify Contracting Officer and utility companies of proposed locations and times for excavation.

a. Contractor shall be responsible for locating and preventing damage to known utilities. If damage occurs, repair utility at no additional expense to the Government.

b. If damage occurs to an unknown utility, repair utility. An equitable adjustment will be made in accordance with the Changes clause of the General Provisions.

c. Interruption of Existing Utility Service:

9. Hauling Restrictions: Comply with all legal load restrictions in the hauling of materials. Load restrictions on park roads are identical to the state load restrictions with such additional regulations as may be imposed by the Park Superintendent. Information regarding rules and regulations for vehicular traffic on park roads may be obtained from the Office of the Park Superintendent. A special permit will not relieve Contractor of liability for damage which may result from moving of equipment.

B. Use of the Existing Buildings:

1. General: Maintain the existing buildings in a weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the buildings during the construction period.

2. The buildings will be closed to the public during construction. However, maintain access for National Park Service administrative and other official business throughout the construction phase.

3. Provide temporary water, sewer, and electric utilities.

4. The Contractor may establish the Construction Office

within Building 33A or the first level of Building 33, with the prior approval of and coordination with the Government. Any damage that occurs due to the office location within the property must be corrected prior to project completion.

5. The Contractor, at his own option may use the existing toilet room in Building 33 first floor for construction employees. When this toilet room is demolished, the Contractor must provide a portable toilet. Use of new toilet rooms by construction personnel is not permitted. Provide and maintain temporary toilet facilities in accordance with State Health Department and National Park Service requirements.

1.4 WORK SEQUENCE

A. The Work will be conducted in two phases to provide the least possible interference to the normal ongoing activities at the Park and to allow for the special celebration planned to occur at the Park during the last week of June, 1994, in honor of the 50th Anniversary of the Park's joining with the NPS System.

1. Phase 1: The contractor will have complete access to the construction site from the time of Notice to Proceed until Friday, 13 May, 1994. Scaffolding may surround the buildings as indicated in the Construction Documents. Work requiring the scaffolding along Shenandoah Street must be completed during Phase 1. At the end of Phase 1 the scaffolding along Shenandoah Street shall be removed and the street, side walk and building fronts returned to the Government in their completed condition. All necessary civil and utility work outside the confines of the project construction fence must be completed during Phase 1. At the end of Phase 1, the construction fence along Shenandoah Street will be removed and adjusted to contain the ongoing work that remains to the east, south and west of the site.

2. Phase 2: The Contractor will complete the remainder of the project.

1.5 SPECIAL CONSTRUCTION REQUIREMENTS:

A. Partial Owner Occupancy: The Government reserves the right to occupy and to place and install equipment in completed areas of the building, prior to Substantial Completion provided that such occupancy does not interfere with completion of the Work. Such placing of

equipment and partial occupancy shall not constitute acceptance of the total Work.

1. A Certificate of Substantial Completion will be executed for each specific portion of the Work to be occupied prior to Government occupancy.

2. Prior to partial Government occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy the Government will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

1.6 FIELD VERIFICATION: Field verify all new and existing dimensions affecting the work of this contract before ordering products.

1.7 GOVERNMENT-FURNISHED ITEMS:

A. The Government will provide certain material and equipment for inclusion in the Work. The Work includes providing support systems to receive the Government's material and equipment, and mechanical and electrical connections.

1. The Government will arrange and pay for delivery of Government-furnished items in accordance with the Contractor's Construction Schedule, and will inspect deliveries for damage.

2. The Contractor is responsible for designating the delivery dates of Government-furnished items in the Contractor's Construction Schedule and for receiving, unloading and handling Government-furnished items at the site. The Contractor is responsible for protecting Government-furnished items from damage, including damage from exposure to the elements, and to repair or replace items damaged as a result of his operations.

1.8 CONTRACTOR-FURNISHED ITEMS: All materials, including borrow and aggregates, shall be Contractor-furnished from outside the park, unless item is specifically designated as otherwise.

PART 2 : PRODUCTS (Not applicable).

PART 3 : EXECUTION (Not applicable).

END OF SECTION 01010

PART 1 GENERAL

A. RELATED DOCUMENTS:

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

1.1 SUMMARY:

A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:

1. Coordination.
2. Administrative and supervisory personnel.
3. General installation provisions.
4. Cleaning and protection.

B. Field engineering is included in Section "Field Engineering".

C. Progress meetings, coordination meetings and pre-installation conferences are included in Section "Project Meetings".

D. Requirements for the Contractor's Construction Schedule are included in Section "Submittals".

1.2 COORDINATION:

A. Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.

1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.

2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

B. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the Government and separate Contractors where coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project Close-out activities.

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

1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as the Government's property.

1.3 SUBMITTALS:

A. Coordination Drawings: Prepare and submit coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.

1. Show the interrelationship of components shown on separate Shop Drawings.

2. Indicate required installation sequences.

3. Comply with requirements contained in Section "Submittals."

4. Refer to Division-15 Section "Basic Mechanical Requirements," and Division-16 Section "Basic

Electrical Requirements" for specific coordination Drawing requirements for mechanical and electrical installations.

B. Staff Names: Within 15 days of Notice to Proceed, submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses, telephone, and fax numbers.

1. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

PART 2 PRODUCTS (Not Applicable).

PART 3 EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS:

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

F. Recheck measurements and dimensions, before starting each installation.

G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent

deterioration.

H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer mounting height and location decisions of all items incorporated into exhibition spaces to the Government's Project Superintendent for final decision.

3.2 CLEANING AND PROTECTION:

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

B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

C. 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.

END OF SECTION 01040

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of 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 cutting and patching.

B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1. Requirements of this Section apply to mechanical and electrical installations. Refer to Division-15 and Division-16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

C. Demolition of selected portions of the building for alterations is included in Section "Selective Demolition."

1.3 SUBMITTALS:

A. Cutting and Patching Proposal: Approval of procedures for cutting and patching is required before proceeding. Submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.

3. List products to be used and firms or entities that will perform Work.

4. Indicate dates when cutting and patching is to be performed.

5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.

6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.

7. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.4 QUALITY ASSURANCE:

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

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

1. If possible retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:

a. Stonework and stone masonry.
b. Ornamental metal.
c. Stucco and ornamental plaster.
d. Finished wood flooring.
e. Carpeting.
f. Wall covering.
g. HVAC enclosures, cabinets or covers.

PART 2 PRODUCTS

2.1 MATERIALS:

A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 EXECUTION

3.1 INSPECTION:

A. This project contains existing material of significant architectural, cultural, and historical value. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

1. Before proceeding, meet at the 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.

3.2 PREPARATION:

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE:

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

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.

1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

C. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.

1. Comply with requirements of applicable Sections of Division-2 where cutting and patching requires excavating and backfilling.

2. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

D. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

2. 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.

3. Where removal of walls or partitions extends one finished area into another, patch and repair individual materials to provide an even surface of original color and appearance.

4. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken region containing the patch, after the patched area has received primer and second coat.

5. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.4 CLEANING:

A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

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. General: This Section specifies administrative and procedural requirements for field engineering services, including, but not necessarily limited to, the following:

1. Civil engineering services.
2. Structural engineering services.

1.3 SUBMITTALS:

A. Certificates: Submit certificates signed by a Professional Engineer certifying that the improvements comply with the Contract Documents.

B. Project Record Documents: Submit a record of Work performed and record survey data as required under provisions of Sections "Submittals" and "Project Closeout".

1.4 QUALITY ASSURANCE:

A. Engineer: Engage a Professional Engineer of the discipline required, registered in the state in which the Project is located, to perform required engineering services.

1.5 LAYOUT OF WORK:

A. Contracting Officer will set initial construction stakes establishing lines, slopes, and grades for road work, and reference and base lines and bench marks for bridges and accessory structures. Contractor shall execute the work in accordance with these stakes, and perform all additional staking he deems necessary to execute the work.

B. Contractor shall preserve all stakes and marks. Stakes or marks originally set by the Contracting Officer that are destroyed by Contractor will be replaced by Contracting Officer, with the cost of replacement deducted from Contractor's final payment.

C. Existing Monuments: All bench marks, land corners, and

triangulation points, established by other surveys, existing within the construction area shall be preserved. If existing monuments interfere with the work, secure written permission before removing them.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 EXAMINATION:

A. The Government will identify existing control points and property line corner stakes.

B. Verify layout information shown on the Drawings, in relation to the existing conditions before proceeding to layout the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.

1. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points, or requirements to relocate reference points because of necessary changes in grades or locations.

2. Promptly replace lost or destroyed project control points. Base replacements on the original survey control points.

C. Existing utilities and equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction.

1. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer and water service piping.

2. Clearly mark the locations of all underground utilities that traverse the construction site. Protect all utilities that are to be reused. Prevent construction or delivery equipment from crossing any utilities not originally placed to withstand such loads.

3.2 PERFORMANCE:

A. Working from lines and levels established by the project documents, establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as

needed to properly locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.

1. Advise entities engaged in construction activities, of marked lines and levels provided for their use.

2. As construction proceeds, check every major element for line, level and plumb. Existing floor levels in the buildings are not level and plumb. New work placed between existing floors must be carefully coordinated with existing conditions.

B. Surveyor's Log: Maintain a surveyor's log of control and other survey Work. Make this log available for reference.

1. Record deviations from required lines and levels, and advise the Contracting Officer when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.

2. On completion of foundation walls, major site improvements, and other Work requiring field engineering services, prepare a certified survey showing dimensions, locations, angles and elevations of construction and site work.

C. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes and invert elevations by instrumentation and similar appropriate means.

D. Building Lines and Levels: Locate and lay out batter boards for structures, foundations, column grids and locations, floor levels and control lines and levels required for mechanical and electrical Work.

E. Existing Utilities: Furnish information necessary to adjust, move or relocate existing structures, utility lines, services or other appurtenances located in, or affected by construction. Coordinate with local authorities having jurisdiction.

END OF SECTION 01050

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 DEFINITIONS:

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

B. Indicated: The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.

C. Directed: Terms such as directed, requested, authorized, selected, approved, required, and permitted mean directed by the Contracting Officer, requested by the Contracting Officer, and similar phrases.

D. Approved: The term approved, when used in conjunction with the Contracting Officer's action on the Contractor's submittals, applications, and requests, is limited to the Contracting Officer's duties and responsibilities as stated in the Conditions of the Contract.

E. Regulations: The term regulations includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. Furnish: The term furnish means supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. Install: The term install describes operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. Provide: The term provide means to furnish and install, complete and ready for the intended use.

I. Installer: An Installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term experienced, when used with the term Installer, means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.
2. Trades: Using terms such as carpentry is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
3. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no choice or option. However, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.

    a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

J. Project site is the space available to the Contractor for performing construction activities either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. Testing Agencies: A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-Division format and MASTERFORMAT numbering system.

B. Specification Content: This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

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

2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.

a. The words "shall be" are implied wherever a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS:

A. Applicability of Standards: Except where 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 the standards in effect as of the date of the Contract Documents.

C. Conflicting Requirements: Where compliance with two or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different but apparently equal and other uncertainties to the Contracting Officer for a decision before proceeding.

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

D. Copies of Standards: Each entity engaged in construction on the Project is required to 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, the Contractor shall obtain copies directly from the publication source.

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the context of the Text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

F. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean the associated names. Names and addresses are subject to change and are believed, but not ensured, to be accurate and up to date as of the date of Contract Documents.

AA Aluminum Association
900 19th St., NW, Suite 300
Washington, DC 20006 (202) 862-5100

AABC Associated Air Balance Council
1518 K St., NW
Washington, DC 20005 (202) 737-0202

AAMA American Architectural Manufacturers Assoc.
1540 E. Dundee Road, Suite 310
Palatine, IL 60067 (708) 202-1350

AAN American Association of Nurserymen

	1250 Eye St., NW, Suite 500 Washington, DC 20005	(202) 789-2900
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol St., Suite 225 Washington, DC 20001	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists P.O. Box 12215 Research Triangle Park, NC	(919) 549-8141
ABMA	American Boiler Manufacturers Association 950 N. Glebe Road, Suite 160 Arlington, Virginia 22203-1824	
ACI	American Concrete Institute P.O. Box 19150 Detroit, MI 48219	(313) 532-2600
ACIL	American Council of Independent Laboratories 1629 K St., NW Washington, DC 20006	(202) 887-5872
ACPA	American Concrete Pipe Assoc. 8300 Boone Blvd., Suite 400 Vienna, VA 22182	(703) 821-1990
ADC	Air Diffusion Council One Illinois Center, Suite 200 111 East Wacker Drive Chicago, IL 60601-4298	(312) 616-0800
AFBMA	Anti-Friction Bearing Manufacturers Assoc. 1101 Connecticut Ave., NW, Suite 700 Washington, DC 20036	(202) 429-5155
AGA	American Gas Assoc. 1515 Wilson Blvd. Arlington, VA 22209	(703) 841-8400
AHA	American Hardboard Assoc. 520 N. Hicks Road Palatine, IL 60067	(708) 934-8800
AHAM	Association of Home Appliance Manufacturers 20 N. Wacker Drive Chicago, IL 60606	(312) 984-5800
AI	Asphalt Institute Research Park Drive P.O. Box 14052	

	Lexington, KY 40512-4052	(606) 288-4960
AIA	American Institute of Architects 1735 New York Ave., NW Washington, DC 20006	(202) 626-7300
A.I.A.	American Insurance Assoc. 1130 Connecticut Ave., NW, Suite 1000 Washington, DC 20036	(202) 828-7100
AIHA	American Industrial Hygiene Assoc. P.O. Box 8390 345 White Pond Dr. Akron, OH 44320	(216) 873-2442
AISC	American Institute of Steel Construction One East Wacker Drive, Suite 3100 Chicago, IL 60601-2001	(312) 670-2400
AISI	American Iron and Steel Institute 1101 17th Street, NW, Suite 1300 Washington, DC 20036-4700	(202) 463-6573
AITC	American Institute of Timber Construction 11818 SE Mill Plain Blvd., Suite 415 Vancouver, WA 98684	(206) 254-9132
ALCA	Associated Landscape Contractors of America 12200 Sunrise Valley Drive, Suite 150 Reston, VA 22091	(703) 620-6363
ALI	Associated Laboratories, Inc. 500 S. Vermont St. Palatine, IL 60067	(708) 358-7400
ALSC	American Lumber Standards Committee P.O. Box 210 Germantown, MD 20875	(301) 972-1700
AMCA	Air Movement and Control Assoc. 30 W. University Drive Arlington Heights, IL 60004-1893	(708) 394-0150
ANSI	American National Standards Institute 11 West 42nd Street, 13th Floor New York, NY 10036	(212) 642-4900
AOAC	Association of Official Analytical Chemists 2200 Wilson Blvd., Suite 400 Arlington, VA 22201-3301	(703) 522-3032
AOSA	Association of Official Seed Analysts c/o Larry J. Prentice	

	268 Plant Science 1ANR-UNL, Box 19281 Lincoln, NE 68583-0911	(402) 472-8649
APA	American Plywood Assoc. P.O. Box 11700 Tacoma, WA 98411	(206) 565-6600
API	American Petroleum Institute 1220 L St., NW Washington, DC 20005	(202) 682-8000
APWA	American Public Works Association 1313 E. 60th Street Chicago, Illinois 60637	
ARI	Airconditioning and Refrigeration Institute 1501 Wilson Blvd., 6th Floor Arlington, VA 22209	(703) 524-8800
ARMA	Asphalt Roofing Manufacturers Assoc. 6288 Montrose Rd. Rockville, MD 20852	(301) 231-9050
ASA	Acoustical Society of America 500 Sunnyside Blvd. Woodbury, NY 11797	(516) 349-7800
ASC	Adhesive and Sealant Council 1627 K Street, NW, Suite 1000 Washington, DC 20006-1707	(202) 452-1500
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329	(404) 636-8400
ASLA	American Society of Landscape Architects 4401 Connecticut Avenue, N.W. Fifth Floor Washington, D.C. 20008-2302	
ASME	American Society of Mechanical Engineers 345 East 47th St. New York, NY 10017	(212) 705-7722
ASPE	American Society of Plumbing Engineers 3617 Thousand Oaks Blvd., Suite 210 Westlake, CA 91362	(805) 495-7120
ASSE	American Society of Sanitary Engineering P.O. Box 40362 Bay Village, OH 44140	(216) 835-3040

ASTM	American Society for Testing and Materials 1916 Race St. Philadelphia, PA 19103-1187	(215) 977-9679
AWCMA	American Window Covering Manufacturers Assoc. 355 Lexington Ave. New York, NY 10017	(212) 661-4261
AWI	Architectural Woodwork Institute P.O. Box 1550 13924 Braddock Rd., Suite 100 Centreville, VA 22020	(703) 222-1100
AWPA	American Wood-Preservers' Assoc. 4128-1/2 California Ave. SW, No. 171 Seattle, WA 98116	(206) 937-5338
AWPB	American Wood Preservers Bureau 4 E. Washington St. Newnan, GA 30263	(404) 254-9877
AWPI	American Wood Preservers Institute 1945 Old Gallows Road, Suite 550 Vienna, Virginia 22182	
AWS	American Welding Society 550 LeJeune Road, NW P.O. Box 351040 Miami, FL 33135	(305) 443-9353
AWWA	American Water Works Assoc. 6666 W. Quincy Ave. Denver, CO 80235	(303) 794-7711
BANC	Brick Association of North Carolina P.O. Box 13290 Greensboro, NC 27415-3290	(919) 273-5566
BHMA	Builders' Hardware Manufacturers Assoc. 355 Lexington Ave., 17th Floor New York, NY 10017	(212) 661-4261
BIA	Brick Institute of America 11490 Commerce Park Drive Reston, VA 22091	(703) 620-0010
BIFMA	Business and Institutional Furniture Manufacturers Assoc. 2335 Burton St., SE Grand Rapids, MI 49506	(616) 243-1681
BOCA	Building Officials Code Administrators 4051 W. Flossmoor Road	

Country Club Hills, Illinois 60478-5795

CAGI — Compressed Air and Gas Institute
c/o John H. Addington
Thomas Associates, Inc.
1300 Sumner Ave.
Cleveland, OH 44115-2851 (216) 241-7333

CAUS — Color Association of the United States
409 W. 44th Street
New York, NY 10036 (212) 582-6884

CBM — Certified Ballast Manufacturers Assoc.
Hanna Building, No. 772
1422 Euclid Ave.
Cleveland, OH 44115-2851 (216) 241-0711

CCC — Carpet Cushion Council
P.O. Box 546
Riverside, CT 06878 (203) 637-1312

CDA — Copper Development Assoc.
2 Greenwich Office Park, Box 1840
Greenwich, CT 06836 (203) 625-8210

CFFA — Chemical Fabrics & Film Association, Inc.
c/o Thomas Associates, Inc.
1300 Sumner Ave.
Cleveland, OH 44115-2851 (216) 241-7333

CGA — Compressed Gas Assoc.
1725 Jefferson Davis Highway, Suite 1004
Arlington, VA 22202-4100 (703) 979-0900

CISCA — Ceiling and Interior Systems Construction Assoc.
5700 Old Orchard Road, 1st Floor
Skokie, IL 60077 (708) 965-2776

CISPI — Cast Iron Soil Pipe Institute
5959 Shallowford Road, Suite 419
Chattanooga, TN 37421 (615) 892-0137

CLFMI — Chain Link Fence Manufacturers Institute
1776 Massachusetts Avenue, N.W., Suite 500
Washington, D.C. 20036

CRA — California Redwood Association
405 Enfrente Drive, Suite 200
Novato, California 94949

CRI — Carpet and Rug Institute
P.O. Box 2048
Dalton, GA 30722 (404) 278-3176

CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Rd. Schaumburg, IL 60173	(708) 517-1200
CTI	Ceramic Tile Institute of America 700 N. Virgil Ave. Los Angeles, CA 90029	(213) 660-1911
CSSB	Cedar Shingle and Shake Bureau 515 116th Avenue, Suite 275 Bellevue, Washington 98004-5294	
DHI	Door and Hardware Institute 14170 New Brook Drive Chantilly, VA 22022	(703) 222-2010
DLPA	Decorative Laminate Products Assoc. 600 S. Federal St., Suite 400 Chicago, IL 60605	(312) 922-6222
ECSA	Exchange Carriers Standards Assoc. 5430 Grosvenor Lane, Suite 200 Bethesda, MD 20814	(301) 564-4505
EIA	Electronic Industries Assoc. 2001 Pennsylvania Ave., NW Washington, DC 20006-1813	(202) 457-4900
EIMA	Exterior Insulation Manufacturers Assoc. 2759 State Road 580, Suite 112 Clearwater, FL 34621	(813) 726-6477
EJMA	Expansion Joint Manufacturers Assoc. 25 N. Broadway Tarrytown, NY 10591	(914) 332-0040
ETL	ETL Testing Laboratories, Inc. P.O. Box 2040 Route 11, Industrial Park Cortland, NY 13045	(607) 753-6711
FCI	Fluid Controls Institute P.O. Box 9036 Morristown, NJ 07960	(201) 829-0990
FGMA	Flat Glass Marketing Assoc. White Lakes Professional Bldg. 3310 S.W. Harrison Topeka, KS 66611-2279	(913) 266-7013
FHVA	Fine Hardwood Veneer Association 5603 W. Raymond Street, Suite 0 Indianapolis, Indiana 46241	

FM	Factory Mutual Research Organization 1151 Boston-Providence Turnpike P.O. Box 9102 Norwood, MA 02062	(617) 762-4300
FTI	Facing Tile Institute P.O. Box 8880 Canton, OH 44711	(216) 488-1211
GA	Gypsum Association 810 First Street, NE, Suite 510 Washington, DC 20002	(202) 289-5440
HEI	Heat Exchange Institute c/o John H. Addington Thomas Associates, Inc. 1300 Sumner Ave. Cleveland, OH 44115-2851	(216) 241-7333
HI	Hydronics Institute P.O. Box 218 35 Russo Place Berkeley Heights, NJ 07922	(908) 464-8200
H.I.	Hydraulic Institute 30200 Detroit Road Cleveland, OH 44145-1967	(216) 899-0010
HMA	Hardwood Manufacturers Assoc. 400 Penn Center Blvd. Pittsburgh, PA 15235	(412) 829-0770
HPMA	Hardwood Plywood Manufacturers Assoc. 1825 Michael Farraday Drive P.O. Box 2789 Reston, VA 22090-2789	(703) 435-2900
IA	Irrigation Association 1911 N. Fort Myer Drive, Suite 1009 Arlington, Virginia 22209-1630	
ICBO	International Conference of Building Officials 5360 S. Workman Mill Road Whittier, California 90601	
IBD	Institute of Business Designers 341 Merchandise Mart Chicago, IL 60654	(312) 647-1950
ICEA	Insulated Cable Engineers Association, Inc. P.O. Box 440 South Yarmouth, MA 02664	(508) 394-4424

IEC	International Electrotechnical Commission (Available from ANSI) 1430 Broadway New York, NY 10018	(212) 354-3300
IEEE	Institute of Electrical and Electronic Engineers 345 E. 47th St. New York, NY 10017	(212) 705-7900
IES	Illuminating Engineering Society of North America 345 East 47th Street New York, New York 10017-2377	
IESNA	Illuminating Engineering Society of North America 345 E. 47th St. New York, NY 10017	(212) 705-7926
IGCC	Insulating Glass Certification Council c/o ETL Testing Laboratories, Inc. P.O. Box 2040 Route 11, Industrial Park Cortland, NY 13045	(607) 753-6711
ILI	Indiana Limestone Institute of America Stone City Bank Building, Suite 400 Bedford, IN 47421	(812) 275-4426
IMSA	International Municipal Signal Assoc. 165 E. Union St. P.O. Box 539 Newark, NY 14513	(315) 331-2182
IRI	Industrial Risk Insurers 85 Woodland St. Hartford, CT 06102	(203) 520-7300
ISA	Instrument Society of America P.O. Box 12277 67 Alexander Drive Research Triangle Park, NC 27709	(919) 549-8411
KCMA	Kitchen Cabinet Manufacturers Assoc. 1899 Preston White Drive Reston, VA 22091-4326	(703) 264-1690
LIA	Lead Industries Association, Inc. 295 Madison Avenue New York, NY 10017	(212) 578-4750
LPI	Lightning Protection Institute 3365 North Arlington Heights Rd., Suite J Arlington Heights, IL 60004	(708) 255-3003

MBMA	Metal Building Manufacturer's Assoc. c/o Charles M. Stockinger Thomas Associates, Inc. 1300 Sumner Ave. Cleveland, OH 44115-2851	(216) 241-7333
MCAA	Mechanical Contractors Association of America 1385 Piccard Dr. Rockville, MD 20850-4329	(301) 869-5800
MFMA	Maple Flooring Manufacturers' Assoc. 60 Revere Dr., Suite 500 Northbrook, IL 60062	(708) 480-9138
MIA	Marble Institute of America 33505 State St. Farmington, MI 48335	(313) 476-5558
MIMA	Mineral Insulation Manufacturers Association 1420 King Street Alexandria, Virginia 22314	
ML/SFA	Metal Lath/Steel Framing Assoc. (A Division of the National Association of Architectural Metal Manufacturers) 600 S. Federal St., Suite 400 Chicago, IL 60605	(312) 922-6222
MS	Military Standardization Documents (U.S. Department of Defense) Naval Publications and Forms Center 5801 Tabor Ave. Philadelphia, Pennsylvania 19120	
MSHA	Mine Safety and Health Administration Room 601, 4015 Wilson Boulevard Arlington, Virginia 22203	
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park Street, N.E. Vienna, Virginia 22180	
NAAMM	National Association of Architectural Metal Manufacturers 600 S. Federal St., Suite 400 Chicago, IL 60605	(312) 922-6222
NACE	National Association of Corrosion Engineers P. O. Box 218340 Houston, Texas 77218-8340	
NAIMA	North American Insulation Manufacturers Assoc.	

	44 Canal Center Plaza, Suite 310 Alexandria, VA 22314	(703) 684-0084
NAPA	National Asphalt Pavement Assoc. NAPA Building 5100 Forbes Blvd. Lanham, MD 20706-4413	(301) 731-4748
NAPCA	National Association of Pipe Coating Applicators 8th Floor, Commercial National Bank Building 333 Texas Street Shreveport, Louisiana 71101-3673	
NAPF	National Association of Plastic Fabricators (Now DLPA)	
NBGQA	National Building Granite Quarries Assoc. P.O. Box 482 Barre, VT 05641	(802) 476-3115
NBHA	National Builders Hardware Assoc. (Now DHI)	
NBS	National Bureau of Standards (U.S. Department of Commerce)(See NIST)	
NCMA	National Concrete Masonry Assoc. P.O. Box 781 Herndon, VA 22070-0781	(703) 435-4900
NCRPM	National Council on Radiation Protection and Measurements 7910 Woodmont Ave., Suite 800 Bethesda, MD 20814	(301) 657-2652
NCSPA	National Corrugated Steel Pipe Association 2011 Eye Street, NW Washington, DC 20006	(202) 223-2217
NEC	National Electrical Code (from NFPA)	
NECA	National Electrical Contractors Assoc. 7315 Wisconsin Ave. Bethesda, MD 20814	(301) 657-3110
NEII	National Elevator Industry, Inc. 185 Bridge Plaza, North Fort Lee, NJ 07024	(201) 944-3211
NELMA	Northeastern Lumber Manufacturers' Association 272 Tuttle Road, P. O. Box 87A Cumberland Center, Maine 04021-0687	

NEMA	National Electrical Manufacturers Assoc. 2101 L St., NW, Suite 300 Washington, DC 20037	(202) 457-8400
NETA	International Electrical Testing Assoc. P.O. Box 687 Morrison, CO 80465	(303) 467-0526
NFPA	National Fire Protection Assoc. One Batterymarch Park P.O. Box 9101 Quincy, MA 02269-9101	(617) 770-3000 (800) 344-3555
N.F.P.A.	National Forest Products Assoc. 1250 Connecticut Ave., NW, Suite 200 Washington, DC 20036	(202) 463-2700
NHLA	National Hardwood Lumber Assoc. P.O. Box 34518 Memphis, TN 38184-0518	(901) 377-1818
NKCA	National Kitchen Cabinet Assoc. (Now KCMA)	
NLGA	National Lumber Grades Authority 1055 W. Hastings St., Suite 260 Vancouver, British Columbia Canada V6E 2E9	(604) 687-2171
NOFMA	National Oak Flooring Manufacturers Assoc. P.O. Box 3009 Memphis, TN 38173-0009	(901) 526-5016
NPA	National Particleboard Assoc. 18928 Premiere Court Gaithersburg, MD 20879	(301) 670-0604
NPCA	National Paint and Coatings Assoc. 1500 Rhode Island Ave., NW Washington, DC 20005	(202) 462-6272
NRCA	National Roofing Contractors Assoc. 10255 W. Higgins Rd., Suite 600 Rosemont, IL 60018-5607	(708) 299-9070
NSF	National Sanitation Foundation 3475 Plymouth Rd. P.O. Box 1468 Ann Arbor, MI 48106	(313) 769-8010
NSSEA	National School Supply and Equipment Assoc. 8300 Colesville Rd., No. 250	

	Silver Spring, MD 20910	(301) 495-0240
NTMA	National Terrazzo and Mosaic Assoc. 3166 Des Plaines Ave., Suite 132 Des Plaines, IL 60018	(708) 635-7744
NWMA	National Woodwork Manufacturers Assoc. (Now NWWDA)	
NWWDA	National Wood Window and Door Assoc. 1400 E. Touhy Ave., #G54 Des Plaines, IL 60018	(708) 299-5200 (800) 223-2301
PCA	Portland Cement Assoc. 5420 Old Orchard Road Skokie, IL 60077	(708) 966-6200
PCI	Precast/Prestressed Concrete Institute 175 W. Jackson Blvd. Chicago, IL 60604	(312) 786-0300
PDI	Plumbing and Drainage Institute c/o Sol Baker 1106 W. 77th St., South Dr. Indianapolis, IN 46260	(317) 251-6970
PEI	Porcelain Enamel Institute 1101 Connecticut Ave., NW, Suite 700 Washington, DC 20036	(202) 857-1134
PI	Perlite Institute, Inc. 88 New Dorp Plaza Staten Island, New York 10306	
PS	Product Standard of NBS (U.S. Department of Commerce) Government Printing Office Washington, D.C. 20402	
RFCI	Resilient Floor Covering Institute 966 Hungerford Drive, Suite 12-B Rockville, MD 20805	(301) 340-8580
RIS	Redwood Inspection Service 405 Enfrente Drive, Suite 200 Novato, CA 94949	(415) 382-0662
RMA	Rubber Manufacturers Assoc. 1400 K St., NW Washington DC 20005	(202) 682-4800
RMMI	Rocky Mountain Masonry Institute	

1780 South Bellaire Street, No. 602
Denver, Colorado 80222

SDI	Steel Deck Institute P.O. Box 9506 Canton, OH 44711	(216) 493-7886
S.D.I.	Steel Door Institute 30200 Detroit Road Cleveland, OH 44145	(216) 889-0010
SFPA	Southern Forest Products Association P. O. Box 52468 New Orleans, Louisiana 70152	
SGCC	Safety Glazing Certification Council c/o ETL Testing Laboratories Route 11, Industrial Park Cortland, NY 13045	(607) 753-6711
SHLMA	Southern Hardwood Lumber Manufacturers Assoc. (Now HMA)	
SIGMA	Sealed Insulating Glass Manufacturers Assoc. 401 N. Michigan Chicago, IL 60611	(312) 644-6610
SJI	Steel Joist Institute 1205 48th Avenue North, Suite A Myrtle Beach, SC 29577	(803) 449-0487
SMA	Screen Manufacturers Assoc. 3950 Lake Shore Dr., Suite 502-A Chicago, IL 60613-3431	(312) 525-2644
SMACNA	Sheet Metal and Air Conditioning Contractors National Association 4201 Lafayette Center Dr. Chantilly, VA 22021	(703) 803-2980
SPIB	Southern Pine Inspection Bureau 4709 Scenic Highway Pensacola, FL 32504	(904) 434-2611
SPRI	Single Ply Roofing Institute 20 Walnut St. Wellesley Hills, MA 02189	(617) 237-7879
SSPC	Steel Structures Painting Council 4400 Fifth Ave. Pittsburgh, PA 15213-2683	(412) 268-3327
SSPMA	Sump and Sewage Pump Manufacturers Assoc.	

	P.O. Box 298 Winnetka, IL 60093	(708) 835-8911
SWI	Steel Window Institute c/o Thomas Associates, Inc. 1300 Sumner Ave, Cleveland, OH 44115-2851	(216) 241-7333
SWPA	Submersible Wastewater Pump Assoc. 600 S. Federal Street, Suite 400 Chicago, IL 60605	(312) 922-6222
TCA	Tile Council of America P.O. Box 326 Princeton, NJ 08542	(609) 921-7050
TIMA	Thermal Insulation Manufacturers Assoc. 29 Bank Street Stamford, CT 06901 (Standards now issued by NAIMA)	(203) 324-7533
TPI	Truss Plate Institute 583 D'Onofrio Drive, Suite 200 Madison, WI 53719	(608) 833-5900
UBC	Uniform Building Code (by ICBO)	
UFAC	Upholstered Furniture Action Council Box 2436 High Point, NC 27261	(919) 885-5065
UL	Underwriters Laboratories, Inc. 333 Pfingsten Rd. Northbrook, IL 60062	(708) 272-8800
USP	U.S. Pharmacopoeial Convention 12601 Twinbrook Parkway Rockville, MD 20852	(301) 881-0666
WCLIB	West Coast Lumber Inspection Bureau P.O. Box 23145 Portland, OR 97223	(503) 639-0651
WCMA	Wallcovering Manufacturers Assoc. 355 Lexington Ave., 17th Floor New York, NY 10017 (WCMA has moved from this location, perhaps to the Chicago area. Address and telephone number not confirmed.)	(212) 661-4261
WIC	Woodwork Institute of California P.O. Box 11428 Fresno, CA 93773-1428	(209) 233-9035

WMMP Wood Moulding and Millwork Producers Association
P. O. Box 25278
Portland, Oregon 97225

WRI Wire Reinforcement Institute
1101 Connecticut Ave. NW, Suite 700
Washington, DC 20036-4303 (202) 429-5125

WSC Water Systems Council
600 S. Federal St., Suite 400
Chicago, IL 60605 (312) 922-6222

WSFI Wood and Synthetic Flooring Institute
4415 W. Harrison St., Suite 242-C
Hillside, IL 60162 (708) 449-2933

WLPDIA Western Lath, Plaster, Drywall Industries Assoc.
(Formerly California Lath & Plaster Assoc.)
8635 Navajo Road
San Diego, CA 92119 (619) 466-9070

WWPA Western Wood Products Assoc.
Yeon Building
522 SW 5th Avenue
Portland, OR 97204-2122 (503) 224-3930

W.W.P.A. Woven Wire Products Assoc.
2515 N. Nordica Ave.
Chicago, IL 60635 (312) 637-1359

G. Federal Government Agencies: Names and titles of federal government standard- or Specification-producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard- or Specification-producing agencies of the federal gove rnment. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up to date as of the date of the Contract Documents.

CE Corps of Engineers
(U.S. Department of the Army)
Chief of Engineers - Referral
Washington, DC 20314 (202) 272-0660

CFR Code of Federal Regulations
(Available from the Government Printing Office)
N. Capitol St. between G and H St. NW
Washington, DC 20402 (202) 783-3238
(Material is usually first published in the "Federal Register")

CPSC Consumer Product Safety Commission
5401 Westbard Ave.

	Bethesda, MD 20207	(301) 492-6580 (800) 638-2772
CS	Commercial Standard (U.S. Department of Commerce) Washington, DC 20230	(202) 482-2000
DOC	U.S. Department of Commerce 14th St. and Constitution Ave., NW Washington, DC 20230	(202) 482-2000
DOT	Department of Transportation 400 Seventh St., SW Washington, DC 20590	(202) 366-4000
EPA	Environmental Protection Agency 401 M St., SW Washington, DC 20460	(202) 382-2090
FAA	Federal Aviation Administration (U.S. Department of Transportation) 800 Independence Ave., SW Washington, DC 20590	(202) 366-4000
FCC	Federal Communications Commission 1919 M St., NW Washington, DC 20554	(202) 632-7000
FHA	Federal Housing Administration (U.S. Department of Housing and Urban Development) Director, Manufactured Housing and Construction Standards Division 451 Seventh St., SW, Room 9158 Washington, DC 20201	(202) 755-5210
FS	Federal Specification (from GSA) Specifications Unit (WFSIS) 7th and D St., SW Washington, DC 20407	(202) 708-9205
GSA	General Services Administration F St. and 18th St., NW Washington, DC 20405	(202) 708-5082
MIL	Military Standardization Documents (U.S. Department of Defense) Naval Publications and Forms Center 5801 Tabor Ave. Philadelphia, PA 19120	
NIST	National Institute of Standards and Technology (U.S. Department of Commerce)	

	Gaithersburg, MD 20899	(301) 975-2000
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor) N3647 200 Constitution Ave., NW Washington, DC 20210	(202) 219-8148
PS	Product Standard of NBS (U.S. Department of Commerce) Washington, DC 20230	(202) 482-2000
REA	Rural Electrification Administration (U.S. Department of Agriculture) 14th St. and Independence Ave., SW Washington, DC 20250	(202) 447-2791

1.5 GOVERNING REGULATIONS AND AUTHORITIES:

A. Copies of Regulations: Obtain copies of the following regulations and retain at the Project site to be available for reference by parties who have a reasonable need.

1.6 SUBMITTALS:

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

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01095

PART 1 : GENERAL

1.1 DESCRIPTION: The work of this section consists of protecting archeological resources contained in soil deposits.

1.2 DEFINITIONS:

A. Resources: Prehistoric, historic, and recent 20th century artifacts, including charcoal, human bones, ash, fire rocks, and building materials that indicate the presence of past human occupation.

B. Archaeologically Sensitive Areas: Areas that have been determined to contain significant in-the-ground archeological resources.

C. Nonsensitive Areas: Areas that have a low likelihood of containing significant in-the-ground archeological resources.

D. Archeological Monitor: Representative of the Government designated to record and collect cultural resources for compliance with Government regulations to protect in-the-ground resources.

1.3 SUBMITTALS: As specified in Section 01300. 30 days before start of ground-disturbing site work, submit a Daily Work Schedule, detailing construction work in archaeologically sensitive areas. Key schedule to drawings and include the following information.

A. Starting and ending dates of ground-disturbing construction.

B. Locations of temporary facilities, such as barriers, field offices, staging areas, sanitary facilities, borrow pits, and haul and access roads.

C. Types of construction, such as clearing, topsoil stripping, structure or trench excavation, landscaping, and post construction clean-up.

D. Methods and equipment used for each type of construction.

E. Plan for relocating work in the event of temporary work stoppages at each archaeologically sensitive area.

1.4 QUALITY ASSURANCE: At least one week before on-site work begins, Contractor shall meet with Contracting Officer and

Archeological Monitor to discuss Daily Work Schedule and equipment and special methods to be used in archaeologically sensitive areas. Contractor shall ensure that approved Daily Work Schedule is followed throughout construction.

PART 2 : PRODUCTS

2.1 BARRICADES: Required under Section 01500 - Temporary Facilities.

PART 3 : EXECUTION

3.1 BARRICADES: Construct as specified in Section 01530. Locate as directed by Contracting Officer.

3.2 OBSERVATION: Archeological Monitor will observe all ground-disturbing site work, including construction of temporary facilities, at all archaeologically sensitive areas, from a safe location mutually agreed on by Contractor and Monitor. As new ground is broken, Monitor will examine excavated materials, using construction layout centerline and perimeter staking as a reference point to record locations of findings.

3.3 DISCOVERY OF RESOURCES:

A. If Archeological Monitor discovers resources, immediate relocation of the work to a nonsensitive area may be required to allow Monitor to take soil samples and record resources. While Archeological Monitor is documenting resources in sensitive areas, Contractor shall relocate work to nonsensitive areas where monitoring is not normally required.

B. If resources are discovered while Archeological Monitor is absent, stop work immediately and report the discovery to the Contracting Officer.

3.4 WORK STOPPAGE: The Contractor shall plan, schedule, and execute the work to prevent stoppages at one area from stopping all work at the construction site.

END OF SECTION 01100

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 project meetings including but not limited to:

1. Pre-Construction Conference.
2. Pre-Installation Conferences.
3. Coordination Meetings.
4. Progress Meetings.

B. Construction schedules are specified in another Division-1 Section.

1.3 PRE-CONSTRUCTION CONFERENCE:

A. Before start of construction, Contracting Officer will arrange an on-site meeting with Contractor.

B. Attendees: The Contracting Officer, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress including such topics as:

1. Tentative construction schedule.
2. Critical Work sequencing.
3. Designation of responsible personnel.
4. Subcontractors
5. Correspondence procedures
6. Procedures for processing field decisions and Change Orders.
7. Procedures for processing Applications for Payment.
8. Labor standards provisions
9. Payroll reports
10. Distribution of Contract Documents.
11. Documents required under the contract
12. Relationship of Division 1 to other divisions
13. Submittal of Shop Drawings, Product Data and Samples.

14. Preparation of record documents.
15. Use of the premises.
16. Office, Work and storage areas.
17. Equipment deliveries and priorities.
18. Security.
19. Housekeeping.
20. Safety procedures: Safety program (compliance with the "Accident Prevention" clause of the General Provisions).
21. Accident prevention program (including name of responsible supervisor)
22. Accident reporting
23. First aid.
24. Working hours.
25. Saturday, Sunday, holiday and night work
26. National Park Service regulations
27. Park rules and regulations
28. Recycling Program

1.4 PRE-INSTALLATION CONFERENCES:

A. Conduct a pre-installation conference at the site before each construction activity that requires coordination with other construction. The 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 the Contracting Officer of the scheduled meeting dates.

1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:

a. Contract Documents.
b. Options.
c. Related Change Orders.
d. Purchases
e. Deliveries.
f. Shop Drawings, Product Data and quality control Samples.
g. Possible conflicts.
h. Compatibility problems.
i. Time schedules.
j. Weather limitations.
k. Manufacturer's recommendations.
l. Compatibility of materials.
m. Acceptability of substrates.
n. Temporary facilities.
o. Space and access limitations.
p. Governing regulations.
q. Safety.

r. Inspection and testing requirements.
s. Required performance results.
t. Recording requirements.
u. Protection.

2. Record significant discussions and agreements and disagreements of each conference, along with the approved schedule. Distribute the record of the meeting to everyone concerned, promptly, including the Contracting Officer.

3. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.5 COORDINATION MEETINGS:

A. Conduct Project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.

B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 PROGRESS MEETINGS:

A. PROGRESS MEETINGS: The Contracting Officer will schedule weekly meetings with the Contractor and subcontractors. Subcontractors will not be allowed to work until they have attended a meeting. Additional meetings will be held as needed or for new subcontractors.

B. Attendees: In addition to representatives of the Government, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

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

Project.

1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind 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.

2. Review the present and future needs of each entity present, including such items as:

    a. Approval of minutes of previous meetings
    b. Interface requirements.
    c. Time.
        1) Identification of problems which impede planned progress
        2) Maintenance of progress schedule
        3) Corrective measures to regain projected schedules
        4) Planned progress during succeeding work period
        5) Coordination of projected progress
    d. Sequences.
        1) Review of submittals schedule and status of submittals
        2) Review of off-site fabrication and delivery schedules
        3) Deliveries.
        4) Off-site fabrication problems.
    e. Site utilization.
        1) Access.
        2) Temporary facilities and services.
        3) Housekeeping.
        4) Hazards and risks.
    f. Hours of Work.
    g. Quality and Work standards.
    h. Change Orders.
        1) Effect of proposed changes on progress schedule and coordination
    i. Documentation of information for payment requests.
    j. Review of work progress
    k. Field observations, problems, and decisions
    l. Maintenance of quality and work standards
    m. Other business relating to work

D. Reporting: No later than 3 days after each progress meeting date, distribute copies of minutes of the meeting

to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

1. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

PART 2 : PRODUCTS (Not Applicable)

PART 3 : EXECUTION (Not Applicable)

END OF SECTION 01200

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of 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 submittals required for performance of the Work, including;

1. Contractor's construction schedule.
2. Submittal schedule.
3. Daily construction reports.
4. Shop Drawings.
5. Product Data.
6. Samples.
7. Waste and Recycling Plan.
8. Substitutions under "or approved equal" clause.
9. Manufacturer's installation instructions.

B. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

1. Permits.
2. Schedule of Values.
3. Applications for payment.
4. Performance and payment bonds.
5. Insurance certificates.
6. List of Subcontractors.

C. Inspection and test reports are included in Section 01400 - Quality Control Services.

D. Submittal of Project photographs is included under Section 01380 - Construction Photographs.

1.3 SUBMITTAL PROCEDURES:

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

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 elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

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

3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.

    a. Allow 30 days for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Contracting Officer will promptly advise the Contractor when a submittal being processed must be delayed for coordination.

4. If an intermediate submittal is necessary, process the same as the initial submittal.

    a. Allow 30 days for reprocessing each submittal.

    b. No extension of Contract Time will be authorized because of failure to transmit submittals to the Contracting Officer sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.

2. Include the following information on the label for processing and recording action taken.

    a. Project name.
    b. Date.
    c. Name and address of Contractor.
    d. Name and address of subcontractor.

e. Name and address of supplier.
f. Name of manufacturer.
g. Number and title of appropriate Specification Section.
h. Drawing number and detail references, as appropriate.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Contracting Officer using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.

1. On the transmittal Record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

2. Transmittal Form: Use AIA Document G 810.

1.4 CONTRACTOR'S CONSTRUCTION SCHEDULE:

A. General: As soon as possible after Notice of Award and before beginning any work, submit Progress Schedule and Schedule of Values as a package. Contracting Officer will review the Construction Schedule and the Schedule of Values for format and content.

1. Construction Schedule: Submit four copies of Construction Schedule (normally in horizontal bar chart form) showing estimated starting and completion dates for each part of the work. The first progress payment will not be issued until an acceptable progress schedule is submitted.

a. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".

b. Within each time bar indicate estimated completion percentage in 10 percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.

c. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show

data for the entire construction period.

d. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.

e. Coordinate the Construction Schedule with the Schedule of Values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.

f. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Contracting Officer's procedures necessary for certification of Substantial Completion.

g. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by requirements for phased completion to permit Work by separate Contractors and partial occupancy by the Owner prior to Substantial Completion.

h. Work Stages: Indicate important stages of construction for each major portion of the Work, including testing and installation.

i. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the Work. Indicate where each element in an area must be sequenced or integrated with other activities.

j. Cost Correlation: At the head of the schedule, provide a two item cost correlation line, indicating "precalculated" and "actual" costs. On the line show dollar-volume of Work performed as of the dates used for preparation of payment requests.

k. Refer to Section "Applications for Payment" for cost reporting and payment procedures.

2. Schedule of Values: Submit a schedule of dollar values based on the Contract Bid Schedule including all bid items. Break down into component parts each

bid item involving a series of operations for which progress payments may be requested. The total costs for the component parts shall equal the bid amount for that item, and the total cost of all items shall equal the contract sum. The Contracting Officer may request data to verify accuracy of dollar values. The Schedule of Values will form the basis for progress payments as provided for in the General Provisions.

B. Distribution: Following response to the initial submittal, print and distribute copies to the Contracting Officer, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.

1. When revisions are made, distribute 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 construction activities.

C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.5 SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule.

1. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.

2. Prepare the schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:

a. Scheduled date for the first submittal.
b. Related Section number.
c. Submittal category.
d. Name of subcontractor.
e. Description of the part of the Work covered.
f. Scheduled date for resubmittal
g. Scheduled date the Contracting Officer's final release or action.

B. Distribution: Following response to initial submittal, print and distribute copies to the Contracting Officer, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.

1. When revisions are made, distribute 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 construction activities.

C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.6 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Contracting Officer at weekly intervals:

1. List of subcontractors at the site.
2. Approximate count of personnel at the site.
3. High and low temperatures, general weather conditions.
4. Accidents and unusual events.
5. Meetings and significant decisions.
6. Stoppages, delays, shortages, losses.
7. Meter readings and similar recordings.
8. Emergency procedures.
9. Orders and requests of governing authorities.
10. Change Orders received, implemented.
11. Services connected, disconnected.
12. Equipment or system tests and start-ups.
13. Partial Completions, occupancies.
14. Substantial Completions authorized.

1.7 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES:

A. General Procedures:

1. As specified in the individual sections, forward submittals to Contracting Officer at least 30 days before need for approval. Unless a different number is specified, submit five copies of each shop drawing, three specimens of each sample, and five copies of all other submittals requested, all of which will be retained by Contracting Officer. Submit any additional copies that are to be returned.

2. Coordinate all submittals and review them for legibility, accuracy, completeness, and compliance with contract requirements. Forward submittals that are related to or affect one another as a package to facilitate coordinated review.

3. List submittals on National Park Service form DSC-1 (CS). Contracting Officer will provide a project identification stamp and an approval stamp. Imprint the front of each sheet or item with both stamps and fill in the blanks in the identification stamp.

4. Submittals will not be accepted for review if identification or approval stamps are missing or are placed on the back of the submittal, an incorrect amount of submittals are submitted, the transmittal form is incorrectly filled out, submittals are not coordinated, or submittals do not show evidence of Contractor's approval.

5. Contracting Officer reserves the right to require submittals in addition to those called for in individual sections.

B. Specific Procedures:

1. Shop Drawings: Identify each copy of shop drawings with contract drawing number in lower right hand corner.

   a. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

   b. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:

      1) Dimensions.
      2) Identification of products and materials included.
      3) Compliance with specified standards.
      4) Notation of coordination requirements.
      5) Notation of dimensions established by field measurement.

   c. Sheet Size: Except for templates, patterns and

similar full- size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 36" x 48".

d. Initial Submittal: Submit one correctable translucent reproducible print and one blue- or black-line print for the Contracting Officer's review; the reproducible print will be returned.

e. Final Submittal: Submit 3 blue- or black-line prints; submit 5 prints where required for maintenance manuals. 2 prints will be retained; the remainder will be returned.

1) One of the prints returned shall be marked-up and maintained as a "Record Document".

2) Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

f. Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.

1) Preparation of coordination Drawings is specified in section "Project Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.

2) Submit coordination Drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.

2. Samples: Samples shall be large enough to illustrate clearly the functional characteristics and full range of color, texture, or pattern.

a. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

b. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Contracting Officer's Sample. Include the following:

1) Generic description of the Sample.
2) Sample source.
3) Product name or name of manufacturer.
4) Compliance with recognized standards.
5) Availability and delivery time.

c. 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 the final submittal and the actual component as delivered and installed.

1) Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.

2) Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.

3) Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.

d. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.

1) Preliminary submittals will be reviewed and returned with the Contracting Officer's mark indicating selection and other action.

2) Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked

with the action taken.

3) Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.

4) Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

5) Sample sets may be used to obtain final acceptance of the construction associated with each set.

e. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.

f. Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.

1) Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

3. Product Data (Manufacturers' Literature): Submit only pertinent pages; mark each copy of standard printed data to identify products referenced in specification section.

a. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."

b. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the

applicable information. Include the following information:

1) Manufacturer's printed recommendations.
2) Compliance with recognized trade association standards.
3) Compliance with recognized testing agency standards.
4) Application of testing agency labels and seals.
5) Notation of dimensions verified by field measurement.
6) Notation of coordination requirements.

c. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

d. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.

1) Submittals: Submit 2 copies of each required submittal; submit 4 copies where required for maintenance manuals. The Contracting Officer will retain one, and will return the other marked with action taken and corrections or modifications required.

2) Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

3) Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

4) Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.

5) Do not permit use of unmarked copies of Product Data in connection with construction.

1.8 CONTRACTING OFFICER'S REVIEW:

A. After approving submittals, Contracting Officer will

return Contractor's copies.

B. If submittals are rejected, Contracting Officer will return all copies to Contractor with reasons for rejection. Resubmit, identifying changes.

C. Any work done before approval shall be at Contractor's own risk.

D. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Contracting Officer will review each submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is the Contractor's responsibility.

E. Action Stamp: The Contracting Officer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. Final Unrestricted Release: Where submittals are marked "Reviewed," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.

2. Final-But-Restricted Release: When submittals are marked "Make Corrections Noted," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

3. Returned for Resubmittal: When submittal is marked "Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.

a. Do not permit submittals marked "Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.

4. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Action Not Required".

1.9 WASTE AND RECYCLING PLAN: Before beginning on-site work, submit a list of materials that might be recycled during the course of the contract. This list should name the material, recycling methods, and/or proposed disposal location. This list is for information only. Recycling is strictly voluntary, but highly encouraged. The following is a list of recycling companies and the products they recycle in the immediate vicinity.

1.10 APPROVED EQUALS:

A. For each item proposed as an "approved equal," submit a separate request. With each request submit supporting data, including:

1. Drawings and samples as appropriate.

2. Comparison of the qualities of the proposed item with that specified.

3. Changes required in other elements of the work because of the substitution.

4. Name, address, and telephone number of vendor.

5. Manufacturer's literature regarding installation, operation, and maintenance, including schematics for electrical and hydraulic systems, lubrication requirements, and parts lists. Describe availability of maintenance service, and state source of replacement materials.

B. A request for approval constitutes a representation that Contractor:

1. Has investigated the proposed item and determined that it is equal or superior in all respects to that specified.

2. Will provide the same warranties for the proposed item as for the item specified.

3. Has determined that the proposed item is compatible with interfacing items.

4. Will coordinate the installation of an approved item and make all changes required in other elements of the work because of the substitution.

5. Waives all claims for additional expenses that may be incurred as a result of the substitution.

C. New Construction Materials: The Contractor is encouraged

to submit for approval products made out of recycled or environmentally responsible material. Every effort will be made by the NPS to approve these materials.

1.11 MANUFACTURER'S INSTALLATION INSTRUCTIONS: When contract documents require compliance with manufacturer's printed instructions, provide one complete set of instructions for Contracting Officer and keep another complete set of instructions at the project site until substantial completion.

PART 2 : PRODUCTS (Not Applicable).

PART 3 : EXECUTION (Not Applicable).

END OF SECTION 01300

PART 1 : GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

A. General: This Section specifies administrative and procedural requirements for construction photographs.

1.3 SUBMITTALS:

A. General: Refer to Division-1 Section "Submittals" for general requirements for submitting photographs.

B. Prints: Submit 3 prints of each view directly to the Contracting within 5 days of taking photographs. The Contracting Officer will distribute prints as follows:

1. One print to the Contractor shall be retained in the field office at the Project site and available at all times for reference.

2. One print to the Contracting Officer as the Government's permanent record.

3. One print shall be retained in the Contracting Officer's files.

C. Extra Prints: When requested by the Contracting Officer, the photographer shall submit extra prints of photographs, with distribution directly to designated parties who will the costs pay for the extra prints directly to the photographer.

D. Negatives: With each submittal, include photographic negatives, in protective envelopes, identified by date photographs were taken. The negatives shall be ready for transmittal to the Contracting Officer and for the Government's unrestricted use.

E. Negatives: The photographer shall retain photographic negatives 3 years after date of Substantial Completion. During this period, the photographer shall fill orders by the Contracting Officer for extra prints. Extra prints shall be priced at prevailing local commercial prices.

1.4 QUALITY ASSURANCE:

A. Engage a qualified commercial photographer to take photographs during construction.

B. Photographer's Qualifications: Photographer shall be a firm or an individual of established reputation who has been regularly engaged as a professional photographer for not less than 3 years.

C. Costs: The photographer's services will be paid for by the Contractor.

D. Associated Services: Cooperate with the photographer's Work. Provide reasonable auxiliary services as requested, including access and use of temporary facilities including temporary lighting.

PART 2 : PRODUCTS

2.1 PHOTOGRAPHIC COPIES

A. Provide 8" by 10" smooth surface glossy black-and-white prints on single-weight commercial-grade stock, mounted on muslin. Allow a 1" wide margin punched for standard 3-ring binder. Place margin on the left edge for vertical shots and at the top for horizontal shots.

B. Identification: Label each photograph on the front in the bottom margin with project name and date the photograph was taken. On the back of each print provide an applied label or rubber stamped impression with the following information:

1. Name of the Project.
2. Name and address of the photographer.
3. Name of the Contractor.
4. Date the photograph was taken.
5. Provide notation of vantage point marked for location and direction of shot, on a key plan of the site and building, with elevation (story height) noted.

PART 3 : EXECUTION

3.1 PRE-CONSTRUCTION PHOTOGRAPHS:

A. Before starting construction, take photographs of the site and surrounding properties from different points of view as selected by the Contracting Officer.

1. Take photographs in sufficient number to show existing conditions adjacent to the property before starting Work.

2. Take photographs of existing buildings either on or adjoining the property in sufficient detail to record accurately the physical conditions at the start of construction.

3.2 PHOTOGRAPHIC REQUIREMENTS:

A. Take 3 black and white Project photographs at monthly intervals, coinciding with the cutoff date associated with each application for payment. The photographer shall select the vantage points for each shot each month to best show the status of construction and progress since the last photographs were taken.

B. From time to time the Contracting Officer will instruct the photographer as to number and frequency of photographs, and general directions regarding vantage points. The photographer shall select actual vantage points and take black and white photographs to best show status of construction and progress since taking previous photographs.

C. Take 5 black and white photographs in accordance with requirements indicated, to best show the status of construction and progress since taking the previous photographs.

1. Frequency: Take photographs weekly, with timing each month adjusted to coincide with cutoff data associated with each Application for Payment.

2. Vantage Points: Following suggestions by the Contracting Officer and Contractor, the photographer shall select vantage points. During each of the following construction phases take not less than 2 of the required shots from the same vantage point each time to create a time-lapse sequence:

a. Commencement of the Work, through completion of subgrade construction.
b. Above-grade structural framing.
c. Exterior building enclosure.
d. Interior Work, through date of Substantial Completion.

D. Additional Photographs: From time to time the Contracting Officer may issue requests for additional photographs, in addition to periodic photographs specified. Additional photographs will be paid for by Change Order, and are not included in the Contract Sum.

1. The Contracting Officer will give the photographer 3 days notice, where feasible.

2. In emergency situations, the photographer shall take additional photographs within 24 hours of the Contracting Officer's request.

3. Circumstances that could require additional photographs include, but are not limited to:

   a. Substantial Completion of a major phase or component of Work.

   b. Government's request for special publicity photographs.

   c. Special events planned at project site.

   d. Immediate follow-up when on-site events result in construction damage or losses.

   e. Photographs to be taken at fabrication locations away from project site; these are not subject to unit prices or unit- cost allowances.

   f. Extra record photographs at time of final acceptance.

END OF SECTION 01380

PART 1 : GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of 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 quality control services.

B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Copntracting Officer.

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

D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.

2. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.

3. Requirements for the Contractor to provide quality control services required by the Government, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 RESPONSIBILITIES:

A. Contractor Responsibilities: The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Government's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Sum.

1. The Contractor shall employ and pay an independent agency, to perform specified quality control services.

2. Retesting: The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.

   a. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.

3. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:

   a. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.

   b. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.

   c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.

   d. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.

   e. Security and protection of samples and test equipment at the Project site.

B. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Contracting Officer and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.

1. The agency shall notify the Contracting Officer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.

3. The agency shall not perform any duties of the Contractor.

C. Coordination: The Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition the Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.4 SUBMITTALS:

A. The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the Contracting Officer, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

2. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:

a. Date of issue.
b. Project title and number.

c. Name, address and telephone number of testing agency.
d. Dates and locations of samples and tests or inspections.
e. Names of individuals making the inspection or test.
f. Designation of the Work and test method.
g. Identification of product and Specification Section.
h. Complete inspection or test data.
i. Test results and an interpretations of test results.
j. Ambient conditions at the time of sample-taking and testing.
k. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
l. Name and signature of laboratory inspector.
m. Recommendations on retesting.

1.5 QUALITY ASSURANCE:

A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

PART 2 : PRODUCTS (Not Applicable).

PART 3 : EXECUTION

3.1 REPAIR AND PROTECTION:

A. General: Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."

B. Protect construction exposed by or for quality control service activities, and protect repaired construction.

C. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for

inspection, testing or similar services.

END OF SECTION 01400

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 requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.

B. Temporary utilities required include but are not limited to:

1. Water service and distribution.
2. Temporary electric power and light.
3. Telephone service.
4. Storm and sanitary sewer.

C. Temporary construction and support facilities required include but are not limited to:

1. Temporary heat.
2. Field offices and storage sheds.
3. Temporary roads and paving.
4. Sanitary facilities, including drinking water.
5. Dewatering facilities and drains.
6. Temporary enclosures.
7. Hoists and temporary elevator use.
8. Temporary Project identification signs and bulletin boards.
9. Waste disposal services.
10. Scaffolding.
11. Rodent and pest control.
12. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities required include but are not limited to:

1. Temporary fire protection.
2. Barricades, warning signs, lights.
3. Enclosure fence for the site.
4. Environmental protection.

1.3 SUBMITTALS:

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

B. Implementation and Termination Schedule: Submit a schedule indicating implementation and termination of each temporary utility within 15 days of the date established for commencement of the Work.

1.4 QUALITY ASSURANCE:

A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:

1. Building Code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, Fire Department and Rescue Squad rules.
5. Environmental protection regulations.

B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.

2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

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

1.5 PROJECT CONDITIONS:

A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Government, change over from use of temporary service to use of the permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous

or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 : PRODUCTS

2.1 MATERIALS:

A. General: Provide new materials; if acceptable to the Contracting Officer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Lumber and Plywood: Comply with requirements in Division-6 Section "Rough Carpentry."

1. For job-built temporary shops and sheds within the construction area, provide UL labeled, fire treated lumber and plywood for framing, sheathing and siding.

2. For signs and directory boards, provide exterior type, Grade B-B High Density Concrete Form Overlay Plywood conforming to PS-1, of sizes and thickness indicated.

3. For fences and vision barriers, provide material as indicated on the Construction Documents.

4. For safety barriers and similar uses, provide minimum 5/8" thick exterior plywood.

C. Roofing Materials: Provide UL Class "A" standard weight asphalt shingles complying with ASTM D 3018, or UL Class "C" mineral surfaced roll roofing complying with ASTM D 249 on roofs of job- built temporary shops and sheds.

D. Paint: Comply with requirements of Division-9 Section "Finish Painting."

1. For job-built temporary shops, sheds, fences and other exposed lumber and plywood, provide exterior grade acrylic-latex emulsion over exterior primer.

2. For sign panels and applying graphics, provide exterior grade alkyd gloss enamel over exterior primer.

3. For interior walls of temporary offices, provide two coats interior latex flat wall paint.

E. Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride

fire retardant tarpaulins.

F. Water: Provide potable water approved by local health authorities.

2.2 EQUIPMENT:

A. General: Provide new equipment; if acceptable to the Contracting Officer, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.

B. Water Hoses: Provide 3/4" heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose discharge.

C. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.

D. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.

E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.

G. Temporary Offices: The contractor, at his option, may use space in the first floor of Building 33 or 33A for his temporary office. Provide heating and air- conditioning units on foundations adequate for normal loading.

H. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.

I. First Aid Supplies: Comply with governing regulations.

J. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.

1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

K. Scaffolding: Provide scaffolding surrounding the project buildings that meets or exceed the following requirements:

1. Comply with OSHA/Code of Federal Regulations, 1926.451 for Scaffolding.

2. Submit plans for the design of the scaffolding, including arrangement of platforms, bracing, anchoring, and all support. The design and layout work shall be undertaken by a Registered Engineer. Plans for the work will be stamped by the designing engineer.

3. The design engineer for the scaffolding is required to field inspect the installation, and to certify in writing that the installation confroms to the stamped scaffolding plans and to OSHA requirements.

4. The scaffolding may not penetrate the buildings or be attached into the existing building materials. The design of the scaffolding system must be self-supporting. Anchoring points at the ground must not penetrate or damage existing street paving, curb stones, or sidewalks along Shenandoah Street.

5. Scaffolding must include the following safety features in order to protect the Public and the quality of the environment throughout the Lower Town of Harpers Ferry:

a. Tarpaulin covers on all facades of the scaffolding to contain dust, debris, demolition materials.

b. Catch basins: under building eaves, soffits, or cornices provide planking to catch falling objects from the roof work. Protect the building, the public, and the workmen below.

c. Guardrails: in addition to metal cross bars

and metal rails, additional 2x4 wood rails at 42" high and at 21" high shall be provided.

d. Toeboards: 2x6 wood toeboards installed on all open sides and ends at all levels.

e. Wire mesh screens: attach to all guardrails to prevent material falling from scaffolding.

f. Plywood shields: at top guardrails at roof levels, provide 2' high shield to prevent roof and chimney material from sliding off.

g. Base protection: provide plywood and timber shims at base anchoring locations in order to protect existing landscaping and paving materials.

PART 3 : EXECUTION

3.1 INSTALLATION:

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the 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. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.

3. Obtain easements to bring temporary utilities to the site, where the Government's easements cannot be used for that purpose.

4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Government, and will not be accepted as a basis of claims for a Change Order.

B. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

1. Sterilization: Sterilize temporary water piping prior to use.

C. Temporary 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 disconnects, automatic ground-fault interrupters and main distribution switch gear.

1. Except where overhead service must be used, install electric power service underground.

2. Power Distribution System: Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

D. Temporary Lighting: Throughout all interior spaces covered by the Work, provide temporary lighting with local switching.

1. Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions.

E. Temporary Telephones: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period. Install telephone on a separate line for each temporary office and first aid station. Where an office has more than two occupants, install a telephone for each additional occupant or pair of occupants.

1. At each telephone, post a list of important telephone numbers.

F. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or

cannot be used, provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.

1. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.

2. Connect temporary sewers to the municipal system as directed by the sewer department officials.

3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.

G. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

3.3 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION:

A. Locate storage sheds, sanitary facilities and other temporary construction and support facilities for easy access.

1. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Government.

B. Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

C. Heating Facilities: Except where use of the permanent system is authorized, provide vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.

D. Field Offices: Provide temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Relocate the office as necessary to continue with the progress of the Work. Furnish and equip offices as follows:

1. Furnish with a desk and chairs, a 4-drawer file cabinet, plan table and plan rack and a 6-shelf bookcase.

2. Equip with a water cooler and private toilet complete with water closet, lavatory and mirror-medicine cabinet unit.

E. Storage and Fabrication Sheds: Install storage and fabrication sheds, sized, furnished and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site.

F. Temporary Vehicle Access: Construct and maintain temporary roadways to adequately support the required delivery loadings and to protect the existing site conditions during the construction period. Review proposed modifications to existing pathways and site conditions with the and Government. Protect subsurface archeological components.

1. Protection: [to be developed].

2. Coordinate temporary roadway development and final location with the Government.

3. Install temporary protection material to minimize the need to rework the installations and to minimize damage or deterioration to adjacent or subsurface conditions.

4. Delay removal of protection until immediately before Substantial Completion. Coordinate with weather conditions to avoid unsatisfactory results.

5. After removal of temporary protection, return all surfaces in and around the construction area to pre-construction conditions, or to conditions as called for in the Construction Documents.

G. Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the

Project's needs.

1. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.

H. Toilets: Use of the Government's existing toilet facilities in the first floor of Building 33 will be permitted, so long as facilities are cleaned and maintained in a condition acceptable to the Government. After demolition of these facilities, the Contractor must provide temporary toilet facilities elsewhere. Use of the new toilet facilities will not be permitted.

I. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.

J. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

K. Drinking Water Fixtures: Provide drinking water fountains where indicated, including paper supply.

1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F (7 to 13 deg C).

L. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division-2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations and construction free of water.

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

1. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.

2. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed

construction.

3. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL-labeled fire-retardant treated material for framing and main sheathing.

N. Temporary Elevator Use: Refer to Division-14 "Elevator" Sections.

O. Project Identification and Temporary Signs: Prepare project identification and other signs of the size indicated; install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative treated wood or steel. Do not permit installation of unauthorized signs. Obtain prior authorization from the Government for installation of any project signs. The Government reserves the right to install additional project signs which it may have fabricated.

1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.

2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

P. Temporary Exterior Lighting: Install exterior yard and sign lights so that signs are visible when Work is being performed.

Q. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

1. Limit dumpster locations to areas not visible from Shenandoah or Market Streets. Coordinate delivery and removal of dumpsters.

2. Limit location of demolition trash chutes to areas not visible from Shenandoah or Market Streets.

R. Rodent and Pest Control: Before deep foundation Work has been completed, retain a local exterminator or pest

control company to recommend practices to minimize attraction and harboring of rodents, roaches and other pests. Employ this service to perform extermination and control procedures at regular intervals so the Project will be relatively free of pests and their residues at Substantial Completion. Perform control operations in a lawful manner using environmentally safe materials.

S. Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION:

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Contracting Officer.

B. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but 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 fighting fires. Prohibit smoking in hazardous fire exposure areas.

4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

C. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

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

E. Enclosure Fence: When Work begins, install an enclosure fence with lockable entrance gates. Locate where indicated to accommodate construction operations. Install in a manner that will prevent people, dogs and other animals from easily entering the site, except by the entrance gates. Refer to Contract Documents for design.

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

1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

G. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.5 OPERATION, TERMINATION AND REMOVAL:

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

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24-hour day basis where required to achieve indicated results and to avoid possibility of

damage.

2. Protection: Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the Contracting Officer requests that it be maintained longer, remove each temporary facility when the need has ended, or when 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 the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of the Contractor. The Government reserves the right to take possession of Project identification signs.

2. Remove temporary paving that is not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances which might impair growth of plant materials or lawns. Replace in kind street paving, curbs and sidewalks at the temporary entrances if damaged. Existing materials are special constructions and localized patching will not be acceptable repair.

3. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:

a. Replace air filters and clean inside of ductwork and housings.

b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.

c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION 01500

PART 1: GENERAL

1.1 DESCRIPTION: The work of this Section consists of:

A. Inventory and document trees to be protected.
B. Install required protective fencing and signage.
C. Construction prune and clean existing trees to be protected.
D. Remove protective fencing and signage.

1.2 RELATED SECTIONS:

A. Section 02072 - Site Demolition
B. Section 02923 - Landscape Grading
C. Section 02931 - Seeding

1.3 REFERENCES:

A. National Arborist Association Book of Standards, most recent edition.

1.4 SUBMITTALS:

A. Submit under Provisions of Section 01300.

B. Inventory and Documentation

1. A licensed arborist shall inventory and assess trees within and 30 feet outside of the contract limit line. Identify all trees with a durable identification tag imprinted with a number. The identification numbers shall correspond to a written Tree Inventory which shall include the following information for each tree:
   a. Species.
   b. Size.
   c. Tree condition or health.
   d. Recommended action for each tree. (Prune, root prune, construction prune, deep root fertilization, deeproot watering, cable, lightning protection, etc.)
2. Submit Tree Inventory document to the Government at least 10 working days prior to the anticipated start of site work. The Government shall approve the Tree Inventory prior to the start of any site work.

1.5 SEQUENCING AND SCHEDULING:

A. Fertilization: March thru May or as approved by the Government.

B. Root Pruning: Immediately before start of construction, only as required.

C. Understory Cleaning: Perform work when ground is dry, firm and not as prone to compaction.

1.6 MAINTENANCE SERVICE:

A. Maintenance Services: Performed by licensed arborist for the first year after final completion of all site construction.

B. Maintenance Period: Begin maintenance immediately upon start of construction. Continue maintenance until one year after final completion of all site construction.

C. Maintenance to include:

1. Monthly review and monitoring of tree conditions.
2. Maintaining guying and lightening protection. Repair or replace when required.
3. Apply pesticides only as needed.
4. Water at a sufficient frequency to saturate root system and keep soil moist.
5. Pruning, including removal of dead or broken branches, and treatment of pruned areas or other wounds.
6. Disease control.

D. Protect planting areas and plants at all times against damage of any kind for the duration of the maintenance. If any plants become damaged or injured, they shall be treated or replaced as directed by the Government at no additional cost to the Government. The Contractor shall not be responsible for acts of vandalism during the maintenance and guarantee period.

1. Root zone fertilize all trees affected by construction. The first root zone fertilization shall occur within 6 months after completion of site construction and the second within 12 months. Use a liquid application with an 18 inch soil probe. Fertilization mix shall be submitted to the Government for acceptance prior to application.

E. Apply pesticides in accordance with manufacturers instructions. Remedy damage resulting from improper use of pesticides.

F. All trees shall be in satisfactory and acceptable condition during and at the end of the Maintenance Period. Trees with abrasions of the bark, sunscalds, disfiguring knots, or fresh cuts of limbs which do not show signs of healing will be rejected.

G. Maintenance reports, including date and detailed summary of work completed on site, will be provided to the Government after each maintenance visit.

H. The Contractor shall prepare within 10 days of the initial acceptance or inspection, a maintenance manual for use by the Government after the maintenance period expires.

PART 2: PRODUCTS

2.1 PROTECTIVE FENCE:

A. Fencing: 48" orange plastic web fencing.

B. Metal Fenceposts: 4' exposed height.

2.2 SILTATION CONTROL FENCE:

A. Fencing: 30" height. Siltation fencing complying to local codes.

2.3 SIGNAGE:

A. Material: Durable, weatherproof.

B. Size: 11" x 17"

C. Color: Sign color - other than white, to be easily seen. Letter color - black.

D. Message: Sign shall read 'PRESERVATION AREA'. Lettering shall be block letters minimum 2½" height.

PART 3: EXECUTION

3.1 PREPARATION:

A. Verify all utility locations in the field before digging.

B. Protective Fencing:

1. Stake proposed protective fencing location. The Government shall approve the location of the protective fencing staking prior to installation of the fencing.
2. Protect all Preservation Areas with fencing supported by metal stakes. Locate fence as shown on the plan. Install fence in an upright position and maintain intact until all construction activity is complete.
3. The Government shall approve protective fencing installation prior to the start of any site work.

C. Signs:

1. Affix 'PRESERVATION AREA' signs to the protective fencing. Signs shall be clearly visible from all angles on the construction site. Post a minimum of two (2) signs for each Tree Preservation Area. Post signs no

further than 150' apart along protective fencing at the site perimeter.

3.2 APPLICATION:

A. Traffic:

1. Prohibit parking, construction equipment, building supply or material storage, trash disposal, foot traffic and vehicular traffic in the Preservation Areas.

B. Work Within and in Close Proximity to Tree Preservation Areas:

1. Root Pruning:
   a. Stake the limit of root pruning as recommended by the arborist. The Government shall approve limits of root pruning prior to the start of trenching in the field.
   b. Root prune prior to the start of adjacent excavation. Trench to a minimum depth of 24" inches or the depth of excavation which ever is greater.
2. Limit fill to that shown on the plans. Deposit and spread specified fill in Tree Preservation Areas by hand. All backfill shall conform to Section 02923 - Landscape Grading.
3. Siltation Control:
   a. Stake limit of silt control fencing as recommended by the arborist. The Government shall approve limits of silt control fencing prior to the start of any clearing and construction.
   b. Provide siltation control at Tree Preservation Areas by attaching silt fence to the uphill side of the protective fencing. Place lower 6" of silt fence in trench below grade. Backfill trench.
   c. Maintain positive drainage from Tree Preservation Areas. Divert runoff from site around Tree Preservation Areas.
4. Remove and dispose of all debris from the site.

C. Concrete Washout:

1. Provide concrete washout in areas which drain away from the Tree Preservation Areas. The Government shall approve concrete washout area prior to the start of any site work.

D. Burning:

1. No burning of materials shall be allowed on site.

E. Understory Cleaning Within Tree Preservation Areas:

1. Unless otherwise shown on the plans, the ground surface

within Tree Preservation Areas shall be left or if necessary returned to the pre-construction condition.
   a. Remove all vines from trees and on building as shown.
   b. Remove additional materials as directed by the Government.
   c. Remove and dispose of all debris from the site.
2. Seed disturbed turf area ground surface in accordance with Section 02931 Seeding.

F. Existing Tree Fertilizing, Watering and Maintenance.

1. Continuously maintain all existing trees from the start of site work through project completion.
2. A licensed arborist shall perform crown reduction pruning as required prior to root pruning of all trees. Construction prune all trees requiring root pruning within the Tree Preservation Areas in accordance with the N.A.A. Class I, Fine Pruning Standard for shade trees.
3. A licensed arborist shall prune all trees indicated by the Government within the Tree Preservation Areas in accordance with the N.A.A. Class I, Fine Pruning Standard for shade trees.
4. A licensed arborist shall remove all vines from the existing trees and building.
5. A licensed arborist shall deep root fertilize and water all trees which required root pruning or have suffered from construction impact. Inject deep root fertilization under pressure to help reduce soil compaction and restore air spaces lost by compaction. The arborist shall use discretion as some stressed trees may not respond well to immediate post-construction fertilization.
6. Water during periods of subnormal rainfall at a rate equivalent to 1 inch per week.
7. Remove damaged bark by cutting the bark back to healthy tissue with a sharp knife, tracing the outline of the wound.
8. Remove and dispose of all debris from the site.

G. Provide sheeting and shoring to stabilize vertical excavations where necessary to preserve existing trees. All work must comply with local safety codes.

3.3 FIELD QUALITY CONTROL:

A. Contractor's Penalty for Negligence

1. The Government shall monitor the construction site. If, in their opinion, the Contractor is exercising procedures that are determined to be detrimental to the trees and site elements that are to be preserved, the Government shall issue a "STOP WORK ORDER".
2. If, in the opinion of the Government, the Contractor has

damaged a tree beyond repair, the Contractor shall be required to reimburse the Government at a rate of $400.00 per caliper inch for each tree that is damaged or destroyed due to the Contractor's negligent operations. The Contractor shall be responsible for the cost of remedial maintenance of or removal of any damaged tree and repair or replacement of protected site elements at no additional cost to the Government.

3. Activities which are detrimental to existing trees include, but are not limited to the following:
   a. Placing backfill in protected areas where not indicated by the grading plan.
   b. Driving construction equipment into or through protected areas.
   c. Burning in or in close proximity to protected areas.
   d. Stacking or storing supplies in protected areas.
   e. Changing site grades which cause drainage to flow into, or to collect in protected areas.
   f. Conducting trenching operations in the vicinity of trees.
   g. Grading in the vicinity of trees.
   h. Pedestrian traffic in or through protected areas.
   i. Physical damage to a tree.
4. The Contractor shall reimburse the Government at a rate of $100.00 per linear foot per day for any damaged or non-functioning protection fencing or siltation control fencing. The Contractor shall be responsible for the cost of remedial maintenance, fencing repair, and return of damaged area to pre-existing condition.

3.4 ADJUSTING:

A. Preservation Area Access:

1. In Preservation Areas where construction traffic is unavoidable as concurred by the Government, the following procedure shall be followed:
   a. Obtain approval from the Government for Preservation Area access.
   b. Install protective fencing by hand to delineate the construction corridor. Fencing location must be approved on site by the Government prior to start of work in Preservation Area.
   c. Remove all materials and return area to pre-construction condition within one week of the work.

3.5 POST-CONSTRUCTION CLEANING:

A. Remove protective fencing, debris and all surplus construction materials from site following construction, in a manner that will not damage Preservation Areas. Re-seed or refurbish all disturbed ground areas as soon as possible.

END

PART 1 : GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of 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 governing the Contractor's selection of products for use in the Project.

B. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section 01500 - Submittals.

C. Standards: Refer to Section 01095 - REFERENCE STANDARDS AND DEFINITIONS for applicability of industry standards to products specified.

D. Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section 01300 - SUBMITTALS.

1.3 DEFINITIONS:

A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in the construction industry.

1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

a. "Named Products" are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.

b. "Foreign Products", as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value)

outside of the United States and its possessions; or produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens of nor living within the United States and its possessions.

2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

1.4 SUBMITTALS:

A. Product List Schedule: A list of products required is included at the end of this Section. Prepare a schedule in tabular form showing each product listed. Include the manufacturer's name and proprietary product names for each item listed.

B. Product List Schedule: Prepare a schedule showing products specified in a tabular form acceptable to the Contracting Officer. Include generic names of products required. Include the manufacturer's name and proprietary product names for each item listed.

1. Coordinate the product list schedule with the Contractor's Construction Schedule and the Schedule of Submittals.

2. Form: Prepare the product listing schedule with information on each item tabulated under the following column headings:

a. Related Specification Section number.
b. Generic name used in Contract Documents.
c. Proprietary name, model number and similar designations.
d. Manufacturer's and name and address.
e. Supplier's name and address.
f. Installer's name and address.
g. Projected delivery date, or time span of delivery period.

3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of an initial product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.

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

4. Completed Schedule: Within 60 days after date of commencement of the Work, submit 3 copies of the completed product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.

5. Contracting Officer's Action: The Contracting Officer will respond in writing to the Contractor within 30 days of receipt of the completed product list schedule. No response within this time period constitutes no objection to listed manufacturers or products, but does not constitute a waiver of the requirement that products comply with Contract Documents. The Contracting Officer's response will include the following:

a. A list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.5 QUALITY ASSURANCE:

A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.

1. When specified products are available only from sources that do not or cannot produce a quantity adequate to complete project requirements in a timely manner, consult with the Contracting Officer for a determination of the most important product qualities before proceeding. Qualities may include attributes relating to visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources that produce products that possess these qualities, to the fullest extent possible.

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

C. Foreign Product Limitations: Except under one or more of the following conditions, provide domestic products, not foreign products, for inclusion in the Work:

1. No available domestic product complies with the

Contract Documents.

2. Domestic products that comply with Contract Document are only available at prices or terms that are substantially higher than foreign products that also comply with the Contract Documents.

D. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.

2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:

a. Name of product and manufacturer.
b. Model and serial number.
c. Capacity.
d. Speed.
e. Ratings.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.

1. Schedule delivery to minimize long-term storage at the 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 the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.

4. Inspect products upon delivery to ensure compliance

with the Contract Documents, and to ensure that products are undamaged and properly protected.

5. Store materials in accordance with manufacturer's instructions, with seals and labels accessible for inspection.

   a. Interior Storage: Maintain temperature and humidity within the ranges required by manufacturer's instructions.

   b. Exterior Storage:

      1) Store products subject to damage by the elements in weathertight enclosures.

      2) Store fabricated products above the ground, on blocking or skids; prevent soiling or staining. Cover products subject to damage or deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

      3) Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

   c. Protection After Installation: Provide adequate coverings as necessary to protect installed materials from damage resulting from natural elements, traffic, and subsequent construction. Remove when no longer needed.

6. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.

7. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.

8. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

9. Arrange deliveries of materials in accordance with construction schedules; coordinate to avoid conflict with work and conditions at the site.

10. Contractor is encouraged to obtain materials in biodegradable or recyclable/ reusable packaging which

uses the minimum amount of packaging possible.

PART 2 : PRODUCTS

2.1 PRODUCT SELECTION:

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

1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

B. Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include the following:

1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.

2. Semi-proprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.

3. Where products or manufacturers are specified by name, accompanied by the term "or equal," or "or approved equal" comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.

4. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.

5. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.

6. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.

   a. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.

7. Compliance with Standards, Codes and Regulations: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.

8. Visual Matching: Where Specifications require matching an established Sample, the Contracting Officer's decision will be final on whether a proposed product matches satisfactorily.

   a. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for noncompliance with specified requirements.

9. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Contracting Officer will select the color, pattern and texture from the product line selected.

PART 3 : EXECUTION

3.1 INSTALLATION OF PRODUCTS::

A. Comply with manufacturer's instructions and recommendations for installation of products in the

applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600

PART 1 : GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY: The work of this section consists of demonstrating system and equipment to operating personnel. It also includes training of personnel.

A. Schedule demonstrations and training periods with Contracting Officer.

PART 2 : PRODUCTS (Not Applicable).

PART 3 : EXECUTION

3.1 INSTRUCTION TO GOVERNMENT PERSONNEL: As specified in individual sections, furnish the services of instructors to train designated personnel in adjustment, operation, maintenance, and safety requirements of equipment and systems. Instructors shall be thoroughly familiar with the equipment and systems and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given after the equipment or system has been accepted and turned over to the Government. The duration of instruction shall be as specified in individual sections. When more than 4 days of instruction are specified, approximately one-half of the time shall be used for classroom instructions. All other time shall be used for instruction with the equipment or system. Use Operating and Maintenance Data as a training guide.

END OF SECTION 01670

PART 1 : GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of 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 project closeout, including but not limited to:

1. Inspection procedures.
2. Project record document submittal.
3. Operating and maintenance manual submittal.
4. Submittal of warranties.
5. Final cleaning.
6. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions-2 through -16.

1.3 CLOSEOUT SUBMITTALS:

A. Closeout Submittals: Submit before final inspection request.

B. Project Record Drawings: As specified below.

C. Guarantees and Bonds: As specified in individual sections.

D. Spare Parts and Materials: As specified in individual sections.

E. Operation and Maintenance Data: As specified in Section 01730.

a. Maintenance manuals.
b. Maintenance agreements and similar continuing commitments.
c. Warranties and bonds.
d. Record documents.
e. Wiring diagrams
f. Manufacturers' model numbers
g. Name, address, and telephone number of local representative
h. Basic operational features
i. Schedule of maintenance work

j. Replacement parts lists
k. Spare parts and materials.
l. Tools.
m. Lubricants.
n. Fuels.
o. Identification systems.
p. Control sequences.
q. Hazards.
r. Emergency procedures
s. Starting, operating, and shut-down procedures
t. Seasonal shut-down procedures
u. Cleaning agents and methods
v. Color and texture designations

F. Demonstration: As part of instruction for operating equipment, demonstrate the following procedures:

1. Start-up.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

G. Keys and Keying Schedule: Submit all keys including duplicates. Wire all keys for each lock securely together. Tag and plainly mark with lock number, equipment identification, or panel or switch number, and indicate location, such as building and room name or number.

H. Operating Tools: As specified in the individual sections.

I. Special Tools: One set of special tools required to operate, adjust, dismantle, or repair equipment. Special tools are those not normally found in possession of mechanics or maintenance personnel.

PART 2 : PRODUCTS

2.1 CLEANING MATERIALS: As recommended by the manufacturer of surface to be cleaned.

PART 3 : EXECUTION

3.1 RECORD DOCUMENTS:

A. Keep record drawings current. Inspection will be made monthly. Certification of accuracy and completeness will be required on monthly payment requisitions. Project record drawings are the property of the Government and shall be delivered to the Contracting Officer before

closeout.

B. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Contracting Officer's reference during normal working hours.

C. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

2. Mark new information that is important to the Government, but was not shown on Contract Drawings or Shop Drawings.

3. Note related Change Order numbers where applicable.

4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

D. Preparation of Record Drawing Submittal: At the completion of work, using colored ink, make changes on a set of clean prints of original tracings permanent. Show all changes and revisions to the original design that affect the permanent structures and will exist in the completed work. Reference underground utilities to semipermanent or permanent physical objects. Reference water, sewer, telephone, and electric lines to corners of buildings. Include schematic diagrams showing terminal numbers for all electrical equipment.

E. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and

similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the Contracting Officer for the Government's records.

F. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

1. Upon completion of mark-up, submit complete set of record Product Data to the Contracting Officer for the Government's records.

G. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Contracting Officer to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Contracting Officer for record purposes. Comply with delivery to the Contracting Officer's Sample storage area.

H. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Contracting Officer for the Government's records.

I. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:

1. Operation and Maintenance Data: Provide four complete sets of the following data. Data shall be on 8-1/2-inch by 11-inch sheets or manufacturers'

standard catalogs, suitable for side binding.

2. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Government's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

   a. Emergency instructions.
   b. Spare parts list.
   c. Copies of warranties.
   d. Wiring diagrams.
   e. Recommended "turn around" cycles.
   f. Inspection procedures.
   g. Shop Drawings and Product Data.
   h. Fixture lamping schedule.

3.2 OPERATING INSTRUCTIONS:

A. Post Operating Instructions: Frame instructions with non-glare glass or approved laminated plastic. In areas where operating instructions are subject to sunlight or moisture, provide weather-resisting materials.

B. Operating Instructions: As specified in the individual sections. Furnish operating instructions attached to or posted adjacent to equipment. Include wiring diagrams, control diagrams, control sequence, start-up, adjustment, operation, lubrication, shut-down, safety precautions, procedures in the event of equipment failure, and other items of instruction recommended by the manufacturer.

3.3 FINAL CLEANING

A. General cleaning during construction is required by the General Conditions and included in Section 01500 - TEMPORARY FACILITIES.

B. General: Remove all tools, equipment, surplus materials, and rubbish. Restore or refinish surfaces of existing facilities that are marred, scratched, or damaged due to the work of this contract to match original condition. Remove grease, dirt, stains, foreign materials, and labels from interior and exterior finished surfaces. Vacuum clean interior building areas. Do any required waxing and polishing. Sweep paved areas; rake grounds. At time of final inspection, project shall be thoroughly clean and ready for use.

C. Cleaning: Employ experienced workers or professional

cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

   a. Remove labels that are not permanent labels.

   b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

   c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

   d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

   e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

D. Pest Control: Engage an experienced exterminator to make a final inspection, and rid the Project of rodents, insects and other pests.

E. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

F. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Government's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose

of in a lawful manner.

1. Where extra materials of value remaining after completion of associated Work have become the Government's property, arrange for disposition of these materials as directed.

3.4 SUBSTANTIAL COMPLETION:

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.

   a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

2. Advise Contracting Officer of pending insurance change-over requirements.

3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.

4. Obtain and submit releases enabling the Government unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.

5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.

6. Deliver tools, spare parts, extra stock, and similar items.

7. Make final change-over of permanent locks and transmit keys to the Government. Advise the Contracting Officer's personnel of change-over in security provisions.

8. Complete start-up testing of systems, and instruction

of the Government's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

9. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. Submit written certification that project, or designated portion of project, is Substantially Complete, and request in writing a final inspection. Contracting Officer will make an inspection within 10 days of receipt of request.

C. When Contracting Officer determines that the work is substantially complete, he will prepare a list of deficiencies to be corrected before final acceptance and issue a Letter of Substantial Completion.

D. If Contracting Officer determines that the work is not substantially complete, he will immediately notify Contractor in writing, stating reasons. After completing work, Contractor shall resubmit certification and request a new final inspection.

E. Inspection Procedures: On receipt of a request for inspection, the Contracting Officer will either proceed with inspection or advise the Contractor of unfilled requirements. The Contracting Officer will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Contracting Officer will repeat inspection when requested and assured that the Work has been substantially completed.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

3.5 FINAL ACCEPTANCE:

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

3. Submit a certified copy of the Contracting Officer's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Contracting Officer.

4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Government took possession of and responsibility for corresponding elements of the Work.

5. Submit consent of surety to final payment.

6. Submit a final liquidated damages settlement statement.

7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure: The Contracting Officer will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Contracting Officer.

1. Upon completion of reinspection, the Contracting Officer will prepare a certificate of final acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

2. If necessary, reinspection will be repeated.

C. Acceptance of the Work: After all deficiencies have been corrected, a Letter of Acceptance will be issued.

3.6 POST-CONSTRUCTION INSPECTION:

A. Before expiration of warranty period, Contracting Officer will inspect project and notify Contractor in writing of all deficiencies. Make all corrections of deficiencies noted to the satisfaction of the Contracting Officer.

END OF SECTION 01700

PART 1 : GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

A. This Section specifies administrative and procedural requirements for operating and maintenance manuals including the following:

1. Preparation and submittal of operating and maintenance manuals for building operating systems or equipment.

2. Preparation and submittal of instruction manuals covering the care, preservation and maintenance of architectural products and finishes.

3. Instruction of the Government's operating personnel in operation and maintenance of building systems and equipment.

B. Special operating and maintenance data requirements for specific pieces of equipment or building operating systems are included in the appropriate Sections of Divisions-2 through -16.

C. Preparation of Shop Drawings and Product Data are included in Section "Submittals."

D. General closeout requirements are included in Section "Project Closeout."

E. General requirements for submittal of Project Record Documents are included in Section "Project Closeout."

1.3 QUALITY ASSURANCE:

A. Maintenance Manual Preparation: In preparation of Maintenance Manuals, use personnel thoroughly trained and experienced in operation and maintenance of the equipment or system involved.

1. Where written instructions are required, use personnel skilled in technical writing to the extent necessary for communication of essential data.

2. Where Drawings or diagrams are required, use draftsmen capable of preparing Drawings clearly in an understandable format.

B. Instructions for the Government's Personnel: For instruction of the Government's operating and maintenance personnel, use experienced instructors thoroughly trained and experienced in the operation and maintenance of the building equipment or system involved.

1.4 SUBMITTALS:

A. Submittal Schedule: Comply with the following schedule for submittal of operating and maintenance manuals.

1. Before Substantial Completion, when each installation that requires submittal of operating and maintenance manuals is nominally complete, submit two draft copies of each manual to the Contracting Officer for review. Include a complete index or table of contents of each manual.

a. The Contracting Officer will return one copy of the draft with comments within fifteen days of receipt.

2. Submit one copy of data in final form at least fifteen days before final inspection. This copy will be returned within 30 days after final inspection, with comments.

3. After final inspection make corrections or modifications to comply with the Contracting Officer's comments. Submit the specified number of copies of each approved manual to the Contracting Officer within fifteen days of receipt of the Contracting Officer's comments.

B. Form of Submittal: Prepare operating and maintenance manuals in the form of an instructional manual for use by the Government's operating personnel. Organize into suitable sets of manageable size. Where possible, assemble instructions for similar equipment into a single binder.

1. Binders: For each manual, provide heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, in thickness necessary to accommodate contents, sized to receive 8-1/2" by 11" paper. Provide a clear plastic sleeve on the spine, to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.

a. Where two or more binders are necessary to accommodate data, correlate data in each binder into related groupings in accordance with the Project Manual table of contents. Cross-reference other binders where necessary to provide essential information for proper operation or maintenance of the piece of equipment or system.

b. Identify each binder on the front and spine, with the typed or printed title "OPERATION AND MAINTENANCE MANUAL", Project title or name, and subject matter covered. Indicate the volume number for multiple volume sets of manuals.

2. Dividers: Provide heavy paper dividers with celluloid covered tabs for each separate Section. Mark each tab to indicate contents. Provide a typed description of the product and major parts of equipment included in the Section on each divider.

3. Protective Plastic Jackets: Provide protective transparent plastic jackets designed to enclose diagnostic software for computerized electronic equipment.

4. Text Material: Where written material is required as part of the manual use the manufacturer's standard printed material, or if it is not available, specially prepared data, neatly typewritten, on 8-1/2" by 11", 20 pound white bond paper.

5. Drawings: Where drawings or diagrams are required as part of the manual, provide reinforced punched binder tabs on the drawings and bind in with the text.

   a. Where oversize drawings are necessary, fold the drawings to the same size as the text pages and use as a fold-out.

   b. If drawings are too large to be used practically as a fold- out, place the drawing, neatly folded, in the front or rear pocket of the binder. Insert a typewritten page indicating the drawing title, description of contents and drawing location at the appropriate location in the manual.

1.5 MANUAL CONTENT:

A. Cover: Provide typed or printed label identifying binder as operating and maintenance data. List title of project, contract number, and location of equipment.

B. Text: Furnish manufacturer's printed data or sheets neatly typewritten on 8-1/2-inch by 11-inch, 20-pound minimum white paper. Provide indexed tabs.

C. Drawings: Bind in with text. Provide reinforcement rings. Fold larger drawings to the size of the text pages.

D. Summary: Prepare a summary for each binder. Include the following:

1. Table of contents.

2. Description of products or major component parts.

3. A list giving, as appropriate, the name, address, and telephone number of:

a. Contractor, including responsible principal.

b. Subcontractor or installer.

c. Maintenance contractor.

d. Nearest source of supply for parts.

e. Nearest manufacturer's representative.

f. Nearest service organization.

E. Data:

1. Include only those sheets pertinent to the specific product, equipment, or system.

2. Annotate each sheet to identify clearly the specific product or part installed. Delete references to inapplicable information.

F. Written Text to Supplement Data:

1. Organize in a consistent format.

2. Provide a logical sequence of instructions.

G. Drawings:

1. Supplement product data with drawings showing the relationship of component parts of equipment and systems.

2. Coordinate drawings with information in project record drawings to ensure correct illustration of

completed installation.

H. Warranties, Bonds, and Service Contracts: Provide a copy of each and the following information.

1. Procedures in the event of failure.

2. Circumstances that might affect the validity of warranties, bonds, or service contracts.

I. In each manual include information specified in the individual Specification Section, and the following information for each major component of building equipment and its controls:

1. General system or equipment description.
2. Design factors and assumptions.
3. Copies of applicable Shop Drawings and Product Data.
4. System or equipment identification, including:
   a. Name of manufacturer.
   b. Model number.
   c. Serial number of each component.
5. Operating instructions.
6. Emergency instructions.
7. Wiring diagrams.
8. Inspection and test procedures.
9. Maintenance procedures and schedules.
10. Precautions against improper use and maintenance.
11. Copies of warranties.
12. Repair instructions including spare parts listing.
13. Sources of required maintenance materials and related services.
14. Manual Index.

J. Organize each manual into separate Sections for each piece of related equipment. As a minimum each manual shall contain a title page, a table of contents, copies of Product Data, supplemented by drawings and written text, and copies of each warranty, bond and service Contract issued.

1. Title Page: Provide a title page in a transparent plastic envelope as the first sheet of each manual. Provide the following information:

   a. Subject matter covered by the manual.
   b. Name and address of the Project.
   c. Date of submittal.
   d. Name, address, and telephone number of the Contractor.
   e. Cross reference to related systems in other operating and maintenance manuals.

2. Table of Contents: After the Title Page, include a typewritten table of contents for each volume, arranged systematically according to the Project Manual format. Include a list of each product included, identified by product name or other appropriate identifying symbol and indexed to the content of the volume.

   a. Where more than one volume is required to accommodate data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.

3. General Information: Provide a general information Section immediately following the Table of Contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the Subcontractor or installer, and the maintenance contractor. Clearly delineate the extent of responsibility of each of these entities. In addition, list a local source for replacement parts and equipment.

4. Product Data: Where manufacturer's standard printed data is included in the manuals, include only sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one item in a tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information that is not applicable.

5. Written Text: Where manufacturer's standard printed data is not available, and information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement data included in the manual, prepare written text to provide necessary information. Organize the text in a consistent format under separate headings for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure.

6. Drawings: Provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems, or to provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure

correct illustration of the completed installation.

a. Do not use original Project Record Documents as part of the Operating and Maintenance Manuals.

7. Warranties, Bonds and Service Contracts: Provide a copy of each warranty, bond or service contract in the appropriate manual for the information of the Government's operating personnel. Provide written data outlining procedures to be followed in the event of product failure. List circumstances and conditions that would affect validity of the warranty or bond.

1.6 MATERIAL AND FINISHES MAINTENANCE MANUAL:

A. Content: Provide complete information for architectural products, applied materials, and finishes.

1. Manufacturer's data, including catalog number, size, composition, color and texture designations, and information for re-ordering.

2. Instructions for care and maintenance, including manufacturer's recommendations for cleaning agents and methods; cautions against detrimental cleaning agents and methods; and recommended schedule for cleaning and maintenance.

B. Submit three copies of each manual, in final form, on material and finishes to the Contracting Officer for distribution. Provide one section for architectural products, including applied materials and finishes, and a second for products designed for moisture- protection and products exposed to the weather.

1. Refer to individual Specification Sections for additional requirements on care and maintenance of materials and finishes.

C. Architectural Products: Provide manufacturer's data and instructions on care and maintenance of architectural products, including applied materials and finishes.

1. Manufacturer's Data: Provide complete information on architectural products, including the following, as applicable:

a. Manufacturer's catalog number.
b. Size.
c. Material composition.
d. Color.
e. Texture

f. Reordering information for specially manufactured products.

2. Care and Maintenance Instructions: Provide information on care and maintenance, including manufacturer's recommendations for types of cleaning agents to be used and methods of cleaning. Provide information regarding cleaning agents and methods that could prove detrimental to the product. Include manufacturer's recommended schedule for cleaning and maintenance.

D. Moisture-Protection and Weather-Exposed Products: Provide complete manufacturer's data with instructions on inspection, maintenance and repair of products exposed to the weather or designed for moisture-protection purposes.

1. Manufacturer's Data: Provide manufacturer's data giving detailed information, including the following, as applicable:

a. Applicable standards.
b. Chemical composition.
c. Installation details.
d. Inspection procedures.
e. Maintenance information.
f. Repair procedures.

E. Schedule: Provide complete information in the materials and finishes manual on products specified in the following Sections:

Finish Hardware:	Section 08710 - Finish Hardware
Carpet:	Section 09680 - Carpeting

1.7 EQUIPMENT AND SYSTEMS MAINTENANCE MANUAL:

A. Submit 5 copies of complete manual.

B. Content: Provide complete information for each unit of equipment and system, as appropriate.

1. Description of equipment and component parts, including function, normal operating characteristics and limiting conditions, performance curves, engineering data, and tests. Provide a complete description of each unit and related component parts, including the following:

a. Equipment or system function.
b. Operating characteristics.
c. Limiting conditions.

d. Performance curves.
e. Engineering data and tests.
f. Complete nomenclature and number of replacement parts.

2. Operating procedures, including start-up, break-in, routine and special operating instructions; sequences required; regulation, control, stopping, shut-down, and emergency instructions; and seasonal operating and shut-down instructions. Provide information on equipment and system operating procedures, including the following:

a. Start-up procedures.
b. Equipment or system break-in.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Instructions on stopping.
f. Shut-down and emergency instructions.
g. Summer and winter operating instructions.
h. Required sequences for electric or electronic systems.
i. Special operating Instructions.

3. Maintenance procedures, including routine maintenance; guide to troubleshooting; disassembly, repair, and reassembly; alignment, adjusting, and checking; and servicing and lubrication schedule, with list of lubricants by type, grade, and temperature range. Provide information detailing essential maintenance procedures, including the following:

a. Routine operations.
b. Trouble-shooting guide.
c. Disassembly, repair and reassembly
d. Alignment, adjusting and checking.

4. Manufacturer's parts lists, illustrations, assembly drawings and diagrams required for maintenance, including predicted life of parts subject to wear, items to be stocked as spare parts, and current price list.

5. Manufacturer's Information: For each manufacturer of a component part or piece of equipment provide the following:

a. Printed operating and maintenance instructions.
b. Assembly drawings and diagrams required for maintenance.
c. List of items recommended to be stocked as spare parts.

C. Equipment and Systems: Provide the following information for each piece of equipment, each building operating system, and each electric or electronic system.

1. Servicing Schedule: Provide a schedule of routine servicing and lubrication requirements, including a list of required lubricants for equipment with moving parts.

2. Controls: Provide a description of the sequence of operation and as-installed control diagrams by the control manufacturer for systems requiring controls.

3. Coordination Drawings: Provide each Contractor's Coordination Drawings.

   a. Provide as-installed color-coded piping diagrams, where required for identification.

4. Valve Tags: Provide charts of valve tag numbers, with the location and function of each valve.

5. Circuit Directories: For electric and electronic systems, provide complete circuit directories of panelboards, including the following:

   a. Electric service.
   b. Controls.
   c. Communication.

6. As-installed diagrams for piping (including direction of flow), HVAC, and wiring, with designations.

7. Safety precautions.

8. Other data specified in individual sections or that becomes apparent during instruction to Government personnel.

D. Submit six copies of each completed manual on equipment and systems, in final form, to the Contracting Officer for distribution. Provide separate manuals for each unit of equipment, each operating system, and each electric and electronic system.

1. Refer to Specification Sections for additional requirements on operating and maintenance of the various pieces of equipment and operating systems.

E. Schedule: Provide complete information in the equipment and systems manual on products specified in the following Sections:

Pipe Markers:	Section 15190 - Mechanical Identification.
Air-Cooled Condensers:	Section 15670 - Condensing Units.
Chillers:	Section 15685 - Centrifugal Chiller - Water Cooled.
Air-Handling Units:	Section 15855 - Air-Handling Units.
Fans:	Section 16860 - Centrifugal Fans.
Filters:	Section 15885 - Air Cleaning.
Diffusers:	Section 15933 - Air Terminals.
Lighting Fixtures:	Section 16515 - Interior Lighting Fixtures.
Telephones:	Section 16740 - Telephone Systems.

1.8 INSTRUCTIONS OF THE GOVERNMENT'S PERSONNEL:

A. Prior to final inspection, instruct the Government's personnel in operation, adjustment, and maintenance of products, equipment and systems. Provide instruction at mutually agreed upon times.

1. For equipment that requires seasonal operation, provide similar instruction during other seasons.

2. Use operation and maintenance manuals for each piece of equipment or system as the basis of instruction. Review contents in detail to explain all aspects of operation and maintenance.

PART 2 : PRODUCTS

2.1 BINDERS: Commercial quality, hard back, three-ring binders. Maximum ring size shall be 3 inches.

PART 3 : EXECUTION (Not Applicable).

END OF SECTION 01730

specifications, including removal of materials for reuse and incorporation into remodeling or new construction.

2. Relocation of pipes, conduits, ducts, and other mechanical and electrical work is specified in other Divisions.

1.3 SUBMITTALS:

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Schedule indicating proposed sequence of operations for selective demolition work to Contracting Officer for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.

1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Government's on-site operations.

2. Coordinate with Government's continuing occupation of portions of existing building and with Government's partial occupancy of completed new addition.

C. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Contracting Officer prior to start of work.

D. As specified in Section 01300, submit schedule showing sequence of work and methods of demolition. Include schedule for shutting off and capping utilities and re-establishing utility services.

1.4 QUALITY ASSURANCE: Comply with safety requirements for demolition, ANSI A10.6-83.

1.5 SCHEDULING: Complete demolition that might damage new construction before starting new work.

1.6 JOB CONDITIONS:

A. Occupancy: The Government will occupy portions of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Government's normal operations. Provide minimum of 72 hours advance notice to the Contracting Officer of demolition activities

that will affect Government's normal operations.

B. Condition of Structures: The Government assumes no responsibility for actual condition of items or structures to be demolished.

1. Conditions existing at time of inspection for bidding purposes will be maintained by Government insofar as practicable. However, minor variations within structure may occur by Government's removal and salvage operations prior to start of selective demolition work.

C. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.

1. Storage or sale of removed items on site will not be permitted.

D. Protection: Provide temporary barricades and other forms of protection to protect Government's personnel and general public from injury due to selective demolition work.

1. Provide protective measures as required to provide free and safe passage of Government's personnel and general public to occupied portions of building.

2. Ensure safety of persons in demolition area. Provide temporary barricades as required.

3. Provide adequate fire protection. Keep area clear of hazardous substances and debris.

4. Maintain access to exits at all times.

5. Erect temporary covered passageways as required by authorities having jurisdiction.

6. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.

7. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.

8. Protect floors with suitable coverings when necessary.

9. Construct temporary insulated dust-proof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dust-proof doors and security locks.

10. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.

11. Remove protection at completion of work.

12. Keep dust and dirt pollution to a minimum.

E. Damages: Promptly repair damages caused to adjacent facilities by demolition work.

F. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

1. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

G. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.

H. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.

1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

2. Maintain fire protection services during selective demolition operations.

I. Environmental Controls: Use water sprinkling, temporary

enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.

1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 : PRODUCTS (Not Applicable).

PART 3 : EXECUTION

3.1 PREPARATION:

A. General: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain. Protect fixtures and equipment to remain. Protect nearby structures and vegetation as necessary.

1. Cease operations and notify the Contracting Officer immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

2. Cover and protect furniture, equipment, and fixtures from soiling or damage when demolition work is performed in areas where such items have not been removed.

3. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.

a. Where selective demolition occurs immediately adjacent to occupied portions of the building, construct dust-proof partitions of minimum 4-inch studs, 5/8-inch drywall (joints taped) on occupied side, 1/2-inch fire-retardant plywood on demolition side. Fill partition cavity with sound-deadening insulation.

b. Provide weatherproof closures for exterior openings resulting from demolition work.

4. Locate, identify, stub off, cap and disconnect utility services that are not indicated to remain.

a. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to the Contracting Officer if

shutdown of service is necessary during changeover.

3.2 DEMOLITION:

A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.

B. Work systematically from top downward.

C. Demolish concrete and masonry in small sections.

D. Avoid excessive loads on supporting walls, floors, and framing by careful location of equipment and prompt removal of demolished materials.

E. Demolish foundation walls to a depth of not less than 12 inches below existing ground surface. Demolish and remove below grade wood or metal construction. Fill below grade voids as specified in Section 02225.

1. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.

2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.

3. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.

4. Demolish foundation walls to a depth of not less than 12 inches below existing ground surface. Demolish and remove below-grade wood or metal construction. Break up below-grade concrete slabs.

5. For interior slabs on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.

6. Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel, or sand, free of trash and debris, stones over 6 inches in diameter, roots, or other organic matter.

F. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design

are encountered, investigate and measure both nature and extent of the conflict. Submit report to the Contracting Officer in written, accurate detail. Pending receipt of directive from the Contracting Officer, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.3 SALVAGED MATERIALS:

A. Salvaged Items: Where indicated on Drawings as "Salvage - Deliver to the Contracting Officer," carefully remove indicated items, clean, store, and turn over to the Contracting Officer and obtain receipt.

1. Historic artifacts, including cornerstones and their contents, commemorative plaques and tablets, antiques, and other articles of historic significance, remain property of the Government. Notify the Contracting Officer if such items are encountered and obtain acceptance regarding method of removal and salvage for the Government.

2. Carefully remove, clean, and deliver to the Contracting Officer the following items to be Salvaged: _____.

a. Storage Area:
_____.

3.4 DISPOSAL OF DEMOLISHED MATERIALS:

A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off site.

1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.

2. Burning of removed materials is not permitted on project site.

3.5 CLEANUP AND REPAIR:

A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protection and leave interior areas broom clean.

1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to

start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

2. Repair and clean adjacent surfaces damaged or soiled by demolition work.

3. Restore utility service to normal operation.

4. Remove equipment, temporary protection and barriers, and debris. Dispose of unsalvageable material as specified in Section 01500.

END OF SECTION 02070

SECTION 02072 MINOR DEMOLITION FOR HISTORIC FABRIC

PART 1 : GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY: The work of this section consists of demolition and removal work and storing salvaged materials.

1.3 SUBMITTALS: As specified in Section 01300. Submit proposed methods of building protection and demolition.

1.4 QUALITY ASSURANCE: Comply with the safety requirements for demolition, ANSI A10.6-83.

1.5 PROJECT CONDITIONS:

A. Keep dust and dirt pollution to a minimum.

B. Ensure safety of persons in demolition area.

C. Provide adequate fire protection. Keep area clear of hazardous substances and debris.

D. Maintain access to exits at all times.

1.6 SCHEDULING: Complete demolition that might damage new construction before starting new work.

PART 2 : PRODUCTS (Not applicable).

PART 3 : EXECUTION

3.1 PREPARATION:

A. Provide temporary supports and protection for parts of the structure to remain. Provide temporary closures for openings made in exterior walls and roofs. Protect nearby structures and vegetation as necessary.

B. Cap or disconnect utilities. Provide bypass connections as necessary to maintain utility service to occupied areas of building.

3.2 REMOVAL:

A. Remove items or materials in inverse order of that used in placing. Methods will be changed by Contracting Officer as necessary.

B. Carefully remove or cut fabric in presence of Contracting Officer. Take every precaution to prevent damage to existing structures and surrounding areas. No flame cutting, vibrating equipment, or explosives will be permitted. Should accidental damage occur, promptly repair damaged area to the satisfaction of the Contracting Officer at no additional expense to the Government.

C. As previously inaccessible areas are exposed, it may be necessary to halt work temporarily for architectural or archeological investigation. When possible, Contractor shall work elsewhere on the project.

3.3 IDENTIFICATION AND DOCUMENTATION: As each section of historic fabric is removed, Contracting Officer will record the date, location, dimensions, origin, and original use.

3.4 SALVAGE:

A. Items to be Salvaged: _____.

B. Items to be Reused: _____.

C. Carefully clean and store materials and items to be salvaged or reused.

D. Storage Area: _____.

3.5 BELOW GRADE AREAS AND VOIDS: Fill voids resulting from demolition work as directed by Contracting Officer.

3.6 RESTORATION AND CLEAN-UP:

A. Repair and clean adjacent surfaces damaged or soiled by demolition work.

B. Restore utility services to normal operation.

C. Remove equipment, temporary protection and barriers, and debris and rubbish. Dispose of unsalvageable material as specified in Section 01560.

END OF SECTION 02072

PART 1 : GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY: The work of this Section consists of exterior demolition, and removal work, and storage and restoration of salvaged materials including:

A. Remove wood gates and posts, cellar doors and hardware, flagpole, iron gate & fence, signage and posts, rope and pipe fencing, brick memorial and store for reuse.

B. Remove stockpiled slate pavers and store for reuse.

C. Remove wood ramps, steps and boardwalks.

D. Remove concrete slabs.

E. Remove exposed aggregate concrete paving.

F. Remove vines and their root systems.

G. Topsoil excavation and stripping.

H. Remove and relocate trees and shrubs.

1.3 RELATED SECTIONS:

A. Section 02111 - Existing Tree & Site Preservation.

B. Section 02923 - Landscape Grading

C. Section 02931 - Seeding

1.4 SUBMITTALS: As specified in Section 01300. Submit proposed methods of protection and demolition.

1.5 QUALITY ASSURANCE: Comply with the safety requirements for demolition, ANSI A10.6-83.

1.6 PROJECT CONDITIONS:

A. Keep dust and dirt pollution to a minimum.

B. Ensure safety of persons in demolition area.

C. Provide adequate fire protection. Keep area clear of hazardous substances and debris.

D. Maintain access to exits at all times.

1.7 SCHEDULING: Complete demolition that might damage new construction before starting new work.

1.8 REGULATORY REQUIREMENTS:

A. Conform to applicable County or City code for disposal of debris and sediment erosion control measures.

B. Coordinate clearing Work with utility companies and the Government. Call "Miss Utility", (1-800-257-7777).

PART 2 : PRODUCTS (Not applicable).

PART 3 : EXECUTION

3.1 PREPARATION:

A. Verify that existing shrubs and trees designated to be removed, are tagged or identified and approved for removal by the Government.

B. Verify that existing items designated to be removed by the Government have been completed.

3.2 PROTECTION:

A. Locate, identify, and protect from damage utilities that remain.

B. Protect trees and shrubs designated to remain as final landscaping as specified in Section 02111.

C. Protect bench marks, existing structures, adjacent curbs, walks, walls, archeological remnants, and site features from damage or displacement.

3.3 BURNING: Open burning is not permitted within the Construction Limits. All materials and debris are to be disposed of off the project site.

3.4 CLEARING:

A. Clear areas required for access to site and execution of Work.

B. Clear designated areas of trees, shrubs and other vegetation. Completely remove stumps, roots, and other debris protruding through the ground surface.

3.5 REMOVAL:

A. For items to be reused, remove items or materials in inverse order of that used in placing. Methods will be changed by Contracting Officer as necessary.

B. Carefully remove or cut fabric in presence of Contracting Officer. Take every precaution to prevent damage to existing structures and surrounding areas. No flame cutting, vibrating equipment, or explosives will be permitted. Should accidental damage occur, promptly repair damaged area to the satisfaction of the Contracting Officer at no additional expense to the Government.

C. As previously inaccessible areas are exposed, it may be necessary to halt work temporarily for architectural or archeological investigation. When possible, Contractor shall work elsewhere on the project.

D. Restore or replace all items damaged during removal, storage and reinstallation to the satisfaction of the Government and at no additional cost to the Government.

E. Remove exposed aggregate and concrete paving and the associated base material from the site.

F. Remove slate pavers without damage and store in a protected area as directed by the Government for later installation on site.

G. Remove wood ramps, decks and steps indicated to be removed. Provide protection for stone wall where wood, deck and steps are removed, to prevent moisture damage.

H. When site conditions permit, load all debris and materials within confines of existing open spaces on site. Trucks, or other equipment, shall interfere as little as possible with traffic on surrounding drives and parking lots. Immediately remove any debris or materials that may accidentally fall onto drives, parking lots, or walks within site.

I. Maintain constant dust control during all operations. Wet down materials on trucks prior to leaving premises.

3.6 IDENTIFICATION AND DOCUMENTATION: As each section of historic fabric is removed, Contracting Officer will record the date, location, dimensions, origin, and original use.

3.7 SALVAGE:

A. Items to be Salvaged: Slate pavers, wood gates and posts,

cellar doors, iron gate, fence and posts, flagpole, signage, rope and pipe fencing, brick memorial.

B. Items to be Reused: Slate pavers, wood grates and posts, cellar doors, iron gate, fence and posts, flagpole, signage, rope and pipe fencing, brick memorial.

C. Carefully clean and store materials and items to be salvaged or reused.

D. Coordinate storage with the Government.

3.8 BELOW GRADE AREAS AND VOIDS: Fill voids resulting from demolition work as directed by Contracting Officer.

3.9 RESTORATION AND CLEAN-UP:

A. Reinstall all salvaged items. Install components plumb and level and accurately fitted.

B. Provide footers, anchors, plates, angles, posts, and other fasteners as required.

C. Touch up paint as necessary for all damaged metal items to match existing paint color.

D. Repair and clean adjacent surfaces damaged or soiled by demolition work.

E. Restore utility services to normal operation.

F. Remove equipment, temporary protection and barriers, and debris and rubbish. Dispose of unsalvageable material as specified in Section 01560.

3.10 TOPSOIL EXCAVATION:

A. Excavate topsoil from marked areas.

B. Stockpile topsoil in area designated on site to depth not exceeding 10 feet. Protect from erosion. Remove excess topsoil not being reused from site.

C. Do not excavate wet topsoil.

3.11 CLEAN UP: At completion of each day's work, clean surrounding drives, parking lots, and walks of any debris, materials, dirt, resulting from demolition operations.

END OF SECTION 02072

PART 1 : GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY: The work of this section consists of removing asbestos-containing materials.

1.3 DEFINITIONS: Work area as used in this section includes all areas within the decontamination enclosure system.

1.4 SUBMITTALS: As specified in Section 01300.

A. Proof that required Federal, State, and local permits, _____, have been obtained.

B. Proof that all employees have passed appropriate medical examinations required by OSHA.

C. Certification that all employees have been instructed on the hazards of asbestos exposure, use and fitting of respirators and protective dress, use of showers, work area entry and exit procedures, work methods, and protective measures.

D. Certification that each employee has been properly fitted with a specified respirator.

E. Certification that vacuums, temporary ventilation equipment, and other equipment required to contain airborne fibers meet ANSI Z9.2-79.

F. If rental equipment is to be used in work area or to transport asbestos contaminated waste, provide notice to rental agency stating intended use of equipment, with copy to Contracting Officer.

G. Air monitoring schedule, in bar chart form.

H. Description, accompanied by sketches to scale, of decontamination enclosure systems.

I. Description of asbestos waste handling procedures. Include name and address of waste disposal site, names, addresses, and telephone numbers of persons who will transport asbestos waste, and a sample of transport manifest to be used to identify quantity of waste removed

and accepted by disposal site.

J. After every disposal operation provide copies of transport manifests, disposal receipts, and chain of custody form for all asbestos waste materials removed from the site. Chain-of-custody form shall include date, address of pickup site, name and address of Contractor, names of persons responsible for pickup, name and address of disposal site, quantity of asbestos waste, and type of containers used. The form shall be signed by the Contractor, the Contracting Officer, disposal site operator, and hauler if a private hauler is employed.

1.5 QUALITY ASSURANCE:

A. Qualifications: Workers shall be fully qualified and experienced in the techniques of abatement, handling, and disposal of asbestos-containing materials.

B. Regulatory Requirements:

1. Comply with OSHA Safety and Health Standard (29 CFR 1910.1001); OSHA Asbestos Regulation for the Construction Industry (29 CFR 1926.58); National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR, Part 61, Subparts A and B); Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763); and Department of Transportation regulations for transporting asbestos-containing waste.

2. Notify the regional OSHA and EPA offices and all responsible state and local agencies in writing at least 10 days before removal work begins. Provide copies to Contracting Officer.

3. Dispose of asbestos waste at an authorized site in accordance with requirements of NESHAP and applicable state and local guidelines and regulations.

1.6 PROJECT CONDITIONS:

A. Maintain existing emergency exits and building emergency equipment, such as fire alarms, fire hose equipment, and emergency lighting devices, in operating order.

B. Personnel Protection:

1. All personnel entering the work area for the first time, shall sign a statement that they have read and understand all posted regulations and are familiar with personal protection requirements and emergency procedures.

2. Personnel shall be fully protected with respirators and protective clothing before the first disturbance of contaminated materials and until final clean-up is completed. Respirator facepieces shall not be removed in the work area. Workers on scaffolding shall tie respirator air line securely to scaffold.

3. Persons wearing beards shall not be allowed to enter the work area.

4. Eating, drinking, smoking, and chewing gum or tobacco will not be allowed in the work area.

PART 2 : PRODUCTS

2.1 PERSONNEL PROTECTION EQUIPMENT:

A. Respirators:

1. As a minimum, provide each worker with a combination Type C supplied air respirator with full facepiece operated in the pressure-demand mode and an emergency backup self-contained breathing apparatus (SCBA) operated in the pressure-demand mode. Provide as a minimum, Grade D breathing air that meets the criteria established by the Compressed Gas Association, Inc.

2. Air-purifying respirators supplied with high-efficiency particulate/aerosol (HEPA) filters or respirators that offer higher protection (powered-air-purifying) may be used in special situations such as pre-abatement inspections, preparation of the work area, removing waste containers from holding area, final cleaning, removal of the last layer of plastic sheeting, and when measurable concentrations of asbestos are not detectable.

B. Disposable Protective Clothing: Provide full body (including head and foot) covering consisting of material impenetrable by asbestos fibers (Tyvek or approved equal) in sizes adequate to accommodate movement without tearing.

C. Provide five sets of protection equipment, including Type C respirator, for representatives of agencies having jurisdiction over the project. In addition, provide hose, coupling airflow control valve, and Type C respirator for exclusive use by Contracting Officer.

2.2 EQUIPMENT: ANSI Z9.2-79. No air movement system or air equipment shall discharge asbestos fibers outside the work area.

A. Vacuum Equipment: HEPA filtered vacuuming equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall be 99.97 percent efficient for retaining fibers 0.3 microns or larger.

B. Air Movement Equipment: HEPA filtration system.

C. Negative Pressure Equipment: Exhaust system capable of maintaining a minimum pressure differential of minus 0.02 inch of water column relative to areas outside the work area. Provide a measuring device capable of measuring the differential.

2.3 PLASTIC SHEETING: 6-mil, in sizes to minimize the frequency of joints.

2.4 TAPE: For use under dry and wet conditions, capable of being cleaned off of surfaces without permanent marks or damage.

2.5 ASBESTOS CHEMICAL REMOVAL ENCAPSULANT: BWE 5000, manufactured by BWE, Inc., Las Vegas, Nevada, or approved equal.

2.6 PENETRATING ENCAPSULANT: BWE 3000, manufactured by BWE, Inc., Las Vegas, Nevada, or approved equal.

2.7 CONTAINERS: Air and water tight, 55-gallon metal or fiberglass drums with tightly fitting lids, lined with 6-mil plastic bags. Label containers in accordance with OSHA 1910.1001.

2.8 OTHER MATERIALS: Provide all other materials required for temporary construction.

PART 3 : EXECUTION

3.1 PREPARATION OF WORK AREA:

A. Post caution signs in and around the work area to comply with OSHA 1910.1001(g)(1) and Federal, state, and local regulations.

B. Shut down and lock out all heating, cooling, and air-conditioning system components that supply or pass through the work area.

C. Seal off openings, such as corridors, doorways, windows, vents, ducts, grilles, diffusers, switch and outlet boxes, and lighting fixtures, with plastic sheeting sealed with tape.

D. Clean items to be removed from work area, using HEPA vacuum equipment and/or wet cleaning methods. Remove

cleaned items to a temporary location as directed by Contracting Officer.

E. Clean items to remain in the work area, using HEPA vacuum equipment and/or wet cleaning methods, and enclose with plastic sheeting sealed with tape. Protect items with temporary barricades, covers, or pads as necessary to prevent damage.

F. Clean work area using HEPA vacuum equipment and/or wet cleaning methods.

G. Cover floors, then walls, with plastic sealed with tape.

1. Cover floors with a minimum of two layers of plastic sheeting. Extend plastic at least 24 inches up walls. Place hardboard, vinyl sheet flooring, or other nonporous material on top of plastic sheeting.

2. Cover walls with a minimum of two layers of plastic sheeting to the floor level. Where wall surfaces are smooth, hard, and nonporous, the wall covering may be omitted if approved by Contracting Officer.

H. Separate open building spaces that will remain in use from work area by airtight barriers. Build wood or metal framing and apply minimum 3/8-inch-thick plywood on the work area side. Cover plywood with 2 layers of plastic sheeting sealed with tape.

I. Construct airlocks consisting of two sealed doorways at least 6 feet apart at entrances and exits of work area. Each sealed doorway shall have two overlapping plastic sheeting secured along the top of the door frame, with the vertical edge of one sheet attached to one vertical side of the frame, and the vertical edge of the other sheet attached to the opposite vertical side of the frame. Attach weights to the bottom of both sheets to ensure that they hang straight and maintain a seal over the doorway when it is not in use.

3.2 DECONTAMINATION ENCLOSURE SYSTEMS: Existing rooms, temporary framed rooms, specially constructed portable temporary rooms, or a combination may be used. Line rooms within the systems with plastic sheeting and seal joints with tape, as specified for work area preparation. Access between contaminated and uncontaminated areas shall be through an airlock, and access between any two rooms shall be through an airlock.

A. Worker Decontamination Enclosure System:

1. An equipment room with an airlock to the abatement

area and one to the shower room. Provide storage for contaminated clothing and personal equipment and temporary toilet facilities for use only by personnel wearing protective clothing.

2. A shower room with an airlock to the equipment room and one to the clean room. Provide soap and hot and cold running water.

3. A clean room with an airlock to the shower and one to uncontaminated areas. Provide storage for street clothes, towels, clean or new respirators, and other uncontaminated items. This area may, at the option of the Contractor, also contain lunchroom and toilet facilities.

B. Equipment Decontamination Enclosure System:

1. A washroom with an airlock to the abatement area and one to the holding area. This area, at Contractor's option, may be combined with the workers' equipment area.

2. A holding area, with an airlock to the washroom and one to the uncontaminated area. The exit to the uncontaminated area shall be kept locked when not in use.

C. Post decontamination and work procedures in the equipment room and clean room.

D. Obtain Contracting Officer's approval of decontamination enclosure systems before beginning work.

E. Maintenance of Enclosure System: Visually inspect enclosure systems at the beginning of each work period. Use smoke methods daily to test effectiveness of sealed doorways. Repair damaged plastic.

3.3 GENERAL ENTRY AND EXIT PROCEDURES:

A. Authorized personnel shall enter the work area through the worker decontamination enclosure system.

B. Upon entry and exit to work area, all personnel shall sign log located in the clean room.

3.4 ENTRY PROCEDURES:

A. Clean Room:

1. Remove all street clothing, including underwear and socks, and put on disposable briefs, suits, and

booties.

2. Secure respirator belt assembly to waist.

3. Proceed to shower room.

B. Shower Room:

1. Rinse the quick disconnect of the air line with fresh water to remove any possible foreign material. Connect the respirator system to the breathing air system (air line quick disconnect); then connect into the air system and adjust the air control valve. Secure respirator facepiece to face, check the facepiece seal, and put on head cover.

2. Proceed to equipment room.

C. Equipment Room:

1. Put on work shoes and other safety equipment as required.

2. Proceed to the abatement area.

3.5 EXIT PROCEDURES:

A. Work Area:

1. Vacuum all loose residue from the protective clothing, then wet spray clothing with water to prevent asbestos from becoming airborne.

2. Proceed to equipment room.

B. Equipment Room:

1. Carefully remove all protective clothing and place in disposal container.

2. Do not disconnect air supply system, or remove respirator.

3. Proceed to the shower room.

C. Shower Room:

1. Thoroughly clean the outside of the respirator facepiece and exposed area of the face under the shower before removing facepiece. Remove respirator and place outside the dirty side of shower and finish preliminary showering.

2. Bring the respirator back into the shower and clean it. Disconnect respirator from the air supply system and place the entire respirator breathing assembly in the clean room.

3. Thoroughly wash entire body with soap and water.

4. Proceed to the clean room.

D. Clean Room: Before leaving the work area, ensure that the respirator is properly cleaned, repaired if necessary, dried, and stored in a clean storage area for reuse.

3.6 HOLDING ROOM ENTRY AND EXIT:

A. Workers removing waste containers from the equipment decontamination enclosure shall enter the holding area from outside wearing a respirator and dressed in clean coveralls.

B. Workers entering holding area from uncontaminated areas shall not go beyond holding area and contaminated workers entering holding area shall not exit to uncontaminated areas.

3.7 AIR MONITORING:

A. Throughout removal, disposal, and clean-up, monitor air to measure the asbestos fiber levels within work area and each decontamination enclosure system. Retain and pay for the services of a testing laboratory qualified in air sampling and testing for asbestos fiber content.

B. Conduct air monitoring according to the method prescribed by OSHA 1910.1001.

Areas To Be Sampled	Samples Each Work Day	Minimum Volume Each Sample
Work Area	2	120 liters
Decontamination Enclosure System Area	1	120 liters
Outside Building	1	240 liters

3.8 ASBESTOS REMOVAL:

A. Spray asbestos material with a mist application of chemical removal encapsulant. Wet the material through to substrate without causing excess dripping or delamination of material. Spray material as often as necessary to maintain wet condition and to minimize asbestos fiber dispersion.

B. Remove material in small sections.

C. Do not allow asbestos waste to accumulate in work area.

D. Pack material in plastic bags, seal bags, and immediately place bags in labeled drum containers. Do not drop bags from a height greater than 6 feet. Seal filled containers. Clean external surfaces of containers thoroughly by wet sponging. Move containers to washroom, wet-clean each container thoroughly, and move containers to holding area.

E. If disposal site gives written approval, large components may be removed and transported for disposal intact. Wrap components in two layers of 6-mil polyethylene sheeting secured with tape, and identify components as asbestos-contaminated materials.

3.9 CLEAN-UP:

A. After removing asbestos, wet-clean surfaces, including structural members, building components, plastic sheeting on walls and floors, and coverings of nonremoval items, to eliminate all visible residue. Then apply a thin coat of penetrating encapsulant to seal in nonvisible residue.

B. Before moving contaminated equipment and toilet waste containers to the equipment decontamination enclosure system, clean external surfaces thoroughly by cleaning and HEPA vacuuming.

C. Remove plastic sheets from walls and floors only, keeping openings sealed. HEPA filtered negative pressure system and air filtration system shall remain in service.

D. Wet-clean and HEPA vacuum surfaces where there is evidence of contamination. After cleaning, wait 24 hours and repeat cleaning. After completion of the second cleaning, inspect work area to ensure that it is free of visible asbestos.

E. If the Contracting Officer finds visible asbestos within 48 hours after second cleaning, repeat wet cleaning and HEPA vacuuming until work area is acceptable.

F. Within 48 hours after last clean-up, make air monitoring test. If area is not in compliance with OSHA 1910.1001, continue clean-up.

G. When air monitoring tests determine that the work area is free of asbestos, remove decontamination enclosure system, thoroughly wet-clean and HEPA vacuum work area, and dispose of contaminated waste. Inspect to ensure that no

asbestos remains on surfaces as a result of dismantling.

H. Remove seals from openings.

3.10 DISPOSAL:

A. Remove and transport asbestos-containing waste at least once per week.

B. Discard sealed plastic bags at disposal site. Keep broken or damaged bags in the drum and dispose of the entire contaminated drum. Uncontaminated drums may be recycled.

C. Workers opening drums shall wear half-face respirators.

3.11 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS:

A. Replace removed objects as directed by Contracting Officer.

B. Re-establish HVAC, mechanical, and electrical systems. Install new HVAC filters and dispose of old filters as contaminated waste.

3.12 FINAL MONITORING OF AIR SAMPLES:

A. After all work is completed and ventilation systems have operated for 24 hours, but before occupants are allowed back into the work area, provide an air sample test within each separate room within the work area.

B. Airborne Asbestos Fiber Measurement for Clearance of Work Area: Analysis by Transmission Electron Microscopy (TEM) shall be used in accordance with AHERA.

C. If tests indicate that asbestos count is above maximum levels as defined by OSHA 1910.1001(b)(2) and (3), additionally clean as required by Contracting Officer. If tests indicate that asbestos count is at or below the maximum levels, no further clean-up will be required.

END OF SECTION 02080

PART 1: GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of 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 abating lead paint known to exist at the site.

1.3 REFERENCES: The publications listed below from a part of this specification to the extent referenced. The publications are referred within the test by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z9.2	1979 Fundamentals Governing the Design and Operation of Local Exhaust Systems
ANSI Z88.2	1980 Respiratory Protection

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.134	1988 Respiratory Protection
29 CFR 1910.1025	1988 Lead
29 CFR 1910.1200	1988 Hazard Communication
29 CFR 1926.55	Gases, Vapors, Fumes, Ducts, and Mists
40 CFR 260	Hazardous Waste Management Systems: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste

40 CFR 264	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	1989 Land Disposal Restrictions
49 CFR 172	Hazardous Materials Tables and Hazardous Materials Communications Regulations
49 CFR 178	Shipping Container Specification

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA 29 CFR 1910.1025

1.4 DEFINITIONS:

A. Abatement

1. Abate" or "abatement" means the elimination of exposure to lead-based substances that may result in lead toxicity or poisoning, by removal or encapsulation of lead containing substances, by thorough cleanup procedures, and by post-cleanup treatment of surfaces.

B. Action Level

1. Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period. As used in this section, "30 micrograms per cubic meter of air" refers to the action level.

C. Eight-Hour Time Weighted Average (TWA)

1. Airborne concentration of lead averaged over an 8-hour workday to which an employee is exposed.

D. Lead

1. Metallic lead, inorganic lead compounds, and organic lead soaps. Excluded from this definition are other organic lead compounds.

E. Lead-Containing Substance

1. "Lead-containing substance" means any paint, plaster or other surface coating material containing more than 0.5 percent lead by weight calculated as lead metal in the dried solid, or more than 0.7 milligrams per square centimeter by the x-ray florescence analyzer.

F. Lead Control Area

1. An enclosed area or structure with containment barriers to prevent the spread of lead dust, paint chips, or debris of lead-containing paint removal operations. The lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.

G. Lead Permissible Exposure Limit (PEL)

1. Fifty micrograms per cubic meter of air as an 8-hour time weighted average as determine by 29 CFR 1910.1025. If an employee is exposed for more than 8 hours in a work day, the PEL shall be determined by the following formula:

a. PEL (micrograms/cubic meter of air) = 400/No. hrs worked per day

H. Personal Monitoring

1. Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1910.1025. Samples shall be representative of the employee's work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and the center at the nose or mouth of an employee.

I. Physical Boundary

1. Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized

entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area".

PART 2 : PRODUCTS (Not applicable).

PART 3 : EXECUTION

3.1 LEAD PAINT ABATEMENT:

A. Demolish, and dispose of in accordance with applicable sections of this specification, and federal, state, and local regulations, walls and other materials identified on drawings as lead-containing painted surfaces.

B. Lead Control Area Requirements

1. Critical barriers established for asbestos abatement will remain in place where feasible. 6 mil polyethylene curtains will be hung around each area designated for demolition in order to prevent contamination of adjacent areas not included in demolition.

a. Protection of Existing Work to Remain

1) Perform paint removal work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better.

2. Furnishings

3. The Building Owner will remove furniture and equipment from the work area before lead-containing paint removal work begins.

4. Heating, Ventilating, and Air Conditioning (HVAC) Systems

5. Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6-mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area.

6. Personal Protection

a. Personnel engaged in work inside the lead control area shall wear protective clothing consisting of tyvek (or similar) full-body coveralls. No one will be permitted in the lead control area without protective clothing.

7. Warning Signs

a. Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1910.1025.

8. Rental Equipment Notification

a. If rental equipment is to be used during lead-containing paint handling and disposal, notify the rental agency in writing concerning the intended use of the equipment. Furnish a copy of the written notification to the Builders Industrial Hygienist.

C. Work Procedures

1. Perform demolition of lead-containing painted surfaces in accordance with specification. Use procedures (wet methods/HEPA vacuuming) and equipment required to limit occupational and environmental exposure to lead when lead-containing painted surfaces are demolished. Dispose of associated waste in compliance with Environmental Protection Agency (EPA), federal, state, and local requirements.

a. Personnel Exiting Procedures

Whenever personnel exit the lead-control area, they shall perform the following procedures.

1) Vacuum themselves off

2) Remove protective clothing in the area and place them in an approved impermeable disposal bag.

D. Monitoring

1. Monitoring of personal exposure to airborne concentrations of lead shall be in accordance with 29 CFR 1910.1025. Air monitoring, testing, and reporting shall be the Contractor's responsibility.

a. Testing Laboratory

Submit to the Consultant for approval the name, address, and telephone number of the testing laboratory selected to perform the monitoring, testing, and reporting of airborne concentrations of lead. Provide proper documentation that persons performing the analysis have been judged proficient by successful participation within the last year in the National Institute of Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program. The laboratory shall be accredited by the American Industrial Hygiene Association (AIHA). Provide AIHA documentation along with date of accreditation/ reaccreditation.

b. Jobsite Monitoring

The Consultant shall be on the jobsite inspecting the lead-containing paint removal work to ensure compliance with this specification and applicable regulations.

E. Lead Control Area Cleanup

1. Deposit all waste including sealing tape, plastic sheeting, mop heads, sponges, filters, and disposable clothing in double plastic bags of at least 4 mils thick or single plastic bags 6 mil thick, and seal the bags.

2. Wet wash all surfaces in the work area including woodwork, walls, windows, window wells, ceilings and floors with a solution containing at least 1 ounce of 5 percent trisodium phosphate to each gallon of water.

3. After all surfaces have dried, HEPA vacuum until no visible residue remains.

3.2 HAZARDOUS WASTE MANAGEMENT:

A. Determination of Hazard Classification of generated lead-containing painted surface debris will be made by the Consultant according to 40 CFR 261.

B. The Contractor shall submit a Hazardous Waste Management Plan, following determination of hazard classification by the Consultant, for approval by the Consultant. The plan shall comply with applicable requirements of federal, state, and local hazardous waste regulations and address:

1. Estimated quantities of wastes to be generated and disposed of.

2. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes.

3. Include the facility location and a 24-hour point of contact.

4. Furnish copies of EPA, state, and local hazardous waste permits and EPA Identification numbers.

C. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

D. Spill prevention, containment, and clean-up contingency measures to be implemented.

E. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up an containerized daily.

3.3 DISPOSAL:

A. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing, which may produce airborne concentrations of lead particles.

B. Handle, store, transport, and dispose lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

END OF SECTION 02090

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. Protection of existing trees indicated to remain.

2. Removal of trees and other vegetation.

3. Topsoil stripping.

4. Clearing and grubbing.

5. Removing above-grade improvements.

6. Removing below-grade improvements.

1.3 PROJECT CONDITIONS:

A. Traffic: Conduct site-clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place.

1. Protect improvements on adjoining properties and on Owner's property.

2. Restore damaged improvements to their original condition, as acceptable to property owners.

C. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide

temporary guards to protect trees and vegetation to be left standing.

1. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.

2. Provide protection for roots over 1-1/2 inch in diameter that are cut during construction operations. Coat cut faces with an emulsified asphalt or other acceptable coating formulated to use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

3. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations in a manner acceptable to Architect. Employ a licensed arborist to repair damage to trees and shrubs.

4. Replace trees that cannot be repaired and restored to full-growth status, as determined by arborist.

D. Improvements on Adjoining Property: Authority for performing removal and alteration work on property adjoining Owner's property will be obtained by Owner prior to award of contract.

1. Extent of work on adjacent property is indicated on Drawings.

E. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated or directed.

1.4 EXISTING SERVICES:

A. General: Indicated locations are approximate; determine exact locations before commencing Work.

B. Arrange and pay for disconnecting, removing, capping, and plugging utility services. Notify affected utility companies in advance and obtain approval before starting this Work.

C. Place markers to indicate location of disconnected services. Identify service lines and capping locations on Project Record Documents.

PART 2 : PRODUCTS (Not Applicable).

PART 3 : EXECUTION

3.1 SITE CLEARING:

A. General: Remove trees, shrubs, grass, and other vegetation, improvements, or obstructions, as required, to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes digging out and off-site disposal of stumps and roots.

1. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.

B. Topsoil: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.

1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.

a. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.

2. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, if required, to prevent wind erosion.

3. Dispose of unsuitable or excess topsoil as specified for disposal of waste material.

C. Clearing and Grubbing: Clear site of trees, shrubs, and other vegetation, except for those indicated to be left standing.

1. Completely remove stumps, roots, and other debris protruding through ground surface.

2. Use only hand methods for grubbing inside drip line of trees indicated to remain.

3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

a. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact each layer to a density equal to adjacent original ground.

D. Removal of Improvements: Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

1. Abandonment or removal of certain underground pipe or conduits may be indicated on mechanical or electrical drawings and is included under work of related Division 15 and 16 Sections. Removing abandoned underground piping or conduits interfering with construction is included under this Section.

3.2 DISPOSAL OF WASTE MATERIALS:

A. Burning on Owner's Property: Burning is not permitted on Owner's property.

B. Removal from Owner's Property: Remove waste materials and unsuitable or excess topsoil from Owner's property.

END OF SECTION 02110

H. The Contractor shall prepare within 10 days of the initial acceptance or inspection, a maintenance manual for use by the Government after the maintenance period expires.

PART 2: PRODUCTS

2.1 PROTECTIVE FENCE:

A. Fencing: 48" orange plastic web fencing.

B. Metal Fenceposts: 4' exposed height.

2.2 SILTATION CONTROL FENCE:

A. Fencing: 30" height. Siltation fencing complying to local codes.

2.3 SIGNAGE:

A. Material: Durable, weatherproof.

B. Size: 11" x 17"

C. Color: Sign color - other than white, to be easily seen. Letter color - black.

D. Message: Sign shall read 'PRESERVATION AREA'. Lettering shall be block letters minimum 2½" height.

PART 3: EXECUTION

3.1 PREPARATION:

A. Verify all utility locations in the field before digging.

B. Protective Fencing:

1. Stake proposed protective fencing location. The Government shall approve the location of the protective fencing staking prior to installation of the fencing.
2. Protect all Preservation Areas with fencing supported by metal stakes. Locate fence as shown on the plan. Install fence in an upright position and maintain intact until all construction activity is complete.
3. The Government shall approve protective fencing installation prior to the start of any site work.

C. Signs:

1. Affix 'PRESERVATION AREA' signs to the protective fencing. Signs shall be clearly visible from all angles on the construction site. Post a minimum of two (2) signs for each Tree Preservation Area. Post signs no

further than 150' apart along protective fencing at the site perimeter.

3.2 APPLICATION:

A. Traffic:

1. Prohibit parking, construction equipment, building supply or material storage, trash disposal, foot traffic and vehicular traffic in the Preservation Areas.

B. Work Within and in Close Proximity to Tree Preservation Areas:

1. Root Pruning:
   a. Stake the limit of root pruning as recommended by the arborist. The Government shall approve limits of root pruning prior to the start of trenching in the field.
   b. Root prune prior to the start of adjacent excavation. Trench to a minimum depth of 24" inches or the depth of excavation which ever is greater.
2. Limit fill to that shown on the plans. Deposit and spread specified fill in Tree Preservation Areas by hand. All backfill shall conform to Section 02923 - Landscape Grading.
3. Siltation Control:
   a. Stake limit of silt control fencing as recommended by the arborist. The Government shall approve limits of silt control fencing prior to the start of any clearing and construction.
   b. Provide siltation control at Tree Preservation Areas by attaching silt fence to the uphill side of the protective fencing. Place lower 6" of silt fence in trench below grade. Backfill trench.
   c. Maintain positive drainage from Tree Preservation Areas. Divert runoff from site around Tree Preservation Areas.
4. Remove and dispose of all debris from the site.

C. Concrete Washout:

1. Provide concrete washout in areas which drain away from the Tree Preservation Areas. The Government shall approve concrete washout area prior to the start of any site work.

D. Burning:

1. No burning of materials shall be allowed on site.

E. Understory Cleaning Within Tree Preservation Areas:

1. Unless otherwise shown on the plans, the ground surface

within Tree Preservation Areas shall be left or if necessary returned to the pre-construction condition.
   a. Remove all vines from trees and on building as shown.
   b. Remove additional materials as directed by the Government.
   c. Remove and dispose of all debris from the site.
2. Seed disturbed turf area ground surface in accordance with Section 02931 Seeding.

F. Existing Tree Fertilizing, Watering and Maintenance.

1. Continuously maintain all existing trees from the start of site work through project completion.
2. A licensed arborist shall perform crown reduction pruning as required prior to root pruning of all trees. Construction prune all trees requiring root pruning within the Tree Preservation Areas in accordance with the N.A.A. Class I, Fine Pruning Standard for shade trees.
3. A licensed arborist shall prune all trees indicated by the Government within the Tree Preservation Areas in accordance with the N.A.A. Class I, Fine Pruning Standard for shade trees.
4. A licensed arborist shall remove all vines from the existing trees and building.
5. A licensed arborist shall deep root fertilize and water all trees which required root pruning or have suffered from construction impact. Inject deep root fertilization under pressure to help reduce soil compaction and restore air spaces lost by compaction. The arborist shall use discretion as some stressed trees may not respond well to immediate post-construction fertilization.
6. Water during periods of subnormal rainfall at a rate equivalent to 1 inch per week.
7. Remove damaged bark by cutting the bark back to healthy tissue with a sharp knife, tracing the outline of the wound.
8. Remove and dispose of all debris from the site.

G. Provide sheeting and shoring to stabilize vertical excavations where necessary to preserve existing trees. All work must comply with local safety codes.

3.3 FIELD QUALITY CONTROL:

A. Contractor's Penalty for Negligence

1. The Government shall monitor the construction site. If, in their opinion, the Contractor is exercising procedures that are determined to be detrimental to the trees and site elements that are to be preserved, the Government shall issue a "STOP WORK ORDER".
2. If, in the opinion of the Government, the Contractor has

damaged a tree beyond repair, the Contractor shall be required to reimburse the Government at a rate of $400.00 per caliper inch for each tree that is damaged or destroyed due to the Contractor's negligent operations. The Contractor shall be responsible for the cost of remedial maintenance of or removal of any damaged tree and repair or replacement of protected site elements at no additional cost to the Government.

3. Activities which are detrimental to existing trees include, but are not limited to the following:
   a. Placing backfill in protected areas where not indicated by the grading plan.
   b. Driving construction equipment into or through protected areas.
   c. Burning in or in close proximity to protected areas.
   d. Stacking or storing supplies in protected areas.
   e. Changing site grades which cause drainage to flow into, or to collect in protected areas.
   f. Conducting trenching operations in the vicinity of trees.
   g. Grading in the vicinity of trees.
   h. Pedestrian traffic in or through protected areas.
   i. Physical damage to a tree.
4. The Contractor shall reimburse the Government at a rate of $100.00 per linear foot per day for any damaged or non-functioning protection fencing or siltation control fencing. The Contractor shall be responsible for the cost of remedial maintenance, fencing repair, and return of damaged area to pre-existing condition.

3.4 ADJUSTING:

A. Preservation Area Access:

1. In Preservation Areas where construction traffic is unavoidable as concurred by the Government, the following procedure shall be followed:
   a. Obtain approval from the Government for Preservation Area access.
   b. Install protective fencing by hand to delineate the construction corridor. Fencing location must be approved on site by the Government prior to start of work in Preservation Area.
   c. Remove all materials and return area to pre-construction condition within one week of the work.

3.5 POST-CONSTRUCTION CLEANING:

A. Remove protective fencing, debris and all surplus construction materials from site following construction, in a manner that will not damage Preservation Areas. Re-seed or refurbish all disturbed ground areas as soon as possible.

PART 4: MEASUREMENT AND PAYMENT

4.1 Fencing.

A. Basis of Measurement: By the linear foot to fence height specified.

B. Basis of Payment: Includes protective fencing, metal post, signs, attachments, installation and removal.

4.2 Construction Pruning and Cleaning of Existing Trees to be Saved.

A. Basis of Measurement: By the tree.

B. Basis of Payment: Includes inventory and documentation, pruning and cleaning.

END

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 Preparing and grading subgrades for slabs-on-grade, walks, pavements, and landscaping.
2 Excavating and backfilling for buildings and structures.
3 Drainage and moisture-control fill course for slabs-on-grade.
4 Subbase course for walks and pavements.
5 Subsurface drainage backfill for walls and trenches.
6 Excavating and backfilling trenches within building lines.
7 Excavating and backfilling for underground mechanical and electrical utilities and appurtenances.

B. Related Sections: The following Sections contain requirements that relate to this Section.

1 Division 2 Section "Site Clearing" for site stripping, grubbing, topsoil removal, and tree protection.
2 Division 2 Section "Foundation Drainage Systems" for footings, underslab, and wall drainage.
3 Division 2 Section "Landscape Work" for finish grading, including placing and preparing topsoil for lawns and planting.
4 Division 3 Section "Cast-In-Place Concrete" for concrete encasings, cradles, and appurtenances for utility systems.

1.3 DEFINITIONS

A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.

B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.

D. Subbase Course: The layer placed between the subgrade and base course in a paving system or the layer placed between the subgrade and surface of a pavement or walk.

E. Base Course: The layer placed between the subbase and surface pavement in a paving system.

F. Drainage Fill: Course of washed granular material supporting slab-on-grade placed to cut off upward capillary flow of pore water.

G. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.

I. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

1.4 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for the following:

1 Each type of plastic warning tape.
2 Filter fabric.

C. Samples of the following:

1 20-lb samples, sealed in air-tight containers, of each proposed fill and backfill soil material from on-site or borrow sources.
2 12-by-12-inch sample of filter fabric.

D. Test Reports: In addition to test reports required under field quality control, submit the following:

1 Laboratory analysis of each soil material proposed for fill and backfill from on-site and borrow sources.

E. Photographs of existing adjacent structures and site improvements.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.

B. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1 Before commencing earthwork, meet with representatives of the governing authorities, Owner, Architect, consultants, Geotechnical Engineer, independent testing agency, and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Architect and then only after acceptable temporary utility services have been provided.

1 Provide a minimum 48-hours' notice to the Architect and receive written notice to proceed before interrupting any utility.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shutoff services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.

B. Satisfactory Soil Materials: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.

C. Unsatisfactory Soil Materials: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.

D. Backfill and Fill Materials: Satisfactory soil materials.

E. Subbase and Base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand, ASTM D 2940, with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Subbase or base materials.

G. Bedding Material: Subbase or base materials with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, coarse aggregate grading size 57, with 100 percent passing a 1-1/2-inch sieve and not more than 5 percent passing a No. 8 sieve.

I. Filtering Material: Evenly graded mixture of natural or crushed gravel or crushed stone and natural sand, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 50 sieve.

J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility.

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick minimum, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 2'-6" deep.

1 Tape Colors: Provide tape colors to utilities as follows:

a. Red: Electric.
b. Yellow: Gas, oil, steam, and dangerous materials.

c. Orange: Telephone and other communications.
d. Blue: Water systems.
e. Green: Sewer systems.

C. Filter Fabric: Manufacturer's standard nonwoven pervious geotextile fabric of polypropylene, nylon or polyester fibers, or a combination.

1 Provide filter fabrics that meet or exceed the listed minimum physical properties determined according to ASTM D 4759 and the referenced standard test method in parentheses:

a. Grab Tensile Strength (ASTM D 4632): 100 lb.
b. Apparent Opening Size (ASTM D 4751): #100 U.S. Standard sieve.
c. Permeability (ASTM D 4491): 150 gallons per minute per sq. ft.

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.

D. Tree protection is specified in the Division 2 Section "Site Clearing."

3.2 EXCAVATION

A. Explosives: Do not use explosives.

B. Unclassified Excavation: Excavation is unclassified and includes excavation to required subgrade elevations regardless of the character of materials and obstructions encountered.

3.3 STABILITY OF EXCAVATIONS

A. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.

3.4 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.10 foot. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, 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.

2 Excavation for Underground Tanks, Basins, and Mechanical or Electrical Appurtenances: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot. Do not disturb bottom of excavations intended for bearing surface.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.6 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated slopes, lines, depths, and invert 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 higher than top of pipe or conduit, unless otherwise indicated.

1 Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove stones and sharp objects to avoid point loading.

1 For pipes or conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.

2 For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with

tamped sand backfill.

3 Where encountering rock or another unyielding bearing surface, carry trench excavation 6 inches below invert elevation to receive bedding course.

3.7 APPROVAL OF SUBGRADE

A. Notify Architect when excavations have reached required subgrade.

B. When Architect determines that unforeseen unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

1 Unforeseen additional excavation and replacement material will be paid according to the Contract provisions for changes in Work.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Architect.

3.8 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position when acceptable to the Architect.

1 Fill unauthorized excavations under other construction as directed by the Architect.

B. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Architect.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust.

1 Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

A. Backfill excavations promptly, but not before completing

the following:

1 Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2 Surveying locations of underground utilities for record documents.
3 Testing, inspecting, and approval of underground utilities.
4 Concrete formwork removal.
5 Removal of trash and debris from excavation.
6 Removal of temporary shoring and bracing, and sheeting.
7 Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.11 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on rock and other unyielding bearing surfaces and to fill unauthorized excavations. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches of footings. Place concrete to level of bottom of footings.

C. Provide 4-inch-thick concrete base slab support for piping or conduit less than 2'-6" below surface of roadways. After installation and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

D. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch, to a height of 12 inches 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.

E. Coordinate backfilling with utilities testing.

F. Fill voids with approved backfill materials as shoring and bracing, and sheeting is removed.

G. Place and compact final backfill of satisfactory soil material to final subgrade.

H. Install warning tape directly above utilities, 12 inches

below finished grade, except 6 inches below subgrade under pavements and slabs.

3.12 SUBSURFACE DRAINAGE BACKFILL

A. Subsurface Drain: Place a layer of filter fabric around perimeter of drainage trench or at footing, as indicated. Place a 6-inch compacted course of filtering material on filter fabric to support drainage pipe. After installing and testing, encase drainage pipe in a minimum of 6 inches of compacted filtering material and wrap in filter fabric, overlapping edges at least 6 inches.

B. Drainage Backfill: Place and compact drainage backfill of filtering material over subsurface drain, in width indicated, to within 12 inches of final subgrade. Overlay drainage backfill with one layer of filter fabric, overlapping edges at least 6 inches.

C. Impervious Fill: Place and compact impervious fill material over drainage backfill to final subgrade.

3.13 FILL

A. Preparation: Remove vegetation, topsoil, debris, wet, and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.

1 Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.

B. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture-condition or aerate soil and recompact to required density.

C. Place fill material in layers to required elevations for each location listed below.

1 Under grass, use satisfactory excavated or borrow soil material.
2 Under walks and pavements, use subbase or base material, or satisfactory excavated or borrow soil material.
3 Under steps and ramps, use subbase material.
4 Under building slabs, use drainage fill material.
5 Under footings and foundations, use engineered 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 satisfactory soil material that is too wet to compact to specified density.

a. Stockpile or spread and dry removed wet satisfactory soil material.

3.15 COMPACTION

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.

C. Percentage of Maximum Dry Density Requirements: Compact soil to not less than the following percentages of maximum dry density according to ASTM D 1557:

1 Under structures, building slabs, steps, and pavements, compact the top 12 inches below subgrade and each layer of backfill or fill material at 95 percent maximum dry density.
2 Under walkways, compact the top 6 inches below subgrade and each layer of backfill or fill material at 95 percent maximum dry density.
3 Under lawn or unpaved areas, compact the top 6 inches below subgrade and each layer of backfill or fill material at 90 percent maximum dry density.

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 existing adjacent grades and new grades.
2 Cut out soft spots, fill low spots, and trim high spots to conform to 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 0.10 foot.
2 Walks: Plus or minus 0.10 foot.
3 Pavements: Plus or minus 1/2 inch.

C. Grading Inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBBASE AND BASE COURSES

A. Under pavements and walks, place subbase course material on prepared subgrades. Place base course material over subbases to pavements.

1 Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections and thickness to not less than 95 percent of ASTM D 4254 relative density.
2 Shape subbase and base to required crown elevations and cross-slope grades.
3 When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
4 When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

B. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders at least 12 inches wide of acceptable soil materials and compact simultaneously with each subbase and base layer.

3.18 DRAINAGE FILL

A. Under slabs-on-grade, place drainage fill course on prepared subgrade.

1 Compact drainage fill to required cross sections and thickness.
2 When compacted thickness of drainage fill is 6 inches or less, place materials in a single layer.
3 When compacted thickness of drainage fill exceeds 6 inches thick place materials in equal layers, with no layer more than 6 inches thick nor less than 3 inches thick when compacted.

3.19 FIELD QUALITY CONTROL

A. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer.

Do not proceed until test results for previously completed work verify compliance with requirements.

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 re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.

1 Scarify or remove and replace material to depth directed by the Architect; reshape and recompact at optimum moisture content to the required density.

C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved 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 the Owner's property.

1 Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION 02200

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* REVISIONS *
* *
* 02221 - 10/85 *
* CSI Section Format: 10/85. *
* Reference Standards: 10/85. *
* Product/Manufacturer Data: N/A *
* Technical Updates: Last major review 1982. *
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SECTION 02221 UTILITY TRENCHING AND BACKFILLING

PART 1: GENERAL

1.1 DESCRIPTION: The work of this section consists of trenching and backfilling for the construction and installation of pipelines, conduits, and cables. All trenching will be open cut.

1.2 DEFINITION: Materials used in backfill, as shown in trench details, are defined as follows:

A. Bedding (BD): When rock, unstable material, or wet trench is encountered at the excavated grade for utility installation, bedding is required. Materials shall be predominantly sand and gravel, having a plasticity index less than 6. Bedding may be omitted if, in the opinion of the Contracting Officer, the excavated trench bottom will adequately support and not damage the utility line.

1. BD-1: Gradation as follows:

Sieve Size	Percent Passing
No. 4	100
No. 8	55- 85
No. 40	15- 30

2. BD-2: Gradation as follows:

Sieve Size	Percent Passing
1/2-inch	100
No. 4	50- 80
No. 40	10- 25

3. BD-3: Gradation as follows:

Sieve Size	Percent Passing
1-1/2-inch	100

1/2-inch	45- 75
No. 40	10- 25

B. Select Backfill (SB): Materials shall be predominantly sand and gravel, having a plasticity index less than 6.

1. SB-1: Gradation as follows:

Sieve Size	Percent Passing
No. 4	100
No. 8	55- 85
No. 40	15- 30

2. SB-2: Gradation as follows:

Sieve Size	Percent Passing
1/2-inch	100
No. 4	50- 80
No. 40	10- 25

3. SB-3: Gradation as follows:

Sieve Size	Percent Passing
3/4-inch	100
3/8-inch	55- 85
No. 40	10- 25

4. SB-4: Gradation as follows:

Sieve Size	Percent Passing
1-1/2-inch	100
1/2-inch	45- 75
No. 40	10- 25

C. Backfill (BF):

1. BF-1: Materials shall be predominantly sand and gravel, having a plasticity index less than 6, and graded as follows:

Sieve Size	Percent Passing
1-1/2-inch	100
1/2-inch	45- 75
No. 40	10- 25

2. BF-2: Soils that contain no rock larger than 6 inches at greatest dimension. If expansive clays are present, such content shall not exceed one-third of the material by volume, and shall be well mixed with noncohesive soils.

1.3 QUALITY ASSURANCE:

A. All compaction testing and gradation analysis will be arranged and paid for by the Government. Contractor shall be present when samples of bedding, select backfill, and backfill materials are gathered for analysis.

B. All references to percent of maximum density will be as determined by ASTM D698-78, Method C, at a moisture content determined to be suitable for such density. Moisture-density curves will be prepared in a certified soils testing laboratory.

C. In-Place Soil Density Testing: Procedures used by the Contracting Officer will be in accordance with ASTM D1556-82, Density of Soil In Place By the Sand-Cone Method, or ASTM D2922-81, Density of Soil and Soil-Aggregate In Place By Nuclear Methods (Shallow Depth). Contracting Officer will perform at least one test within each backfill material zone (BD, SB, BF) at the following maximum intervals:

1. Vehicular Traffic Areas: 50 linear feet of trench.

2. Pedestrian and Lawn Areas: 100 linear feet of trench.

3. Nontraffic Areas: 200 linear feet of trench.

Testing at more frequent intervals may be performed at the discretion of the Contracting Officer.

1.4 SUBMITTALS: As specified in Section 01300.

A. Written procedure for trench dewatering and disposal of fluidized materials removed.

B. Written description of barricading, shoring, cribbing, bracing, and sloping precautions.

1.5 PROJECT CONDITIONS:

A. Obtain all required permits and licenses before installing utilities under existing roads, other than Park Service roads, and follow the rules and requirements of the authority having jurisdiction.

B. Arrange construction sequences to provide the shortest practical time that the trenches will be open to avoid hazard to the public, and to minimize the possibility of trench collapse.

1.6 EXCAVATION CLASSIFICATION: Regardless of the nature of material excavated, all excavation will be considered unclassified.

1.7 HAND EXCAVATION: Contracting Officer will direct the performance of hand excavation within the drip line of selected trees shown on the drawings.

PART 2: PRODUCTS

2.1 GENERAL: All backfill material shall be approved before use and be free of cinders, ashes, ice, frozen soil, large hard clods, organic debris, or other deleterious items. Trench excavation materials may be used as approved.

2.2 MATERIALS FOR BACKFILLING: Furnish required bedding, select backfill, and backfill materials listed under the appropriate types of utility line in the sections to which this work relates.

2.3 UTILITY LINE MARKING: All utilities shall be marked for location and identified by marking tapes, as specified in Section 02229.

PART 3: EXECUTION

3.1 TRENCH EXCAVATION:

A. Trenching Guidelines: Excavate the trench to the approximate level of the top of the utility line to be installed, using adequate trench width and side slopes to safely accommodate worker access. Continue excavating for the utility line, to a width not greater than is shown on the appropriate trench detail.

1. Rocky Trench Bottom: Where ledge rock, hard pan, boulders, or sharp-edged materials are encountered, over-excavate a minimum depth of 6 inches below the bottom of the utility exterior wall to permit adequate bedding preparation. The installed utility shall have at least 6 inches of clearance from any rock protrusion.

2. Unstable Trench Bottom: Secure approval of depth of over-excavation and stabilization method. For wet trench construction, use approved method of dewatering through diversion, damming and pumping, well points, or underdrain systems. Dispose of removed fluidized materials as approved.

Use BD-3 material to build a suitable foundation to within 6 inches of finished utility grade, prior to bedding with the specified material. Compact layers to 95 percent of maximum density in not greater than 6-inch layers. Do not proceed with utility installation until wet trench and unstable conditions are under control.

3. Hand Excavation: Perform hand excavation of trenches dug within the drip line of selected trees as shown. Carefully excavate around all roots 2 inches in diameter and larger to ensure against damage.

B. Paved Areas: Cut existing pavement full depth to a true line before excavation, as shown, and maintain the edge suitable for repaving. Pavement removed shall not be used as backfill.

C. Lawn Areas: Where trenches cross established lawn areas, remove turf with approved sod cutting equipment. Store and maintain the removed sod for later replacement. Cut to the lines shown or as directed.

3.2 SHORING AND SHEETING:

A. Construct and maintain all sheeting and shoring necessary to protect the excavation, as needed for the safety of the employees and as required by applicable State and Federal laws. Under no condition shall trench and/or structure excavations be "laid back" to accomplish work operations noted herein.

B. For trenches over 5 feet deep, provide suitable barricades for worker protection. When work area is left open and unattended by Contractor, provide suitable barricades for public safety, regardless of trench depth.

C. For trenches over 4 feet deep, provide suitable exit means in accordance with applicable provisions of OSHA.

D. Do not remove timber or sheeting if it is in a compacted zone. Instead, trim it off at a safe level above that zone.

E. As directed, remove all other sheeting and shoring when safe to do so.

3.3 BACKFILLING:

A. Compaction: Use vibratory compactors for sands and gravels (noncohesive soils). Use mechanical tampers for sand and gravel containing a significant portion of fine-grained material, such as silt and clay (cohesive soils). Hand tamp around pipe or cable to protect the lines until adequate cushion is attained.

Puddling or water flooding for consolidation of backfill or compaction by wheel rolling with construction equipment will not be permitted.

B. Bedding: Compact the specified material to 95 percent of maximum density to the finished utility grade.

C. Utility Installation: Shape the trench bottom to ensure uniform contact with the full length of the installed line and remove any sharp-edged materials that might damage the line. Compaction shall be maintained beneath the line.

D. Select Backfill: Fill by hand placement around the utility to just over half depth, and compact in a manner to ensure against lateral or vertical displacement. Place select backfill to 12 inches above the utility line by hand placement in not more than 6-inch layers. Compact each layer to 95 percent of maximum density.

E. Backfill: Place and compact the specified material as follows:

1. Vehicular Traffic Areas: Fill and compact in 8-inch maximum layers to 95 percent of maximum density.

2. Pedestrian and Lawn Areas: Fill and compact in 8-inch maximum layers to 90 percent of maximum density.

3. Nontraffic Areas: Fill and compact in 8-inch maximum layers to 90 percent of maximum density.

3.4 SURFACE FINISH WORK:

A. Paved Areas: Replace removed paving and base course with new material of equal or better quality and of the same texture and color as the adjacent paved areas. Saw cut pavement edge to a true line and broom as needed prior to paving.

B. Lawn Areas: Prepare the area for proper relaying of the previously removed sod. Remove trench and backfill materials from adjacent lawn areas to permit unhindered growth of grasses and safe operation of mowing equipment. Replace sod as specified in Section 02932. Sod and adjacent lawn areas that do not reestablish at the commencement of the next growing season shall be replaced at no additional expense to the Government.

C. Open and Seeded Areas: Grade all disturbed areas to a finish ordinarily obtained from a blade grader, with no abrupt changes in grade or irregularities that will hold water.

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* REVISIONS *
* *
* 02229 - 06/92 *
* CSI Section Format: 06/92. *
* Reference Standards: 06/92. *
* Product/Manufacturer Data: 06/92. *
* Technical Updates: Last major review 04/88. 6/92, Changed *
* salient features for marking tape. *
****
* **DESIGN NOTE:** All buried utility lines, metallic and non- *
* metallic, shall be marked and identified for ease of future *
* field verification of line location and description. Surface *
* markers, in addition to tape marking, should be used on *
* electrical lines. *
****
* **DRAWING DATA:** Show depth placement of marking tape on trench *
* details. See Standard Details 02221 and 02222. Include *
* Standard Detail 02229 on drawings if surface markers are used.*
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SECTION 02229 UTILITY LINE MARKING

PART 1: GENERAL

1.1 DESCRIPTION: The work of this section consists of furnishing and installing utility line marking.

1.2 SUBMITTALS: As specified in Section 01300.

A. Samples: 24-inch strips of tape and 2 markers.

B. Certification that the materials used in the tape fabrication meet the requirements of this section.

C. Installation procedure if the cable is installed by plowing.

PART 2: PRODUCTS

2.1 MARKING TAPE: Capable of being inductively detected electronically.

A. Construction: Metallic foil laminated between two layers of impervious plastic film not less than 3 inches wide. Total thickness of tape shall not be less than 0.005 inch (5 mil) plus or minus 10 percent manufacturing tolerances.

1. Film: Inert plastic. Each film layer shall be not less than 0.0005 inch thick (0.5 mil).

2. Foil: Not less than 0.00035 inch thick (0.035 mil).

3. Adhesive: Compatible with foil and film.

B. Imprint: 3/4-inch or larger bold black letters.

C. Legend: Identify buried utility line tape with imprint such as "Caution: Sewer Line Below". Repeat identification at approximately 24-inch intervals.

D. Background Color: APWA color code and as specified below:

Color	Utility
Safety Red	Electric
High Visibility Safety Yellow	Gas, Oil, Steam, Dangerous Materials
Safety Alert Orange	Telephone, Communications, Cable Television
Safety Precaution Blue	Water System, Irrigation
Safety Green	Sanitary Sewer, Storm Sewer
Safety Brown	Force Mains, Reclaimed Water, and Effluent Lines

E. Manufacturer: Lineguard, Inc., Wheaton, Illinois; Reef Industries, Inc., Houston, Texas; Thor Enterprises, Inc., Sun Prairie, Wisconsin; or approved equal.

2.2 SURFACE MARKERS: All markers shall have an identifying letter either cast or routed into marker. The Contractor has the option of any of the following:

A. Cast-In-Place Concrete: Section 03310.

1. Concrete: Compressive strength of 3,000 psi at 28 days; maximum size aggregate, 1-inch; air entrainment, 6 percent, plus or minus 1-1/2 percent.

2. Reinforcement: One No. 3 bar in center of the marker.

B. Precast Concrete: Commercially fabricated concrete marker meeting design dimensions and concrete reinforcing requirements.

C. Timber Posts: Any softwood lumber species meeting PS 20-70. Grade No. 1 or better, free of heart center, S4S, size as shown. Pressure treat timber posts for soil contact with waterborne preservative in accordance with AWPA C2-90.

PART 3: EXECUTION

3.1 MARKING TAPE:

A. Install tape in backfill directly over each buried utility line as shown. Place tape by plowing or during final backfilling.

B. Where utilities are buried in a common trench, identify each line by a separate warning tape. Bury tapes side by side directly over the applicable line.

3.2 ELECTRICAL CABLE AND CONDUIT SURFACE MARKERS: In addition to marking tape, install surface markers at all changes in horizontal direction or at intervals not exceeding 400 feet.

PART 4: MEASUREMENT AND PAYMENT

4.1 UTILITY LINE MARKING: Payment will be included in the contract unit prices for utility lines.

END

PART 1: GENERAL

1.1 DESCRIPTION: The work of this Section consists of furnishing and placing aggregate base and filler, if required, on a prepared subgrade.

1.2 RELATED SECTIONS:

A. Section 02519: Brick Pavers

B. Section 02517: Stone Paver

C. Section 02921: Landscape Grading: Soil fill at areas adjacent to base course

1.3 REFERENCES:

A. AASHTO M147-65 - Materials for Aggregate and Soil-Aggregate.

B. ASTM C136 - Sieve Analysis of Fine and Coarse Aggregates.

C. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

D. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

E. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.4 SUBMITTALS:

A. Submit under provisions of Section 01300.

B. Two copies of certified weight tickets for each load of aggregate delivered to project site.

C. If materials are obtained from a commercial source, submit certification from the supplier certifying that aggregate base course meets the requirements of this section.

PART 2: PRODUCTS

2.1 AGGREGATE MATERIALS:

A. Coarse Aggregate: Clean, hard, durable, angular, crushed stone; free of shale, clay, friable materials and debris; material, inclusive of filler, shall meet following screen analysis requirements by weight:

Sieve Designation	Percent Passing
1-1/2 inch	100
1 inch	75-100
No. 4	30-70
No. 200	3-15

B. Fine Aggregate: Finely divided mineral matter such as hydrated lime, stone dust, organic impurities; washed free of silt, clay, loam, friable or soluble materials.

2.2 Water: See Section 02233.

PART 3: EXECUTION

3.1 EXAMINATION:

A. Verify subgrade has been inspected, gradients and elevations are correct, and are dry.

3.2 MIXING:

A. Mix the aggregate by any one of the three following methods:

1. Stationary Plant Method: Mix aggregate base course and appropriate amount of water for compaction in an approved mixer. After mixing, transport aggregate to the job site while it contains the proper moisture content and place on the roadbed with an approved aggregate spreader. Before compaction, remove excess moisture.

2. Travel Plant Method: After the material for each layer has been placed through an aggregate spreader or windrow sizing device, it shall be uniformly mixed by a traveling mixing plant.

3. Road Mix Method: After placing each layer, mix materials at optimum moisture content using motor graders or other approved equipment until the moisture is uniform throughout.

B. When commercial binders or fillers are used with aggregate, mix with a central mixing plant of the twin-pugmill type. Other methods that ensure a thorough and homogenous mixture may be used on written approval.

3.3 AGGREGATE PLACEMENT:

A. Placing: If the required compacted depth of the aggregate base course exceeds 6 inches, place course in two or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches.

3.4 COMPACTION:

A. Level and contour surfaces to elevations and gradients as shown.

B. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

C. Compact each layer to a density of not less than 95 percent of the maximum density, as determined by AASHTO T180-74, Method D. Contracting Officer will test density in-place, in accordance with AASHTO T191-61, T205-64, or other recognized method. Random tests for compacted depth will be made during the progress of the work.

D. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

3.5 SURFACE FINISHING:

A. Use a smooth steel wheel roller for the final rolling of top surface base course. Water surface and evenly spread loose stones before final rolling. Make minimum of two complete passes over area to embed stones. Correct soft spots developed during rolling.

B. Compacted base course surface shall be smooth and free from waves and other irregularities. Unsatisfactory portions of base course shall be torn up, reworked, relaid, and rerolled, at no additional expense to the Government.

3.6 MATERIAL ACCEPTANCE REQUIREMENTS:

A. Acceptance will be based on periodic samples and tests taken following mixing and before laying.

3.7 TOLERANCES:

A. Surface: The Contracting Officer will test finished surface of the base course with a 10-foot straightedge or other device. The variation between any two contacts with the surface shall not exceed 1/2 inch. Any areas not complying with these tolerances shall be reworked to obtain conformity.

B. Width: Plan dimension, plus or minus 2 inches.

C. Scheduled Compacted Thickness: Within 1/4 inch (6 mm) of plan dimension.

3.8 FIELD QUALITY CONTROL:

A. Field testing will be performed under provisions of Section 01400.

B. Gradation of Aggregate: In accordance with ASTM C136.

C. Compaction testing will be performed in accordance with ANSI/ASTM D698, ANSI/ASTM D1557 and with Section 01400.

D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the Government.

E. Maintenance: Maintain base course in a satisfactory condition until surfaced or until final acceptance.

PART 4: MEASUREMENT AND PAYMENT

4.1 AGGREGATE BASE COURSE: Payment will be included in the bid item to which this work relates.

END

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 soil treatment for termite control.

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.

B. Product data and application instructions.

C. Certification that products used comply with U.S. Environmental Protection Agency (EPA) regulations for termiticides.

D. Verification of exterminator's qualifications.

E. List of product's active ingredients, including EPA registration number, trade name, common name if available, and percentage of each active ingredient.

F. Method of application.

G. Proof that insurance includes cost of decontamination of spills.

1.4 QUALITY ASSURANCE

A. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for preparing substrate and application.

B. Use only termiticides that bear a federal registration number of the EPA and are approved by local authorities having jurisdiction.

C. Employ only insured pest control firms licensed and certified by the state in which the pesticide is to be applied.

1.5 JOB CONDITIONS

A. Restrictions: Do not apply soil treatment solution until excavating, filling, and grading operations are completed, except as otherwise required in construction operations.

B. To ensure penetration, do not apply soil treatment to frozen or excessively wet soils or during inclement weather. Comply with handling and application instructions of the soil toxicant manufacturer.

C. Secure written approval before delivery of chemicals.

D. Deliver pesticides in original sealed containers.

E. Protect and identify treatment area to prevent disturbance of treated soil by human or animal contact.

F. Before drilling, examine existing drawings for locations of utilities. Equip drill with ground fault interrupter and a mechanism for stopping the drill at required depth.

G. Begin soil poisoning after foundations are complete.

1.6 WARRANTY

A. Warranty: Furnish written warranty, executed by Applicator and Contractor, certifying that applied soil termiticide treatment will prevent infestation of subterranean termites. If subterranean termite activity is discovered during warranty period, Contractor will re-treat soil and repair or replace damage caused by termite infestation.

B. Warranty Period: 5 years from date of Substantial Completion.

C. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 PRODUCTS

2.1 SOIL TREATMENT SOLUTION

A. General: Use an emulsible, concentrated termiticide that dilutes with water, specially formulated to prevent termites infestation. Fuel oil will not be permitted as a diluent. Provide a solution consisting of one of following chemical elements.

B. Available Products: Subject to compliance with requirements, products that may be incorporated in the

Work include, but are not limited to, the following:

C. Products: Subject to compliance with requirements, provide one of the following:

1. Chloropyrifos:

a. Dursban TC, Dow Chemical Co., Midland, Michigan.

D. Dilute with water to concentration level recommended by manufacturer.

E. Other products containing chlorpyrifos that are registered by EPA for subterranean termite control may be used if approved by Contracting Officer and if approved for intended application by local authorities having jurisdiction. Use only soil treatment solutions that are not harmful to plants.

PART 3 EXECUTION

3.1 PREPARATION:

A. Remove stumps, roots, wood debris, and foreign material. Provide adequate drainage away from structure to prevent moisture buildup. When earthwork has been completed, verify that soil is friable, with moisture content low enough to permit absorption of solution.

B. Mixing: In the presence of the Contracting Officer, mix the pesticide to produce the tank mix specified by the manufacturer.

3.2 APPLICATION

A. Surface Preparation: Remove foreign matter that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and foundations. Toxicants may be applied before placing compacted fill under slabs if recommended by toxicant manufacturer.

B. Application: Comply with state and Federal requirements. Apply the pesticide according to manufacturer's directions and in the presence of the Contracting Officer. Drill on 12-inch centers when treating clay soil and 16-inch centers when treating sandy soil. Do not exceed the labeled application rate in either case.

C. Application Rates: Apply soil treatment solution as follows:

1. Under slab-on-grade structures, treat soil before

concrete slabs are placed, using the following application rates:

a. Apply 4 gallons of chemical solution per 10 linear feet to soil in critical areas under slab, including entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers.

b. Apply 1 gallon of chemical solution per 10 sq. ft. as an overall treatment under slab and attached slab areas where fill is soil or unwashed gravel. Apply 1-1/2 gallons of chemical solution to areas where fill is washed gravel or other coarse absorbent material.

c. Apply 4 gallons of chemical solution per 10 linear feet of trench for each foot of depth from grade to footing, along outside edge of building. Dig a trench 6 to 8 inches wide along outside of foundation to a depth of not less than 12 inches. Punch holes to top of footing at not more than 12 inches o.c. and apply chemical solution. Mix chemical solution with the soil as it is being replaced in the trench.

2. Under crawlspace and basement structures, treat soil along exterior and interior walls of foundations with shallow footings as specified above for exterior of slab-on-grade structures.

3. Treat soil under or around crawlspace structures as follows:

a. Apply 4 gallons of chemical solution per 10 linear feet of trench along inside of foundation walls, along both sides of interior partitions, and around piers and plumbing. Do not apply an overall treatment in crawlspaces.

b. Apply 4 gallons of chemical solution per 10 linear feet of trench, for each foot of depth from grade to footing, along outside of foundation walls, including part beneath entrance platform porches, etc.

c. Apply 4 gallons of chemical solution per 10 linear feet along the inside and outside of foundation walls of porches.

d. Apply one gallon per 10 sq. ft. of soil surface

as an overall treatment only where attached concrete platform and porches are on fill or ground.

4. At hollow masonry foundations or grade beams, treat voids at rate of 2 gallons per 10 linear feet, poured directly into the hollow spaces.

5. At expansion joints, control joints, and areas where slabs will be penetrated, apply at rate of 4 gallons per 10 linear feet of penetration.

D. Post signs in areas of application to warn workers that soil termiticide treatment has been applied. Remove signs after areas are covered by other construction.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, landscape grading, or other construction activities following application.

3.3 CLEAN-UP: Dispose of excess pesticide and chemical containers legally outside park boundaries.

END OF SECTION 02282

PART 1: GENERAL

1.1 DESCRIPTION: The work of this section consists of:

A. Subgrade preparation

B. Constructing aggregate (crushed stone) walks

C. Filter Fabric

D. Brick edging

1.2 RELATED SECTIONS:

A. Section 02231: Aggregate Base Course

1.3 PROJECT CONDITIONS: Use lightweight hauling equipment. Exercise care in using equipment, avoiding damage to adjacent plant material and stone walls, and existing archeological remnants.

1.4 QUALITY ASSURANCE:

A. Density testing of subgrade, shale base, and shale/clay mixture shall be done by an independent geotechnical testing firm at the Contractor's expense. Submit 4 copies of all test reports as specified in Section 01300.

B. AASHTO T99-81, Method D, shall be used to determine maximum density, and AASHTO T191-61, or a standard nuclear method, shall be used to determine in-place density. In-place densities specified are minimums and may be exceeded.

1.5 PROJECT CONDITIONS: Use lightweight hauling equipment. Exercise care in using equipment, avoiding damage to adjacent plant growth and exiting structures, foundations and archeological resources.

1.6 SUBMITTALS: Submit 9 cubic inches of fine crushed shale mix for finished surface of walk.

PART 2: PRODUCTS

2.1 AGGREGATE BASE COURSE: See Section 02231.

2.2 FINE CRUSHED SHALE SURFACE COURSE:

A. Clean, hard, durable particles or fragments of shale with no pieces larger than 1 inch to 1-1/2 inch. Supplier: Liskey Shale Pit, Middleway, West Virginia, or approved equal.

B. The portion retained on the No. 4 sieve shall have a maximum percentage of wear of 50 at 500 revolutions as determined by AASHTO T96-77.

C. The portion passing the No. 40 sieve shall have a maximum liquid limit of 25 and a maximum plasticity index of 7, as determined by AASHTO T89-81 and AASHTO T90-81, respectively.

D. Free from clay lumps, vegetable matter, and deleterious material.

E. Grading Requirements - Large Aggregate:

1. Percentage by Weight Passing Square Mesh Sieve AASHTO T11-82 and T27-82

Sieve Designation	Percent Passing	Sieve Designation	Percent Passing
1-inch	100	No. 10	30 - 50
3/4-inch	90 -100	No. 200	3 - 10
3/8 inch	65 - 85		

F. Grading Requirements - Small Aggregate:

1. Percentage by Weight Passing Square Mesh Sieve AASHTO T11-82 and T27-82

Sieve Designation	Percent Passing	Sieve Designation	Percent Passing
3/4-inch	100	No. 10	25 - 60
3/8-inch	50 - 80	No. 40	15 - 30
No. 4	35 - 65	No. 200	5 - 15

2.3 CLAY: Material with a plasticity index greater than 10, with 100 percent passing the 200 mesh sieve. Commercial products may be used with approval.

2.4 BRICK EDGING: See Section 02514.

2.5 MORTAR: See Section 04100.

2.6 ACCESSORIES:

A. Filter Fabric: Mirifi 140N, synthetic fabric, Mirafi, Inc. or approved equal.

PART 3: EXECUTION

3.1 SUBGRADE PREPARATION: Remove 6-inch deep area of sod in sufficient width for the installation of the walk. Grade and compact to 95 percent of maximum density. No excess excavation will be allowed.

3.2 BRICK EDGING: Place mortar on undisturbed compacted soil and place ends of bricks into mortar so that bricks will not shift and will be secure in place. Bricks shall be oriented with the nominal 4-inch dimension running parallel to the walk, to form

outer edge of walk. Bricks shall fit tight against each other with no gaps. Brush joints with sand upon completion. Backfill back of bricks by compacting to match existing undisturbed ground. Place crushed shale and grade. Compact to 95 percent of maximum density.

3.3 AGGREGATE BASE COURSE: See Section 02231.

3.4 FILTER FABRIC: Install as shown and as per manufacturer's recommendations.

3.5 PLACING AGGREGATE - SURFACE COURSE: Place to avoid segregation, in maximum layers of 4 inches. Place layer of fine crushed shale mixed with clay. Clay shall be 10 to 15 percent of total mixture. Grade and compact to 95 percent of maximum density. Compact by wetting. Roll with a hand operated power roller of type and weight as approved to obtain a dense, smooth, uniform texture. Backfill back of forms by compacting to match existing undisturbed ground.

3.6 PLACING CLAY: Place 1/2-inch layer of clay; grade and compact to 95 percent of maximum density.

3.7 FINISHING: Grade area on each side of walk. Finish adjacent shoulders and slopes to required grade and cross section.

3.8 INSPECTION: Final thickness of completed walk shall not vary more than 1/2 inch from indicated. Make measurements by means of test holes taken at random in finished walk surface. Correct any variations in the thickness beyond the allowable 1/2 inch by adding material, shaping, and compacting.

PART 4: MEASUREMENT AND PAYMENT

4.1 AGGREGATE PAVING:

A. Basis of Measurement: By the number of square yards of actual length and specified width measured along the centerline of walk.

B. Basis of Payment: Includes preparation of subgrade, materials and installation of aggregate base course, aggregate surface course, filter fabric. Payment will be made at the contract unit price.

END

PART 1: GENERAL

1.1 DESCRIPTION: The work of this Section consists of:

A. Slate pavers and edging.

B. Subgrade Preparation.

C. Filter fabric.

D. Sand bed and joint filler.

1.2 RELATED SECTIONS:

A. Section 02923 - Landscape Grading: Preparation of subsoil for pavers

B. Section 02223 - Backfilling: Compacted fill for pavers

1.3 REFERENCES:

A. ASTM C33 - Concrete Aggregates.

B. ASTM C144 - Aggregate for Masonry Mortar.

C. ASTM C150 - Portland Cement.

1.4 QUALITY ASSURANCE:

1.5 SUBMITTALS:

A. Submit under provisions of Section 01300.

B. Product Data: Provide characteristics of new paver unit, dimensions, and special shapes.

C. Samples: Submit four stone samples, 12 inches by 12 inches by 3-4 inches, illustrating size, color range and surface texture of units being provided. Each sample shall be partially sawn through on back to facilitate breaking.

1.6 ENVIRONMENTAL REQUIREMENTS:

A. Maintain substrate surface to a minimum of 50 degrees F (10 degrees C) prior to, during, and 48 hours after completion of work.

B. At end of working day, store stones on planks or during

rainy weather, cover work exposed to weather with waterproof coverings, securely anchored.

PART 2: PRODUCTS

2.1 PAVER MATERIALS

A. Salvaged Slate Paving & Edging Pavers: To be supplied by the Government.

B. New Slate Pavers: Natural cleft surface finish; color selected from quarried range available with no defects impairing strength, durability, and appearance. Cut stone to required size and shape at project site. Hand tool to accurate lines and dimension, limiting tooling to 1 percent of face area.

C. New Slate Edging Pavers: Shape and size as shown. Natural cleft surface finish; color selected from quarried range available. Cut stone to required size at project site.

D. Maximum Warp Tolerance: 1/2 inch.

2.2 SAND BED MATERIALS:

A. Sand for Setting Bed: ASTM C33, uniformly graded, sharp, clean, washed concrete sand containing maximum of 30 percent particle size of No. 10 (2 mm) sieve and 100 percent passing the No. 4 sieve.

B. Sand for Joints: ASTM C144, fine graded masonry sand, thoroughly dry silica sand, uniformly graded, 56.5 percent retained on a No. 30 sieve.

2.3 CEMENTITIOUS MATERIALS

A. Portland Cement: ASTM C150-84 Type 1, non-staining, grey color.

B. Sand: ASTM C144-84; sharp, coarse, clean, screened sand, free of organic material.

C. Water: Potable, not detrimental to mix.

D. Admixtures: ASTM C260-77, water reducing and plasticizing agent.

E. Color: Mineral type, non-fading, color to match pavers.

2.4 ACCESSORIES:

A. Filter Fabric: Mirafi 140N, synthetic fabric, Mirafi, Inc., or approved equal.

2.5 MIXES:

A. Cementitious Bed: One part cement, three parts sand. Use only enough moisture to hold mix together. Sprinkle top with portland cement before setting stone.

B. Pointing: One part cement, two parts sand with mortar coloring.

C. Thoroughly mix ingredients in quantities needed for immediate use.

D. Use within two hours after mixing. Do not re-temper.

PART 3: EXECUTION

3.1 EXAMINATION:

A. Verify substrate conditions under provisions of Section 01039.

B. Verify that substrate is level, smooth, capable of supporting pavers and imposed loads, and ready to receive work of this Section. Excavate or fill to lines or grades shown. Remove soft yielding material and replace with suitable material. Shake and compact and firm.

C. Verify gradients and elevations of substrate are correct.

3.2 AGGREGATE BASE COURSE: Section 02231

3.3 FILTER FABRIC: Install as per manufacturer's recommendations as shown.

3.4 INSTALLATION - ON SAND SETTING BED:

A. Spread sand evenly over prepared subgrade to a thickness of 1 inch.

B. Dampen and roller compact sand to level and even surface.

C. Screed and scarify top 1/2 inch (12 mm) of sand.

D. Place paver units in pattern in the exact numbered sequence and order as shown.

E. Place half units, special shaped units, and curbs at edge and interruptions. Maintain tight, evenly spaced joints.

F. Sprinkle sand over surface, sweep into joints and moisten. Recover with additional sand until firm joints are achieved. Remove excess sand.

G. Tamp and level paver units with mechanical vibrator until units are firmly bedded, level, and to correct elevation and gradients.

3.5 CLEANING:

A. Do not clean pavers until pavers and mortar are dry.

B. Clean soiled surfaces using cleaning solution. Do not harm pavers, joint materials, or adjacent surfaces.

C. Use non-metallic tools in cleaning operations.

D. Rinse surfaces with clean water.

E. Broom clean paving surfaces. Dispose of excess sand.

3.6 PROTECTION OF FINISHED WORK:

A. Protect finished Work under provisions of Section 01500.

B. Do not permit traffic over unprotected paver surface. Protect paver surface with sheets of plywood sheathing.

PART 4: MEASUREMENT AND PAYMENT

4.1 STONE PAVERS ON SAND BED:

A. Basis of Measurement: By the square foot.

B. Basis of Payment: Includes preparation of subgrade, aggregate base course, sand setting bed, new slate pavers, installation and cutting of new and salvaged slate pavers, sand jointing, finishing.

4.2 STONE EDGING:

A. Basis of Measurement: By the linear foot.

B. Basis of Payment: Includes preparation of subgrade, aggregate base course, new slate curbs, and installation of salvaged slate curbs.

END

PART 1: GENERAL

1.1 DESCRIPTION: The work of this Section consists of:

A. Preparation of subgrade.

B. Sand and mortar setting bed.

C. Sand swept and mortar joints.

D. Brick window well curb.

E. Handmolded, clay brick pavers.

F. Expansion joints.

G. Filter fabric.

1.2 RELATED SECTIONS:

A. Section 02223 - Backfilling: Compacted fill preparation

B. Section 07900 - Joint Sealers

C. Section 02232 - Aggregate Base Course

1.3 REFERENCES:

A. ASTM C144 - Aggregate for Masonry Mortar.

B. ASTM C150 - Portland Cement.

C. ASTM C270 - Mortar For Unit Masonry.

1.4 SYSTEM DESCRIPTION:

A. Paving and setting bed to accommodate pedestrian traffic.

1.5 SUBMITTALS:

A. Submit under provisions of Section 01300.

B. Product Data: Provide data on characteristics of paver unit, dimensions, and special shapes.

C. Samples: Submit four sample paver units, illustrating color, surface finish, and texture.

1.6 MOCKUP:

A. Provide mockup of paving layout under provisions of Section 01400.

B. Size: 100 sq ft.

C. Install sand setting bed, brick pavers, and accessories to pattern indicated.

D. Show range of shades, color, and texture of pavers.

E. Mockup may remain as part of the Work.

1.7 ENVIRONMENTAL REQUIREMENTS:

A. Do not install mortar when surrounding air or substrate surface temperature is below 50 degrees F (10 degrees C) prior to, during, and 48 hours after completion of work.

B. Do not install mortar when surrounding air or substrate surface temperature is above 90 degrees F (32 degrees C) during or 48 hours after completion of the work.

C. Do not install mortar when wind velocity exceeds 15 mph or relative humidity exceeds 50 percent.

D. At end of working day, or during rainy weather, cover work exposed to weather with waterproof coverings, securely anchored.

PART 2: PRODUCTS

2.1 MORTAR: Sand, ASTM C144-81; portland cement, ASTM C150-84; lime, ASTM C207-79, Type S.

A. Mortar for Brick Curb & Steps: One part nonstaining portland cement, 1/4 part hydrated lime, and three parts sand, measured by volume.

B. Dry Cement Mortar: One part portland cement to three parts sand, measured by volume.

2.2 PAVING BRICK: ASTM C902-79a, Type I, Application PX. Broken, chipped, cracked, warped, or underburned brick will be rejected. Match color and texture of existing brick pavers (front of Building #33). Use molded new bricks such as solid, hand-molded brick by Victor Cushwa and Sons, Williamsport, Maryland, or approved equal.

2.3 BRICK CURB: ASTM C902-79a, Type I, Application PX. Broken, chipped, cracked, warped, or underburned brick will be rejected. Match color and texture of existing brick pavers (front of Building #33). Use molded, new bricks such as solid,

hand-molded brick by Victor Cushwa and Sons, Williamsport, Maryland, or approved equal.

2.4 SAND MATERIALS:

A. Sand for Setting Bed: ASTM C33 uniformly graded, sharp, clean, washed, concrete, sand coarse to fine with 30 percent, 3mm (1/8") particle size of No. 10 sieve, and 100 percent passing the No. 4 sieve.

B. Sand for Swept Joints: ASTM C144, fine aggregate, masonry sand, thoroughly dry silica sand, uniformly graded, 56.5 percent retained on a No. 30 sieve.

2.5 WATER: Potable and not detrimental to mortar.

2.6 ACCESSORIES:

A. Filter Fabric: Mirafi, 140N, synthetic fabric, Mirafi, Inc., or approved equal.

B. Cleaning Solution: Type recommended by paver manufacturer.

C. Expansion Joint Filler: ASTM D1752-67, self expanding corkboard.

D. Sealant: Urethane, self levelling type as specified in Section 07900 including bond breaker from sealant.

2.7 MIXES:

A. Cementitious Bed: Portland cement mix conforming to the following:

Property	Value
Compressive Strength (28 day)	4500 psi
Slump 2 to 3 inches	

B. Thoroughly mix ingredients in quantities required for immediate use.

C. Use within two hours after mixing. Do not re-temper thereafter.

PART 3: EXECUTION

3.1 EXAMINATION:

A. Verify substrate conditions under provisions of Section 01039. Excavate or fill to lines and grades shown. Remove soft, yielding material and replace with suitable material. Shape and compact to a firm, even surface with rollers or mechanical tampers to a minimum of 95 percent compaction.

B. Verify substrate is ready to support pavers and imposed loads.

C. Verify gradients and elevations of substrate are correct.

D. Maintain base until paving is placed.

3.2 AGGREGATE BASE COURSE: See Section 02232.

3.3 INSTALLATION - FILTER FABRIC: Install as per manufacturer's recommendations and as shown.

3.4 INSTALLATION - SAND SETTING BED:

A. Spread sand evenly over prepared substrate surface to a maximum thickness of 1 inch.

B. Dampen and roller compact sand to level surface.

C. Screed and scarify top 1/2 inch (13 mm) of sand.

D. Place brick field paving units in a running bond pattern from straight reference line as indicated on plans.

E. Keep sand/cement setting bed mix off of face of brick.

F. Place half units or special shaped units at edges and interruptions. Maintain hand tight joints. Machine saw partial units. Back cut pavers a maximum of 1/2 paver size as needed. Pavers less than 4x4x2-1/4" are not permitted.

G. Sprinkle masonry sand over surface and sweep into joints. Moisten joints and recover with additional sand until firm joints are achieved. Remove excess sand.

H. Tamp and level paver units with mechanical plate vibrator until units are firmly bedded, level, and to correct elevation and slope gradient.

I. Tolerances: Check surface with a 4 foot straight edge. Correct deviances greater than 1/8 inch.

J. Keep paving damp for 3 days with intermittent spraying to cure joints and setting bed.

3.5 CONCRETE FOOTING: See Section 00000

3.6 INSTALLATION - MORTAR SETTING BED:

A. Set paver units in full cementitious mortar bed of minimum 3/8 inch thickness, to support pavers over full bearing surface.

B. Place paver units in linear pattern as shown on plans from straight reference line.

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* REVISIONS *
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* 02605 - 10/85 *
* CSI Section Format: 10/85. *
* Reference Standards: 10/85. *
* Product/Manufacturer Data: 10/85. *
* Technical Updates: Last major review pre-1976. *
* 5/85; changed steps to polypropylene. *
****
* **Drawing Data Required:** Layout plan for locations of proposed *
* manholes. Typical cross section showing construction details.*
* Show types and installation of frames and covers; and dimen- *
* sions and spacings of steps. *
****

SECTION 02605 MANHOLES

PART 1: GENERAL

1.1 DESCRIPTION: The work of this section consists of constructing storm drain manholes.

PART 2: PRODUCTS

2.1 CAST-IN-PLACE CONCRETE MANHOLES: Concrete, Section 03305.

2.2 BRICK MANHOLES: Brick, ASTM C32-73, Grade SM, clay.

2.3 MORTAR: One part portland cement, one part hydrated lime, and six parts sand.

2.4 STEPS: Polypropylene steps, manufactured by M. A. Industries, Peachtree City, Georgia, or approved equal. Size as shown.

2.5 GROUT: Neat portland cement and water.

2.6 FRAME AND COVER: FS RR-F-621D, gray cast iron.

A.Traffic: Type I, Style A, Size 24A frame; Type A, Size 24A nonventilated cover.

PART 3: EXECUTION

3.1 EXCAVATION AND BACKFILL: Section 02225.

3.2 MANHOLES:

A. Field Constructed Manholes: Construct at locations and to dimensions shown.

B. Invert Channels: Smooth and semi-circular in shape, conforming to the inside of the adjacent sewer sections. Make changes in flow direction by a smooth curve of a radius as large as permitted by manhole size. Make changes in size and grade gradually and evenly. Form by one of the following methods:

1. Form directly in manhole concrete base.

2. Build up with brick and mortar.

3. Lay half sewer tile pipe in concrete.

4. Lay full sewer tile pipe section in concrete. After concrete has hardened, break off top half of section.

C. Floors Outside Invert Channel: Smooth, with slope toward the channel of between 1 inch and 2 inches per foot.

3.3 FRAMES AND COVERS: Install as shown, with top of cover flush with finish grade or ground surface. Grout frames to the concrete manhole section.

3.4 STEPS: Install steps in accordance with manufacturer's recommendations and as shown.

PART 4: MEASUREMENT AND PAYMENT

4.1 STANDARD MANHOLES: Measurement will be the number of manholes in place. Each manhole of 4-foot depth or less, measured to the nearest whole foot, from the invert of the lowest connected pipe to the top of the cone section, to the top of any concrete adjusting rings provided, or to the top of the slab cover, will be measured as a standard manhole. Payment will be made at the contract unit price.

4.2 EXTRA DEPTH FOR STANDARD MANHOLES: Measurement will be the number of linear feet of manhole in excess of the 4-foot standard manhole depth. Payment will be made at the contract unit price.

END

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* REVISIONS *
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* 02711 - 10/85 *
* CSI Section Format: 10/85. *
* Reference Standards: 10/85. *
* Product/Manufacturer Data: N/A *
* Technical Updates: Last major review 5/85. *
****
* This section is based on Road Guide Detail No. 131A. Delete *
* filter fabric if not required. When filter fabric is *
* required, modify Guide Detail accordingly. *
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SECTION 02711 UNDERDRAINS

PART 1: GENERAL

1.1 DESCRIPTION: The work of this section consists of furnishing and installing underdrains using slot-perforated pipe, granular filter material, synthetic filter fabric, and nonperforated pipe outlets.

1.2 SUBMITTALS: As specified in Section 01300. Submit two copies of manufacturer's certification that pipe meets requirements of the appropriate referenced standards.

1.3 CONTRACTOR'S OPTION: Contractor may furnish any of the pipe materials specified below. Use only one type.

PART 2: PRODUCTS

2.1 CORRUGATED STEEL PIPE: AASHTO M36-82, Type III, Class I, II, III, or IIIA, and AASHTO M218-82. Sheet thickness _____.

2.2 CORRUGATED ALUMINUM ALLOY PIPE: AASHTO M196-82, Type III, Class I or II. Sheet thickness _____.

2.3 CLAD ALUMINUM ALLOY PIPE: AASHTO M197-82. Sheet thickness _____.

2.4 CORRUGATED POLYETHYLENE (PE) PIPE: AASHTO M252-81. Installation beneath vehicle traffic areas requires a minimum cover of 4 feet.

2.5 POLYVINYL CHLORIDE (PVC) PIPE: ASTM D3034-81.

2.6 SLOT-PERFORATION REQUIREMENTS: Slot-perforated pipe shall have at least two rows of slots, cut perpendicular to the axis of

the pipe or at right angles to the pitch of corrugations and with the centerlines of the rows separated by one-third the circumference of the pipe. Slots shall be between 1/16 inch and 1/10 inch wide, and 1 inch to 1-1/4 inches long. Spacing of slots shall be between 3/4 inch and 1-1/2 inches along the axis of the pipe. Slots shall be formed so that inflow of water through the slots will not be impeded by excessive residual material from slotting procedure.

2.7 OUTFALL SCREEN FOR UNDERDRAIN PIPE: Galvanized 17-gauge hardware cloth screen having approximately 1/2-inch square openings. Use standard coupling bands.

2.8 FILTER FABRIC: Synthetic material, either woven or punched, manufactured especially for drainage and filtration.

2.9 FILTER AGGREGATE: 1-1/2-inch maximum, coarse aggregate, well graded.

PART 3: EXECUTION

3.1 EXCAVATION AND BACKFILL: Make width of trenches not less than 24 inches plus diameter of pipe. Install filter fabric to contact bottom and sides of trench. Place 3 inches of filter aggregate on fabric on bottom of trench and grade material to receive pipe. Place perforated pipe and fill trench with filter aggregate to level shown on drawings. Hand tamp or vibrate aggregate until consolidated, then fold over filter fabric. Fill balance of trench with select backfill and compact to 90 percent of maximum density.

3.2 GRADE TOLERANCE: The final invert grade of the pipe taken at any point along the line shall not vary more than plus or minus 1/2 inch from the established grade.

3.3 UNDERDRAIN INSTALLATION:

A. Place slot-perforated pipe with perforations down. Join pipe sections securely with coupling fittings and bands.

B. Close upgrade end of underdrain pipe with suitable plug.

C. Lay nonperforated outlet pipe with all ends firmly joined. Fasten outfall screen securely in place using standard coupling band or other means approved by the Contracting Officer.

3.4 FILTER FABRIC: The surface on which fabric is to be placed shall have a smooth, uniform slope, free of debris or projections which could damage the fabric. Place fabric loosely. Overlap

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* REVISIONS *
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* 02721 - 10/85 *
* CSI Section Format: 10/85. *
* Reference Standards: 10/85. *
* Product/Manufacturer Data: 10/85. *
* Technical Updates: Last major review 1978. *
* 5/83; added Contractor's option and references to excavation *
* and concrete sections. *
****
* **Design Note:** This section is compatible with drop inlet *
* Details R112, R113, R114, and R115. There is no standard *
* detail for catch basins. *
****

SECTION 02721 CONCRETE DROP INLETS AND CATCH BASINS

PART 1: GENERAL

1.1 DESCRIPTION: The work of this section consists of constructing drop inlets and catch basins.

1.2 CONTRACTOR'S OPTION: The Contractor may, with prior approval, furnish precast boxes, provided they meet the requirements of the concrete section. The Contractor may also furnish commercial grates and frames with prior approval.

1.3 PROJECT CONDITIONS: Unless concrete is properly protected, construct structures only during periods when nighttime temperatures are above 35 degrees F.

PART 2: PRODUCTS

2.1 CONCRETE: Section _____. Cement, Type I or II, air entrained.

A. Reinforcing Bars: Grade 40.

B. Color Additive: _____, as manufactured by _____, or approved equal. Use additive as recommended by manufacturer. Field sample will be required for determining the exact amount of additive.

2.2 GRATE AND FRAME: As shown. Structural steel, ASTM A36-81a.

2.3 PAINT FOR GRATES AND FRAMES:

A. Prime: AASHTO M72-74, Type I or II, two coats of red lead.

B. Finish Coat: AASHTO M68-74, black bridge paint.

2.4 CONCRETE COVER: Precast, reinforced concrete, as shown.

2.5 CULVERT PIPE: Section 02722.

PART 3: EXECUTION

3.1 EXCAVATION AND BACKFILL: Section 02225.

3.2 CONCRETE: Section _____. Finish exposed areas same as adjacent curbs.

3.3 INSTALLATION: Set metal frames in full mortar bed. Place pipe sections flush on the inside of the structure wall, projecting outside sufficiently for proper connection with the next pipe section.

PART 4: MEASUREMENT AND PAYMENT

4.1 CONCRETE DROP INLET: Payment will be made at the contract unit price per each, excluding pipe, for each size and type drop inlet.

4.2 CONCRETE CATCH BASINS: Payment will be made at the contract unit price per each, excluding pipe, for each size and type catch basin.

END

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* REVISIONS *
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* 02722 - 05/91 *
* CSI Section Format: 05/91. *
* Reference Standards: 05/91. *
* Product/Manufacturer Data: N/A. *
* Technical Updates: Last major review 1978. *
* 3/86; deleted article on cast-in-place concrete pipe. 5/91; *
* editorial changes. *
****
* **DRAWING DATA:** Show type, class, gauge or thickness, and cor- *
* rugations, as applicable. For concrete pipe, show joint type.*
* Show acceptable material for each location by station in *
* accordance with strength requirements and other design crite- *
* ria. This should be done preferably in tabular form. Use *
* pipe option unless justification can be made to support the *
* use of specific materials. This section is compatible with *
* Standard Detail Nos. 02724 and 02725 with changes. See AISC *
* Handbook of Steel Drainage and Highway Construction Products *
* or check with Branch of Specifications. *
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SECTION 02722 CULVERTS AND STORM DRAINS

PART 1: GENERAL

1.1 DESCRIPTION: The work of this section consists of furnishing and installing storm drains to receive and convey rain water from building down spouts sump pump drains and underdrains to the existing underground drainage system.

1.2 SUBMITTALS: As specified in Section 01300.

1.2 A. Manufacturer's literature and certificates of compliance with the reference standards for pipe, fittings and gaskets.

B. Manufacturer's installation instruction or guide.

C. Written procedure for cleaning sewer lines and disposing of fluidized materials removed.

1.3 DEFINITION: Bedding and backfill material type (BD,SB,BF) are defined in Section 02221.

1.4 PRODUCT HANDLING:

A. Delivery: Handle pipe carefully to ensure delivery at the project site in sound, undamaged condition. Contracting

3.3 PLACING TOPSOIL:

A. Place topsoil in areas where seeding and transplanting of trees and shrubs are scheduled to a depth of 6 inches.

B. Place topsoil during dry weather and on dry, unfrozen subsoil.

C. Remove vegetative matter and foreign, non-organic material from topsoil while spreading.

D. Incorporate soil amendments as specified in Sections 02931: Seeding.

E. Spread topsoil and grade to eliminate rough, low, soft areas and to ensure positive drainage. Maintain profiles and contour of subgrade. Fine grade topsoil to finished elevations.

F. Manually spread topsoil close to trees, shrubs, stonewalls, building and other historic site elements to remain to prevent damage.

G. Roll placed topsoil after coordinating fertilization requirements.

H. Remove surplus subsoil and topsoil from site.

I. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.4 TOLERANCES:

A. Top of Topsoil: Plus or minus 1/2 inch.

3.5 PROTECTION:

A. Protect landscaping and other landscape features remaining as final work.

B. Protect existing structures, fences, sidewalks, stonewalls, utilities, paving and curbs.

PART 4: MEASUREMENT AND PAYMENT

4.1 Topsoil:

A. Basis of Measurement: By the cubic yard.

B. Basis of Payment: Includes excavating existing topsoil, supplying topsoil materials, stockpiling, preparing and scarifying substrate surface, placing where required, rolling and fine grading.

END

PART 1: GENERAL

1.1 DESCRIPTION: The work of this Section consists of:

A. Preparation of subsoil of all disturbed areas.

B. Fertilizer.

C. Seeding and mulching of all disturbed areas.

D. Maintenance.

1.2 RELATED SECTIONS:

A. Section 02923 - Landscape Grading

1.3 DEFINITIONS:

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Weed, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.4 SUBMITTALS: As specified in Section 01300.

A. Test Results: Topsoil - both existing and borrow stockpiles.

B. Product Data: Fertilizer, lime, organic matter, herbicides and pesticides.

C. Samples: Submit one cubic foot sample of mulch, if commercial mulch is used.

D. Certification Label: State Department of Agriculture

1.5 MAINTENANCE DATA:

A. Submit two copies to the Government for approval.

B. Maintenance Data: Include instructions for cutting methods and maximum grass height; types, application frequency, and recommended coverage of: fertilizer, herbicides, and pesticides.

1.6 QUALITY ASSURANCE:

A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.7 REGULATORY REQUIREMENTS:

A. Comply with regulatory agencies for fertilizer, herbicide and pesticide, composition and application.

B. Provide certification label from State Department of Agriculture indicating approval of seed mixture.

1.8 DELIVERY, STORAGE, AND HANDLING:

A. Protect seed during delivery and storage. Seed that has become wet or otherwise damaged will not be acceptable.

B. Deliver grass seed mixture in original, unopened, sealed containers. Seed in damaged packaging is not acceptable.

C. Deliver fertilizer and limestone in original, unopened, waterproof bags showing type, weight, chemical analysis, and name or trademark of manufacturer.

1.9 COORDINATION:

A. Coordinate with Contractors work requiring access to site over lawn areas.

1.10 MAINTENANCE SERVICE:

A. Maintain seeded areas until the work under the entire Contract has been completed and accepted for substantial completion by the Government.

B. Maintenance shall consist of repair and replacement of eroded areas, watering, fertilizing, liming, reseeding, and remulching as necessary to provide a uniform, healthy, well rooted stand of grass. Seeded areas shall be watered and maintained until a thick stand of grass is established over 90 percent of the site's limit of seeding.

C. Provide protection against traffic and erect the necessary barricades and warning signs required, immediately after planting is completed.

D. Mow grass at regular intervals to maintain a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.

E. Neatly trim edges and hand clip where necessary.

F. Immediately remove clippings after mowing and trimming.

G. Water to prevent grass and soil from drying out.

H. Roll surface to remove minor depressions or irregularities.

I. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions and maintenance data submission. Remedy damage resulting from improper use of herbicides.

PART 2: PRODUCTS

2.1 SEED:

A. The minimum seed purity shall be 95 percent with a minimum germination of 85 percent. The percentage of material, other than grass seed in the mixture, shall not include more than 18 percent non-viable seed, chaff, hulls, live seed of crop plants (other than those specified), harmless inert matter. Weed seed shall not exceed 0.50 percent of the total weight of the mixture.

2.2 SEED MIXTURE:

Common Name	% by Weight	Min % Purity	Min % Germination
Mix No. 1 - General Lawn			
-Turf Type Tall Fescue (Rebel II, Tribute)	80	95	85
-Perennial Ryegrass (Palmer, Prelude)	10	95	85
-Kentucky Bluegrass (Georgetown, Baron, Merit)	10	95	85

2.3 SOIL MATERIALS:

A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, stones over 1" diameter, clay or impurities, plants, weeds and roots; pH value of minimum 5.0 and maximum 7.0.

2.4 ACCESSORIES:

A. Mulching Material: Oat or wheat straw, free from noxious weed seed, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable. Commercial products may be used with approval.

B. Fertilizer: FS O-F-241D granular or pelleted; complete commercial type with 50 percent of nitrogen in slowly available form. Uniform in composition, free flowing and suitable for

application with approved equipment, of the proportions necessary to eliminate any deficiencies of topsoil, as indicated in analysis. Fertilizer shall be delivered to the site fully labeled according to applicable state fertilizer laws and shall bear the name, tradename, trademark and warranty of the provider.

C. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

D. Limestone: Limestone material shall be ground or pulverized limestone which contains at least 85% carbonates. Minimum gradation: 100 percent passing a 10 mesh sieve; 98 percent passing a 20 mesh sieve; 55 percent passing a 60 mesh sieve; and 40 percent passing a 100 mesh sieve. Granular or pelletized limestone may be used but it must follow the same specifications as above prior to being granulated or pelletized.

E. Herbicide and Pesticide: Submit for approval.

F. Binder: Emulsified asphalt, ASTM D977-86, Grade SS-1.

G. Stakes: Softwood lumber, chisel pointed.

H. Organic Matter:
1. Reed Sedge Peat/Peat Humus: decomposed peat containing no identifiable fibers.
2. Leaf Mold: thoroughly shredded, composted leaf material.
3. Composted Sewage Sludge:
   a. Approved, screened, polymer-dewatered sewage sludge with a pH of 6.2 - 7.2.
   b. Approved, screened, lime-dewatered sewage sludge with a pH range of 7.2 - 8.5.
4. Paper Mill Sludge: approved, screened, natural-dewatered paper mill sludge with a pH range of 6.8 - 8.0.

2.5 TESTS:

A. Provide agricultural soil analysis of existing topsoil and/or proposed sample to the Government prior to the placement of any additives.

B. Submit minimum 10 oz. sample of topsoil proposed. Forward sample to approved testing laboratory in sealed containers to prevent contamination.

C. Analyze topsoil to ascertain percentage of nitrogen, phosphorus, potash, soil texture, soluble salt content, organic matter content, and pH value.

D. Acceptable Soil Test Results:

pH Range	6.0 - 6.5
Organic Matter	3% or greater
Magnesium - Mg	105-225 pounds per acre (ppa)
Phosphorus - P_2O_5	140-250 pounds per acre (ppa)
Potassium - K_2O	190-280 pounds per acre (ppa)
Soluble Salts/ Conductivity	100-300 part per million (ppm)

PART 3: EXECUTION

3.1 EXAMINATION:

A. Verify that prepared soil base is ready to receive the work of this Section.

B. Start of work covered in this Section constitutes Contractor's approval of all existing site conditions.

3.2 PROTECTION:

A. Protect landscaping and other features remaining as final work.

B. Protect existing structures, fences, sidewalks, utilities, paving and curbs.

3.3 PREPARATION OF SUBSOIL:

A. Prepare sub-soil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

B. Remove foreign materials, stones, weeds and undesirable plants and their roots.

C. Remove contaminated sub-soil.

D. Scarify subsoil to a depth of 4 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

3.4 PLACING TOPSOIL: See Section 02923

3.5 FERTILIZING AND LIMING:

A. Apply fertilizer and lime at a rate indicated by the soil tests.

B. Apply after smooth raking of topsoil and prior to roller compaction.

C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.

D. Mix thoroughly into upper 3 inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.6 SEEDING:

A. Apply seed at a rate of 5 lbs per 1000 sq ft evenly in two intersecting directions. Rake in lightly.

B. Do not seed areas in excess of that which can be mulched on same day.

C. Planting Season: March 1 to April 15 in the spring, Sept. 1 to Oct. 15 in the fall.

D. Do not sow immediately following rain, when ground is too dry, or during windy periods.

E. Roll seeded area with roller not exceeding 100 lbs.

F. Immediately following seeding and compacting, apply mulch.

3.7 MULCHING:

A. Mulching: Immediately after rolling, apply mulch uniformly to a depth of 2 inches. Application by mechanical methods is preferred; however, mulch chopped or cut into short pieces will not be acceptable. Secure mulch in place by staking and tying or by spraying with binder. Apply binder at a rate of 6-10 gallons per 1,000 square feet.

B. Apply water with a fine spray immediately after each area has been mulched. Saturate to a minimum depth of 2 inches of soil. Water as needed until final inspection.

3.8 CLEANUP:

A. During landscape installation, all areas shall be reasonably clean at the end of each work day. Sidewalks and other paved areas shall be swept or washed down as needed.

B. Following project completion, all debris, soil and trash resulting from landscape operations shall be removed from the site. All paved areas shall be washed down.

3.9 ACCEPTANCE:

A. Acceptance for topsoil installation and final grading shall be given by the Government upon satisfactory completion of each section or areas as indicated on the drawings or as otherwise specified.

B. Final acceptance for seeded lawn areas shall be given as soon as there is an even stand of grass two (2) inches tall with 85%

germination, over 90% of the site.

PART 4: MEASUREMENT AND PAYMENT

4.1 Seeding, Fertilizing and Mulching:

A. Measurement: By the number of 1,000 square foot units acceptably seeded.

B. Payment will be made at the contract unit price.

END

PART 1: GENERAL

1.1 DESCRIPTION: The work of this section consists of furnishing and placing concrete.

1.2 QUALITY ASSURANCE:

a. Contractor shall have copies of ASTM C94-87 and CRSI Manual of Standard Practice available for reference on the jobsite.

b. Enforcement of Strength Requirements: Substitute the following for Paragraph 18.1 of ASTM C94-87:

i. If the 28-day strength tests fail to meet the requirements of Paragraph 17.5.2 of ASTM C94-87, Contracting Officer may require either or both of the following:

(1) Additional curing.

(2) That core samples be taken and tested in accordance with ASTM C42-87a at Contractor's expense.

ii. If the core tests are below strength, if there is evidence of damage by freezing, or if the concrete fails in other ways to meet specifications, Contracting Officer may require that the defective concrete be removed and replaced at no additional expense to the Government.

c. Except as modified by the Contract Documents, comply with the applicable provisions and recommendations of the following codes and standards:

i. ACI 301, "Specifications for Structural Concrete for Buildings", with changes to paragraphs as follows:

(1) (3.71): The use of admixtures containing calcium chloride shall not be permitted.

(2) (8.6): No concrete shall be placed under water.

1.3 SUBMITTALS: As specified in Section 01300.

a. Shop Drawings: Show sizes and dimensions for fabrication and placing of reinforcing steel and bar supports. Show bar schedules, stirrup spacing, and diagrams

of bent bars. Do not use reproduction of design drawings as a base for shop drawings.

b. In compliance with Paragraph 5.3.2 of ASTM C94-87, furnish statement of composition of concrete mix and evidence that mix will meet quality specified herein.

PART 2: PRODUCTS

2.1 FORMWORK: Contractor shall be responsible for design, strength, and safety of formwork.

a. Exposed concrete finish: 5/8 inch plyform coated with form release oil.

b. Unexposed concrete finish: forms of metal, wood or other material approved by the architect.

c. Form ties and spreaders: prefabricated assemblies by Richmond; Superior, Dayton or approved equal. Wire ties SHALL NOT BE USED. Ties for foundation work shall be of snap design with removal cones and water seal washer.

2.2 REINFORCEMENT: Details of concrete reinforcement not shown shall be in accordance with CRSI Manual of Standard Practice.

A. Reinforcing Steel:

1. Reinforcing steel shall be deformed bars and shall comply with ASTM A615-84a and shall be Grade 60.

B. Welded Wire Fabric: Shall be of gauge and mesh size shown and shall meet the requirements of ASTM A185-79.

C. Bar support shall meet the requirements of Chapter 3 of the CRSI Manual of Standard Practice, and shall be steel or concrete block.

2.3 CONCRETE:

A. Materials: Materials including cement, aggregates, water, and admixtures shall meet the requirements of ASTM C94-84.

1. Cement: Type I or II

2. Maximum Sizes of Coarse Aggregates: The nominal maximum size of the aggregate shall be not more than one-fifth of the narrowest dimension between forms, one-third of the depth of slabs, nor more than three-fourths of the minimum clear spacing between

reinforcing bars. The aggregate shall be well graded crushed stone or washed gravel.

3. Fine Aggregate: washed, inert, natural or manufactured or combination thereof, sand conforming ASTM C33-84 gradation.

B. Quality of Concrete: Concrete shall be furnished under Alternative No. 2, ASTM C94-84, whereby the manufacturer assumes full responsibility for the selection of the proportions for the concrete mixture. Submit statement of composition as called for in Part 1 of this section.

C. Total Average Air Content: Entrained air quantities shall comply with Table 3 of ASTM C94-84, unless otherwise noted on structural drawings.

D. Slump: Shall not exceed 4 inches, with tolerances as specified in ASTM C94-84.

E. Strength: Twenty-eight-day strength shall be 3,000 psi.

F. Manufacture and Delivery: Measurement of materials, batching, mixing, transporting, and delivery shall be as specified in ASTM C94-84. Discharge concrete into forms within 1-1/2 hours after introduction of water to cement. When temperature of concrete is 85 degrees F or above, the time between introduction of water to cement and complete discharge of concrete into forms shall not exceed 45 minutes.

G. Water: Portable, clean and free from oils, acids, alkali, organic matter and other deleterious material.

H. Admixtures: Water-reducing agents: "Pozzolith 200N" Master Builders Co.; "PDA25"/Protex Industries; or approved equal conforming to ASTM C-494.

2.4 GROUT: Pre-mixed, non-shrink, metallic, Five Star by U.S. Grout Co. or equal.

2.5 EXPANSION JOINT FILLERS: Pre-molded type, ASTM D1751-83. Size, 1/2 inch by depth of slab.

2.6 Waterstops: extruded "PVC"; 2,000 psi minimum tensile strength; 350% minimum elongational Shore "A" hardness, 65 to 75: maximum 0.15% water absorption; inert; as manufactured by Progress Unlimited, or equal.

2.7 Vapor Barrier: 10 mil polyethylene.

2.8 CURING MATERIALS FOR SLABS:

A. Burlap: Burlap is an acceptable material provided it does not come from sacks that have contained sugar.

B. Sheet Materials: ASTM C171-69, 4-mil polyethylene film or waterproof paper.

C. Spray Applied Membrane Forming Liquids: ASTM C309-81.

PART 3: EXECUTION

3.1 FORMWORK:

A. Forms shall be sufficiently tight to prevent loss of material.

B. Provide temporary openings at the base of wall forms and at other points where necessary to facilitate cleaning and observation immediately before concrete is placed.

C. Rough Form Finish: No selected form facing materials required.

3.2 PLACING REINFORCEMENT: Support and wire all reinforcing bars together to prevent displacement by construction loads or the placing of concrete. Methods and details of placing, and concrete protection required, shall comply with Chapter 8 of the CRSI Manual of Practice.

3.3 JOINTS AND EMBEDDED ITEMS:

A. Construction Joints:

1. Obtain approval for joints not shown and locate them where they least impair the strength of the structure. In general, locate them near the middle of the spans of slabs and beams. Place beams, and haunches at the same time as slabs. Make joints perpendicular to the main reinforcement.

2. Continue all reinforcing steel and mesh across joints.

3. Clean the surface of the concrete at all joints and remove all laitance.

4. When required, obtain bond by roughening the surface of the concrete to the satisfaction of the Contracting Officer.

B. Other Embedded Items:

1. Before concreting, place all required sleeves, inserts, anchors, and embedded items in conformance to approved shop drawings.

2. Give all trades whose work is related to the concrete ample notice and opportunity to introduce embedded items before concrete is placed.

3. Position expansion joint material, waterstops, and embedded items accurately and support them against displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material to prevent the entry of concrete.

3.4 PREPARATION OF FORM SURFACES:

A. Ensure that forms are clean and free of ice or water.

B. Seal plywood with coating material to minimize absorption of moisture from the concrete.

3.5 PLACING OF CONCRETE:

A. Preparation Before Placing:

1. Remove hardened concrete and foreign materials from inner surfaces of conveying equipment.

2. Check formwork for completion, check position and securement of reinforcement, expansion joint material, anchors, and other embedded items, and obtain approval on entire preparation.

3. Remove ice and excess water and sprinkle semiporous subgrades sufficiently to eliminate absorption of mix water.

4. Do not place concrete on frozen ground.

5. Do not place concrete during rain, sleet, or snow unless protection is provided.

6. In cold weather, or very hot weather, check to see that concrete temperature meets the requirements of Paragraphs 11.8 and 11.9 of ASTM C94-84.

B. Depositing:

1. Handle concrete from the mixer to the place of final deposit as rapidly as possible by methods that will prevent separation or loss of ingredients and

ensure that the required quality of the concrete is obtained.

2. Deposit concrete continuously and rapidly enough so that the layer supporting the one being placed is still plastic. If continuous placement is impossible, locate construction joints where shown or as approved. Do not use partially hardened or contaminated concrete.

3. Remove temporary form spreaders when concrete reaches them.

4. Do not begin placing concrete in supported elements until the concrete previously placed in walls is no longer plastic.

5. Deposit concrete as near to its final position as possible to avoid segregation due to rehandling or flowing. Do not subject concrete to any procedure that will cause segregation.

C. Compacting:

1. Consolidate all concrete by vibration, spading, rodding, or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness.

2. Internal vibrators shall have a minimum frequency of 8,000 rpm. Overvibrating and use of vibrators to transport concrete within forms shall not be allowed. Insert and withdraw vibrators at many points, from 18 to 30 inches apart, for 5 to 15 seconds duration. Keep a spare vibrator on the job site during all concrete placing operations.

3. Compact concrete in slabs thoroughly by means of screeds.

D. Bonding: Where fresh concrete is to be placed against and bonded to hardened concrete, dampen (but do not saturate) the hardened concrete. If bonding is required in a critical section, obtain approval from Contracting Officer of method proposed.

3.6 FORM REMOVAL:

A. Leave formwork for walls, sides of beams, and other parts not supporting weight of the concrete, in place during curing period.

B. Leave formwork for beam soffits, slabs, and other parts that support the weight of the concrete in place until concrete has reached its specified 28-day strength.

3.7 REPAIRING AND PATCHING: Patch all the tie holes and all repairable defective areas immediately after form removal.

A. All honeycombed and other defective concrete shall be removed to sound concrete with edges perpendicular to the surface. Dampen the area to be patched and an area at least 6 inches wide surrounding it to prevent absorption of water from the patching mortar. Mix patching mortar to the consistency of thick cream and brush it well into the surface.

B. Make the patching mortar of the same material and a-pproximately the same portions as used for the concrete, omitting the coarse aggregate. The resultant mortar shall consist of not more than 1 part cement to 2-1/2 parts sand by damp loose volume.

C. Do not use more mixing water than necessary for handling and placing. Mix the patching mortar in advance and allow to stand with frequent manipulation with a trowel, without adding water, until it has reached the stiffest consistency that will permit placing.

D. After surface water has evaporated from the area to be patched, brush the patching grout well into the surface. When the patching grout begins to lose the water sheen, apply the premixed patching mortar. The mortar shall be thoroughly consolidated into place and struck off to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, leave the patch undisturbed for at least 1 hour before finishing it. Keep the patched area damp for 7 days. Do not use metal tools in finishing a patch in a formed wall that will be exposed.

E. Tie Holes: Clean and thoroughly dampen, then fill solid with patching mortar.

3.8 FINISHES FOR FORMED SURFACES:

A. Rough Form Finish: Patch tie holes and defects. Chip off or rub off fins over 1/4 inch in height; otherwise leave surface with texture imparted by the forms.

3.9 SLABS:

A. Screeding: After concrete has been thoroughly consolidated, screed slabs to the desired elevation and contours by means of accurately placed edge forms and intermediate screed strips. Power float and thoroughly

compact the concrete to provide an even level surface. Finsh as follows:

1. Steel trowel all floors to receive applied resilient finish with a single pass.

2. Double burnish all floors scheduled to remain exposed.

3. Power float all floors designated to receive ceramic tile or other like material.

4. Double burnish all areas scheduled to receive membrane waterproofing.

5. Finish tops of walls, piers and the like by floating to a level and true surface.

6. Site concrete - Walks, broom after float with all edges and joints treated with smooth edging tool; curbs, faces and tops rubbed.

B. Jointing:

1. Locate and construct joints in slabs on grade as shown.

2. Start cutting saw-cut joints as soon as concrete is hard enough to prevent dislodgement of aggregates while sawing, and complete cutting before shrinkage stresses have developed sufficiently to induce cracking.

3.10 CURING AND PROTECTION:

A. General: Beginning immediately after placement, protect concrete from drying, excessively hot or cold temperatures, and mechanical injury. Keep moisture loss to a minimum until cement has hydrated and concrete is hard.

B. Curing:

1. Formed Surfaces: Keep forms wet. Cool metal forms exposed to the sun with water.

2. Slabs: Immediately after finishing, apply one of the materials specified in article entitled Curing Materials for Slabs, but use membrane forming liquid only with Contracting Officer's approval. Keep burlap continuously wet.

3. Duration of Curing: 7 days minimum.

C. Protection:

1. In cold weather, maintain the moisture conditions but also, by heating or covering, maintain temperature of the concrete between 50 degrees F and 70 degrees F for entire curing period.

2. In hot weather, take immediate steps to protect newly finished concrete from the drying effects of wind and sun, and maintain temperature of the air surrounding the concrete uniform within 5 degrees F in any one hour or 50 degrees F in any 24-hour period.

3. During curing period, protect concrete from mechanical damage, loading, shock, and vibration.

3.11 CONCRETE TESTS: Contractor shall pay for the following tests to be made by an independent testing laboratory acceptable to the Contracting Officer. Laboratory shall take, prepare, and cure samples, do all field and laboratory testing, and shall promptly submit five copies of test reports to the Contracting Officer. Testing shall comply with ASTM C94-84.

A. Strength Tests: Strength tests shall be made from at least 100 cubic yards of each class of concrete or fraction thereof, each day. For each test, three cylinders shall be molded, one of them to be used for a 7-day test. Strength tests shall meet the values of Paragraph 17.5.1 of ASTM C94-84.

B. Air Content and Slump Tests: When samples are taken for strength tests, the laboratory shall make slump and air content tests.

END

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Concrete unit masonry.

2. Clay unit masonry in the form of brick.

3. Dimension stone masonry trim in unit masonry walls.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 2 Section "Unit Pavers" for exterior applications.

2. Division 7 Section "Flashing and Sheet Metal" for exposed sheet metal flashing installed in masonry.

3. Division 9 Section "Brick Flooring" for interior applications.

4. Division 9 Section "Chemical-Resistant Brick Flooring" for chemical-resistant interior applications of clay.

5. Division 10 Section "Louvers and Vents" for wall vents.

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

1. Steel lintels in unit masonry are specified in Division 5 Section "Metal Fabrications."

2. Wood nailers and blocking built into unit masonry are specified in Division 6 Section "Rough Carpentry."

3. Reglets in masonry joints for metal flashing are specified in Division 7 Section "Flashing and Sheet Metal."

4. Hollow metal frames in unit masonry openings are specified in Division 8 Section "Steel Doors and Frames."

5. Hollow metal frames in unit masonry openings are specified in Division 8 Section "Custom Hollow Metal Work."

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops the following installed compressive strengths (f'm):

1. For clay unit masonry: As follows:

a. f'm = 1500 psi.
b. f'm = 2000 psi.
c. f'm = 2500 psi.
d. As indicated.

2. For concrete unit masonry: As follows:

a. f'm = 1500 psi.
b. as indicated.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each different masonry unit, accessory, and other manufactured product indicated.

C. Shop drawings for stone trim in form of cutting and setting drawings showing sizes, profiles, and locations of each stone trim unit required.

D. Shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 "Details and Detailing of Concrete Reinforcing" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement.

E. Samples for initial selection purposes of the following:

1. Unit masonry samples in small-scale form showing full extent of colors and textures available for each different exposed masonry unit required.

2. Colored masonry mortar samples showing full extent of colors available.

F. Samples for verification purposes of the following:

1. Full-size units for each different exposed masonry unit required showing full range of exposed color, texture, and dimensions to be expected in completed construction.

   a. Include size variation data verifying that actual range of sizes for brick falls within ASTM C 216 dimension tolerances for brick where modular dimensioning is indicated.

2. Colored masonry mortar samples for each color required showing the full range of colors expected in the finished construction. Label samples to indicate type and amount of colorant used.

3. Stone trim samples not less than 12 inches in length showing full range of colors and textures expected in finished construction.

4. Aluminum weep holes/vents painted in color to match mortar color.

5. Accessories embedded in the masonry.

G. Material certificates for the following signed by manufacturer and Contractor certifying that each material complies with requirements.

1. Each different cement product required for mortar and grout including name of manufacturer, brand, type, and weight slips at time of delivery.

2. Each material and grade indicated for reinforcing bars.

3. Each type and size of joint reinforcement.

4. Each type and size of anchors, ties, and metal accessories.

H. Material test reports from a qualified independent testing laboratory employed and paid by Contractor indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:

1. Mortar complying with property requirements of ASTM C 270.

2. Grout mixes. Include description of type and proportions of grout ingredients.

3. Masonry units.

I. Cold-weather construction procedures evidencing compliance with requirements specified in referenced unit masonry standard.

J. Hot-weather construction procedures evidencing compliance with requirements specified in referenced unit masonry standard.

K. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, telephone numbers, names of Architects and Owners, and other information specified.

L. Results from tests and inspections performed by Owner's representatives will be reported promptly and in writing to Architect and Contractor.

1.5 QUALITY ASSURANCE

A. Unit Masonry Standard: Comply with ACI 530.1/ASCE 6 "Specifications for Masonry Structures," except as otherwise indicated.

1. Revise ACI 530.1/ASCE 6 to exclude Sections 1.4 and 1.7; Parts 2.1.2, 3.1.2, and 4.1.2; and Articles 1.5.1.2, 1.5.1.3, 2.1.1.1, 2.1.1.2, and 2.3.3.9 and to modify Article 2.1.1.4 by deleting requirement for installing vent pipes and conduits built into masonry.

B. Owner will employ and pay a qualified professional engineer to inspect foundations for compliance with dimensional tolerances specified in referenced unit masonry standard.

1. Engineer Qualifications: Professional engineer legally authorized to practice surveying in jurisdiction where project is located.

C. Inspecting Laboratory Qualifications: To qualify for employment in performing tests and inspection specified in this Section, an independent testing laboratory must demonstrate to Architect's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM C 1093, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying the progress of the Work.

D. Preconstruction Testing: Owner will employ and pay a

qualified independent testing laboratory to perform the following preconstruction testing indicated as well as other inspecting and testing services required by referenced unit masonry standard or indicated herein for source and field quality control:

1. Clay unit masonry tests: For each different clay masonry unit indicated, units will be tested per ASTM C 67.

2. Concrete Masonry Unit Tests: For each different concrete masonry unit indicated, units will be tested for strength, absorption, and moisture content per ASTM C 140.

3. Prism Tests: For each type of wall construction indicated, masonry prisms will be tested per ASTM E 447, Method B.

4. Mortar properties will be tested per property specification of ASTM C 270.

5. Mortar composition and properties will be evaluated per ASTM C 780.

6. Grout compressive strength will be tested per ASTM C 1019.

E. Fire Performance Characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E 119 by a testing and inspecting organization, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

F. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

G. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

H. Field-Constructed Mock-Ups: Prior to installation of unit masonry, erect sample wall panels to further verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock-ups to comply with the following

requirements, using materials indicated for final unit of Work:

1. Locate mock-ups on site in locations indicated or, if not indicated, as directed by Architect.

2. Build mock-ups for the following types of masonry in sizes of approximately 4 feet long by 4 feet high by full thickness, including face and backup wythes as well as accessories.

   a. Each type of exposed unit masonry construction.

   b. Typical exterior face brick wall.

   c. Typical exterior face brick wall with window opening framed with stone trim.

   d. Typical interior unit masonry wall.

3. Where masonry is to match existing, erect panels parallel to existing surface.

4. Notify Architect one week in advance of the dates and times when mock-ups will be erected.

5. Protect mock-ups from the elements with weather-resistant membrane.

6. Retain and maintain mock-ups during construction in undisturbed condition as standard for judging completed unit masonry construction.

   a. When directed, demolish and remove mock-ups from Project site.

   b. Accepted mock-ups in undisturbed condition at time of Substantial Completion may become part of completed unit of Work.

I. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry materials to project in undamaged condition.

B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If

units become wet, do not place until units are in an air-dried condition.

C. Store cementitious materials off the ground, under cover, and in dry location.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

A. Protection of Masonry: During erection, 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 down both sides and hold cover securely in place.

2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

2. Protect sills, ledges, and projections from mortar droppings.

3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes from mortar droppings.

D. Cold-Weather Construction: Comply with referenced unit masonry standard for cold-weather construction and the following:

1. Do not lay masonry units that are wet or frozen.

2. Remove masonry damaged by freezing conditions.

E. Hot-Weather Construction: Comply with referenced unit masonry standard.

PART 2 PRODUCTS

2.1 MATERIALS, GENERAL

A. Comply with referenced unit masonry standard and other requirements specified in this Section applicable to each material indicated.

2.2 CLAY MASONRY UNITS

A. General: Comply with the following requirements applicable to each form of brick required:

1. Provide special molded shapes where indicated and as follows:

a. For applications requiring brick of form, color, texture, and size on exposed surfaces that cannot be produced by sawing standard brick sizes.

b. For applications where stretcher units cannot accommodate special conditions including those at corners, movement joints, bond beams, sashes, and lintels.

2. Provide units without cores or frogs and with all exposed surfaces finished for ends of sills, caps, and similar applications that expose brick surfaces that otherwise would be concealed from view.

B. Face Brick Standard: ASTM C 216 and as follows:

1. Grade and Unit Compressive Strength: Provide units of grade and minimum average net area compressive strength indicated below:

a. Grade SW.
b. Grade MW or SW.

c. 3000 psi.
d. 4400 psi.
e. 5500 psi.
f. 6400 psi.
g. 8000 psi.
h. Not less than the unit compressive strengths required to produce clay masonry construction of compressive strength indicated.

2. Type FBS (for general use in exposed masonry requiring wider variations in size and color ranges than Type FBX).

3. Type FBX (for general use in exposed masonry requiring minimum variations in size and color ranges).

4. Type FBA (for special architectural effects resulting from nonuniformity in size, color, and texture of individual units).

5. Size: Provide bricks manufactured to the following actual dimensions within the tolerances specified in ASTM C 216:

   a. Standard: 3-5/8 inches thick by 2-1/4 inches high by 8 inches long.

   b. Standard Modular: 3-5/8 inches thick by 2-1/4 inches high by 7-5/8 inches long.

   c. Oversize: 3-5/8 inches thick by 2-3/4 inches high by 7-5/8-inches long.

   d. Economy: 3-5/8 inches thick by 3-5/8 inches high by 7-5/8 inches long.

6. Shape units during manufacture as indicated below:

   a. Molding.

   b. Pressing.

   c. Extruding.

   d. Any method indicated above.

7. Application: Use where brick is exposed, unless otherwise indicated.

8. Wherever shown to "match existing," provide face brick of matching color, texture, and size as existing adjacent brickwork.

9. Color and Texture: Match Architect's sample.

10. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

11. Products: Subject to compliance with requirements,

provide one of the following:

a. "Belcrest 560," Belden Brick Company.
b. "53-DD," Glen-Gery Corporation.

C. Building (Common) Brick: ASTM C 62, and as follows:

1. Grade and Unit Compressive Strength: Provide units of grade and minimum average net area compressive strength indicated below:

a. Grade SW.
b. Grade MW or Grade SW.
c. Grade NW, MW, or SW.

d. 3000 psi.
e. 4400 psi.
f. 5500 psi.
g. 6400 psi.
h. 8000 psi.
i. Not less than the unit compressive strengths required to produce clay masonry construction of compressive strength indicated.

2. Size: Provide bricks manufactured to the following actual dimensions within the tolerances specified in ASTM C 216:

a. Match size specified for face brick.

b. Standard Modular: 3-5/8 inches thick by 2-1/4 inches high by 7-5/8 inches long.

3. Application: Use where brick is indicated for concealed locations.

D. Hollow Brick: ASTM C 652 and as follows:

1. Grade and Unit Compressive Strength: Provide units of grade and minimum average net area compressive strength indicated below:

a. Grade SW.
b. Grade MW or SW.

c. 3000 psi.
d. 4400 psi.
e. 5500 psi.
f. 6400 psi.
g. 8000 psi.
h. Not less than the unit compressive strengths required to produce clay masonry construction of compressive strength indicated.

2. Type HBS (for general use in exposed masonry requiring wider variations in size and color ranges than Type HBX).

3. Type HBX (for general use in exposed masonry requiring minimum variations in size and color ranges).

4. Type HBA (for special architectural effects resulting from nonuniformity in size, color, and texture of individual units).

5. Type HBB (for general use where color and texture are not a consideration and requiring wider variations in size range than Type HBX).

6. Class H40V (void areas between 25 and 40 percent of gross cross-sectional area).

7. Class H60V (void areas between 40 and 60 percent of gross cross-sectional area).

8. Size: Provide bricks manufactured to the following actual dimensions within the tolerances specified in ASTM C 652:

   a. 6-Inch Utility: 5-5/8 inches thick by 3-5/8 inches high by 11-5/8 inches long.

   b. 8-Inch Utility: 7-5/8 inches thick by 3-5/8 inches high by 11-5/8 inches long.

2.3 CONCRETE MASONRY UNITS

A. General: Comply with requirements indicated below applicable to each form of concrete masonry unit required.

1. Provide special shapes where indicated and as follows:

   a. For lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.

   b. Bullnose units for outside corners unless otherwise indicated.

   c. Square-edged units for outside corners, except where indicated as bullnose.

2. Size: Provide concrete masonry units complying with requirements indicated below for size that are manufactured to specified face dimensions within

tolerances specified in the applicable referenced ASTM specification for concrete masonry units.

a. Concrete Masonry Units: Manufactured to specified dimensions of 3/8 inch less than nominal widths by nominal heights by nominal lengths indicated on drawings.

b. Concrete Building Brick: Specified dimensions as follows:

1) Standard Modular: 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.

2) Oversize: 3-5/8 inches wide by 2-3/4 inches high by 7-5/8 inches long.

3) Economy: 3-5/8 inches wide by 3-5/8 inches high by 7-5/8 inches long.

c. Prefaced Concrete Masonry Units: Manufactured to specified dimensions of 3/8 inch less than nominal widths by nominal heights by nominal lengths indicated on drawings, with prefaced surfaces having 1/16-inch-thick returns of facing to create 1/4-inch-wide mortar joints with modular coursing.

3. Provide Type I, moisture-controlled units.

4. Provide Type II, non-moisture-controlled units.

5. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

a. Where special finishes are indicated, provide units with exposed faces of the following general description matching color and texture of Architect's sample.

1) Standard aggregate, ground finish.

2) Special aggregate, ground finish.

3) Standard aggregate, split face finish.

4) Special aggregate, split face finish.

5) Standard aggregate, split ribbed finish.

6) Special aggregate, split ribbed finish.

b. Where special patterns are indicated, provide

units with exposed faces matching color, texture and pattern of Architect's sample.

B. Hollow Load-Bearing Concrete Masonry Units: ASTM C 90, Grade N and as follows:

1. Unit Compressive Strength: Provide units with minimum average net area compressive strength indicated below:

a. 1900 psi.

b. Not less than the unit compressive strengths required to produce concrete unit masonry construction of compressive strength indicated.

2. Weight Classification: Lightweight.

3. Weight Classification: Medium weight.

4. Weight Classification: Normal weight.

C. Solid Load-Bearing Concrete Masonry Units: ASTM C 145, Grade N and as follows:

1. Unit Compressive Strength: Provide units with minimum average net area compressive strength indicated below:

a. 1800 psi.

b. Not less than the unit compressive strengths required to produce concrete unit masonry construction of compressive strength indicated.

2. Weight Classification: Lightweight.

3. Weight Classification: Medium weight.

4. Weight Classification: Normal weight.

D. Concrete Building Brick: ASTM C 55 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net area compressive strength indicated below:

a. 3500 psi.

b. Not less than the unit compressive strengths required to produce concrete unit masonry construction of compressive strength indicated.

2. Weight Classification: Lightweight.

3. Weight Classification: Medium weight.

E. Weight Classification: Normal weight.

F. Limestone: Indiana oolitic limestone as quarried in Lawrence, Monroe, and Owen Counties, Indiana, complying with ASTM C 568, Category II (medium density), and matching standards of the Indiana Limestone Institute of America (ILI) for the following:

1. Grade and Color: Select, buff.

2. Grade and Color: Select, gray.

3. Grade and Color: Standard, buff.

4. Grade and Color: Standard, gray.

5. Finish: Smooth.

6. Finish: Plucked.

7. Finish: Match Architect's sample.

G. Cut stone accurately to shape and dimensions indicated, with exposed faces dressed true, beds and joints at right angles to face; comply with ILI fabricating tolerances.

2.4 MORTAR AND GROUT MATERIALS

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

B. Masonry Cement: ASTM C 91.

1. For colored pigmented mortars use premixed colored masonry cements of formulation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations.

2. For colored aggregate mortars use masonry cement of natural color or white as required to produce mortar color indicated.

C. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this article, combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142.

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

E. Aggregate for Mortar: ASTM C 144, except for joints less than 1/4 inch use aggregate graded with 100 percent passing the No. 16 sieve.

1. White Mortar Aggregates: Natural white sand or ground white stone.

2. Colored Mortar Aggregates: Ground marble, granite, or other sound stone, as required to match Architect's sample.

F. Aggregate for Grout: ASTM C 404.

G. Colored Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.

H. Water: Clean and potable.

I. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

J. Products: Subject to compliance with requirements, provide one of the following:

1. Colored Masonry Cement:

a. "Colorbond Custom Color Masonry Cement," Centurion.
b. "Atlas Custom Color Masonry Cement," Lehigh Portland Cement Co.
c. "Flamingo Color Masonry Cement," The Riverton Corporation.

2. Colored Mortar Pigments:

a. "Centurion Pigments," Centurion.
b. "True Tone Mortar Colors," Davis Colors, A Subsidiary of Rockwood Industries, Inc.
c. "SGS Mortar Colors," Solomon Grind-Chem Services, Inc.

2.5 REINFORCING STEEL

A. General: Provide reinforcing steel complying with requirements of referenced unit masonry standard and this article.

B. Steel Reinforcing Bars: Material and grade as follows:

1. Billet steel complying with ASTM A 615.

2. Epoxy-coated billet steel complying with ASTM A 615 and ASTM A 775.

3. Grade 60.

C. Deformed Reinforcing Wire: ASTM A 496.

D. Plain Welded Wire Fabric: ASTM A 185.

E. Deformed Welded Wire Fabric: ASTM A 497.

2.6 JOINT REINFORCEMENT

A. General: Provide joint reinforcement complying with requirements of referenced unit masonry standard and this article, formed from the following:

1. Galvanized carbon steel wire, coating class as required by referenced unit masonry standard for application indicated.

2. Stainless steel wire, Type 304 complying with ASTM A 580, for exterior walls; and galvanized carbon steel wire, coating class as required by referenced unit masonry standard, for interior walls.

3. Stainless steel wire, Type 304 complying with ASTM A 580.

B. Description: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units, and complying with requirements indicated below:

1. Wire Diameter for Side Rods: 0.1483 inch (9 gage).

2. Wire Diameter for Side Rods: 0.1875 inch.

3. Wire Diameter for Cross Rods: 0.1483 inch (9 gage).

4. Wire Diameter for Cross Rods: 0.1875 inch.

5. For single-wythe masonry provide type as follows with single pair of side rods:

a. Ladder design with perpendicular cross rods spaced not more than 16 inches o.c.

b. Truss design with continuous diagonal cross rods spaced not more than 16 inches o.c.

6. For multiwythe masonry provide type as follows:

a. Ladder design with perpendicular cross spaced not more than 16 inches o.c. and number of side rods as follows:

b. Truss design with diagonal cross rods spaced not more than 16 inches o.c. and number of side rods as follows:

1) Number of Side Rods for Multiwythe Concrete Masonry: One side rod for each face shell of hollow masonry units more than 4 inches in nominal width plus one side rod for each wythe of masonry 4 inches or less in nominal width.

c. Tab design with single pair of side rods and rectangular box-type cross ties spaced not more than 16 inches o.c.; with side rods spaced for embedment within each face shell of backup wythe and ties extended to engage the outer wythe by at least 1-1/2 inches.

d. Use units with adjustable 2-piece rectangular ties where horizontal joints of facing wythe do not align with those of backup by more than and where indicated.

C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering joint reinforcement that may be incorporated in the Work include, but are not limited to, the following:

D. Manufacturers: Subject to compliance with requirements, provide joint reinforcement by one of the following:

1. AA Wire Products Co.
2. Dur-O-Wal, Inc.
3. Heckman Building Products, Inc.
4. Hohmann & Barnard, Inc.
5. Masonry Reinforcing Corp. of America.
6. National Wire Products Industries.
7. Southern Construction Products, Inc.

2.7 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of referenced unit masonry standard and of this article.

B. Galvanized Carbon Steel Wire: ASTM A 82, coating class as required by referenced unit masonry standard for application indicated.

C. Galvanized Carbon Steel Wire: ASTM A 82, coating class as required by referenced unit masonry standard, for wire ties and anchors in interior walls, unless otherwise indicated.

D. Stainless Steel Wire: ASTM A 580, Type 304, for wire ties and anchors in exterior walls.

E. Stainless Steel Wire: ASTM A 580, Type 304.

1. Wire Diameter: 0.1875 inch.

2. Wire Diameter: 0.25 inch.

3. Wire Diameter: As indicated.

F. Galvanized Steel Sheet: As follows:

1. ASTM A 526 (commercial quality), Coating Designation G60, steel sheet zinc-coated by hot-dip process on continuous lines prior to fabrication, for sheet metal ties and anchors completely embedded in mortar.

2. ASTM A 366 (commercial quality) cold-rolled carbon steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153, Class B2 (for unit lengths over 15 inches) and Class B3 (for unit lengths under 15 inches), for sheet metal ties and anchors exposed to the weather and not completely embedded in mortar and grout.

G. Galvanized Steel Sheet: ASTM A 366 (commercial quality) cold-rolled carbon steel sheet, hot-dip galvanized after fabrication to comply with ASTM A 525, Class B2 (for unit lengths over 15 inches) and Class B3 (for unit lengths under 15 inches), for sheet metal ties and anchors.

H. Stainless Steel Sheet: ASTM A 167, Type 304, for sheet metal ties and anchors in exterior walls and where exposed to weather; and galvanized steel sheet complying with ASTM A 526 (commercial quality), Coating Designation G60, for other applications.

I. Stainless Steel Sheet: ASTM A 167, Type 304.

1. Galvanized Steel Sheet Thickness: For steel sheet hot-dip galvanized by continuous process prior to fabrication:

a. 0.0635 inch (16 gage).

b. 0.0785 inch (14 gage).

c. 0.1084 inch (12 gage).

2. Thickness of Steel Sheet Galvanized After Fabrication: Uncoated thickness of steel sheet hot-dip galvanized after fabrication:

a. 0.0598 inch (16 gage).

b. 0.0747 inch (14 gage).

c. 0.1046 inch (12 gage).

3. Stainless Steel Sheet Thickness: As follows:

a. 0.0625 inch (16 gage).

b. 0.0781 inch (14 gage).

c. 0.1094 inch (12 gage).

J. Galvanized Heavy-Thickness Steel Sheet: ASTM A 635 (commercial quality) hot-rolled carbon steel sheet hot-dip galvanized after fabrication to comply with ASTM A 525, Class B3, for rigid anchors fabricated from steel sheet or strip with a thickness of 0.180 inch and greater.

K. Steel Plates and Bars: ASTM A 36, shop painted with 2 coats of coal-tar epoxy-polyamide paint complying with SSPC Paint-16 to comply with SSPC-PA1 ("Paint Application Specification No. 1") and SSPC-SP6 ("Commercial Blast Cleaning") for surface preparation.

L. Steel Plates and Bars: ASTM A 36, hot-dip galvanized to comply with ASTM A 123 or ASTM A 153, Class B3, as applicable to size and form indicated.

M. Stainless Steel Plates and Bars: ASTM A 666, Type 304, temper as required to support loads imposed without exceeding allowable design stresses.

N. 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:

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

1. AA Wire Products Co.
2. Dur-O-Wal, Inc.
3. Heckman Building Products, Inc.
4. Hohmann & Barnard, Inc.
5. Masonry Reinforcing Corp. of America.

6. National Wire Products Industries.
7. Southern Construction Products, Inc.

2.8 BENT WIRE TIES

A. Individual units prefabricated from bent wire to comply with requirements indicated below:

B. Tie Shape for Hollow Masonry Units Laid with Cells Vertical: Rectangular with closed ends and not less than 4 inches wide.

C. Tie Shape for Solid Masonry Unit Construction: Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches long.

D. Type for Masonry Where Coursing Between Wythes Align: Unit ties bent from one piece of wire.

E. Type for Masonry Where Coursing Between Wythes Does Not Align: Adjustable ties composed of two parts, one with pintles, the other with eyes, maximum misalignment 1-1/4 inches.

2.10 ADJUSTABLE ANCHORS FOR CONNECTING MASONRY TO STRUCTURAL FRAMEWORK

A. General: Two-piece assemblies as described below allowing vertical or horizontal differential movement between wall and framework parallel to plane of wall, but resisting tension and compression forces perpendicular to it.

B. For anchorage to concrete framework, provide manufacturer's standard with dovetail anchor section formed from sheet metal and triangular-shaped wire tie section sized to extend within 1 inch of masonry face and as follows:

C. For anchorage to steel framework provide manufacturer's standard anchors with crimped 1/4-inch-diameter wire anchor section for welding to steel and triangular-shaped wire tie section sized to extend within 1 inch of masonry face and as follows:

1. Wire Diameter: 0.1875 inch.

2. Wire Diameter: 0.25 inch.

2.11 RIGID ANCHORS

A. Provide straps of form and length indicated, fabricated from metal strips of following width and thickness.

1. 1-1/2 inches wide by 1/4 inch thick.

2. As indicated.

2.12 MISCELLANEOUS ANCHORS

A. Unit Type Masonry Inserts in Concrete: Cast iron or malleable iron inserts of type and size indicated.

B. Dovetail Slots: Furnish dovetail slots, with filler strips, of slot size indicated, fabricated from 0.0336-inch (22-gage) sheet metal.

C. Anchor Bolts: Steel bolts complying with A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations:

1. Headed bolts.

2. Nonheaded bolts, straight.

3. Nonheaded bolts, bent in manner indicated.

2.13 POSTINSTALLED ANCHORS

A. Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing laboratory.

1. Type: Chemical anchors.

2. Type: Expansion anchors.

3. Type: Undercut anchors.

4. 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).

5. Corrosion Protection: Stainless steel components complying with ASTM F 593 and ASTM F 594, Group 1 alloy 304 or 316 for bolts and nuts; alloy 304 or 316 for anchor.

6. For cast-in-place and postinstalled anchors in concrete: Capability to sustain, without failure, a load equal to 4 times loads imposed by masonry.

7. For postinstalled anchors in grouted concrete masonry units: Capability to sustain, without failure, a

load equal to 6 times loads imposed by masonry.

2.14 EMBEDDED FLASHING MATERIALS

A. Sheet Metal Flashing: Fabricate from the following metal complying with requirements specified in Division 7 Section "Flashing and Sheet Metal" and below:

1. Stainless Steel: 0.0156 inch (28 gage) thick.

2. Copper: 10-oz. weight (0.0135 inch thick) for fully concealed flashing, 16 oz. (0.0216 inch thick) elsewhere.

3. Fabricate through-wall metal flashings embedded in masonry as follows:

a. With ribs formed in dovetail pattern at 3-inch intervals along length of flashing to provide a three-way integral mortar bond and weep-hole drainage.

b. With ribs formed in sawtooth pattern at 3-inch intervals along length of flashing to provide a three-way integral mortar bond and weep-hole drainage.

4. Fabricate metal expansion joint strips from sheet metal indicated above, formed to shape indicated.

5. Application: Use where flashing is partly concealed in masonry wall.

6. Application: Use where flashing is fully or partly concealed in masonry wall.

B. Laminated Flashing: Manufacturer's standard laminated flashing of type indicated below:

1. Copper-Fabric Laminate: Copper sheet of weight per sq. ft. indicated below, bonded with asphalt between 2 layers of glass fiber cloth.

a. Weight: 3 oz.

b. Weight: 5 oz.

c. Weight: 7 oz.

2. Application: Use where flashing is fully concealed in masonry.

C. Asphalt-Coated Copper Flashing: Manufacturer's standard

product consisting of sheet copper of weight per sq. ft. indicated below coated with flexible asphalt.

1. Weight: 3 oz.

2. Weight: 5 oz.

3. Weight: 7 oz.

4. Application: Use where flashing is fully concealed in masonry.

D. Reinforced Plastic Flashing: Manufacturer's standard composite plastic flashing as described below:

1. Metal foil, 0.33 mil thick, encapsulated between polyester film and bonded to 20 by 10 fiberglass scrim reinforcement, with a total thickness of 7 mils.

2. Polyester film bonded to 20 by 10 fiberglass scrim reinforcement and 1.25-mil black vinyl ethylene film, with a total thickness of 8 mils.

3. Joint Tape: Reinforced plastic flashing manufacturer's standard polyester tape, 2 inches wide by 2.0 mil thick.

4. Application: Use where flashing is fully concealed in masonry.

E. Rubberized Asphalt Sheet Flashing: Manufacturer's standard composite flashing product consisting of 32-mil-thick pliable and highly adhesive rubberized asphalt compound bonded completely and integrally to 8-mil-thick, high-density, cross-laminated polyethylene film to produce an overall thickness of 40 mils.

F. Vinyl Sheet Flashing: Flexible sheet flashings especially formulated from virgin polyvinyl chloride with plasticizers and other modifiers to remain flexible and waterproof in concealed masonry applications, black in color and of thickness indicated below:

1. Thickness: 20 mils.

2. Thickness: 30 mils.

3. Thickness: 56 mils.

4. Application: Use where flashing is fully concealed in masonry.

G. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 section "Flashing and Sheet Metal."

H. Adhesive for Flashings: Of type recommended by manufacturer of flashing material for use indicated.

I. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

J. Products: Subject to compliance with requirements, provide one of the following:

1. Metal Flashing:

   a. "Cheney Flashing (Dovetail)," Cheney Flashing Company, Inc.
   b. "Cheney Flashing (Sawtooth)," Cheney Flashing Company, Inc.
   c. "Keystone Three-Way Interlocking Thruwall Flashing," Keystone Flashing Co.

2. Copper Fabric Laminate Flashing:

   a. "Copper Fabric," Afco Products Inc.
   b. "Type FCC-Fabric Covered Copper," Phoenix Building Products.
   c. "Copper Fabric Flashing," Sandell Manufacturing Co., Inc.
   d. "York Copper Fabric Flashing," York Manufacturing, Inc.

3. Asphalt-Coated Copper Flashing:

   a. "Cop-A-Cote," Afco Products Inc.
   b. "Type ACC-Asphalt Bituminous Coated," Phoenix Building Products.
   c. "Coated Copper Flashing," Sandell Manufacturing Co., Inc.
   d. "Copperseal," York Manufacturing, Inc.

4. Reinforced Plastic Flashing:

   a. "Fiberweb 300," Fiberweb International Corp.
   b. "Fiberweb 200," Fiberweb International Corp.

5. Rubberized Asphalt Sheet Flashing:

   a. "Perm-A-Barrier Wall Flashing," W.R. Grace & Co.

6. Vinyl Sheet Flashing:

a. "Lexsuco Water Barrier," International Permalite Inc.
b. "Nervastral," Nervastral, Inc.

2.15 MISCELLANEOUS MASONRY ACCESSORIES

A. Nonmetallic Expansion Joint Strips: Premolded filler strips complying with ASTM D 1056, Type 2 (closed cell), Class A (cellular rubber and rubber-like materials with specific resistance to petroleum base oils), Grade 1 (compression-deflection range of 2-5 psi), compressible up to 35 percent, of width and thickness indicated, formulated from the following material:

1. Neoprene.

2. Urethane.

3. Polyvinyl chloride.

B. Preformed Control Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

1. Styrene-Butadiene Rubber Compound: ASTM D 2000, Designation 2AA-805.

2. Polyvinyl Chloride: ASTM D 2287, General Purpose Grade, Type PVC-65406.

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

D. Weep Holes: Provide the following:

1. Round Plastic Tubing: Medium-density polyethylene, 3/8-inch outside diameter by 4 inches long.

2. Rectangular Plastic Tubing: Clear butyrate, 3/8 inch by 1-1/2 inches by 3-1/2 inches long.

3. Wicking Material: Material as indicated below, in length required to produce 2 inches exposure on exterior and 18 inches in cavity between wythes:

a. Cotton sash cord.

b. Fibrous glass rope.

4. Aluminum Weep Hole/Vent: One-piece L-shaped units made to fit in a vertical mortar joint from sheet

aluminum and consisting of a vertical channel with louvers stamped in web and a flat horizontal; painted to comply with Division 9 section "Painting," prior to installation, in color approved by Architect to match that of mortar.

5. Plastic Weep Hole/Vent: One-piece flexible extrusion manufactured from ultraviolet-resistant polypropylene co-polymer, designed to weep moisture in masonry cavity to exterior, sized to fill head joints with outside face held back 1/8 inch from exterior face of masonry, in color selected from manufacturer's standard.

6. Vinyl Weep Hole/Vent: One-piece offset T-shaped units formed to fit in a vertical mortar joint by injection molding of flexible polyvinyl chloride and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and top flap; in color approved by Architect to match that of mortar.

   a. Available Products: Subject to compliance with requirements, weep hole/ventilators that may be incorporated in the Work include, but are not limited to, the following:

   b. Products: Subject to compliance with requirements, provide one of the following weep hole/ventilators:

      1) Aluminum Weep Hole/Vent:

      2) "Wilko Weephole Ventilators," AA Wire Products Co.

      3) Plastic Weep Hole/Vent:

      4) "Cell Vent," Dur-O-Wal, Inc.

      5) Vinyl Weep Hole/Vent:

      6) "Williams-Goodco Brick Vent," Williams Products, Inc.

2.16 INSULATION

A. Loose Granular Perlite Insulation: ASTM C 549, Type II (surface-treated for water repellency and limited moisture absorption) or IV (surface-treated for water repellency and to limit dust generation).

B. Loose Granular Vermiculite Insulation: ASTM C 516, Type

II (surface-treated for water repellency and limited moisture absorption), Grade 3 (Fine), complying with 29 CFR 1926 by containing less than 0.10 percent by weight of asbestos and that demonstration shows will not release asbestos fibers in excess of 0.1 fibers per cubic centimeter under reasonably foreseeable jobsite conditions.

C. Extruded Polystyrene Board Insulation: Rigid cellular polystyrene thermal nsulation with closed cells and integral high-density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C 578, Type IV; in manufacturer's standard lengths and widths; thicknesses as indicated.

D. Molded Polystyrene Board Insulation: Rigid, cellular thermal insulation formed by the expansion of polystyrene resin beads or granules in a closed mold to comply with ASTM C 578, Type I; in manufacturer's standard lengths and widths; thicknesses as indicated.

E. Provide specially shaped units designed for installation in cores of concrete blocks.

F. Adhesive: Type recommended by insulation board manufacturer for application indicated.

2.17 MASONRY CLEANERS

A. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2-cup dry measure) and laundry detergent (1/2-cup dry measure) dissolved in one gallon of water.

B. Job-Mixed Muriatic Solution: Solution of 1 part muriatic acid and 10 parts clean water, mixed in a nonmetallic container with acid added to water.

C. Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned:.

D. For masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface-acting acids, chelating, and wetting agents.

1. For dark colored masonry not subject to metallic oxidation stains, use formulation consisting of a liquid blend of surface-acting acids and special inhibitors.

corrected.

3.2 INSTALLATION, GENERAL

A. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.

B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.

C. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.

D. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.

E. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of new masonry with existing masonry.

3.3 CONSTRUCTION TOLERANCES

A. Comply with construction tolerances of referenced unit masonry standard.

3.4 LAYING MASONRY WALLS

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

B. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

C. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less that nominal 4-inch horizontal face dimensions at corners or jambs.

1. One-half running bond with vertical joint in each course centered on units in courses above and below.

2. Stack bond.

3. One-third running bond.

4. As indicated on drawings.

D. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

E. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.

F. Built-In Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

a. At exterior frames insert extruded polystyrene board insulation around perimeter of frame in thickness indicated but not less than 3/4 inch to act as a thermal break between frame and masonry.

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

3. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow concrete masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.

2. Bed webs in mortar in starting course on footings and

in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.

3. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

B. Set stone units in full bed of mortar with all vertical joints slushed full. Fill dowel, anchor, and similar holes solid. Wet stone joint surface thoroughly before setting; for stone surfaces that are soiled, clean bedding and exposed surfaces with fiber brush and soap powder and rinse thoroughly with clear water.

C. Cut joints flush for masonry walls to be concealed or to be covered by other materials, unless otherwise indicated.

3.6 STRUCTURAL BONDING OF MULTIWYTHE MASONRY

A. Use individual metal ties installed in horizontal joints to bond wythes together.

B. Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes.

C. Use either of the structural bonding systems specified above.

D. Use structural bonding system indicated on Drawings.

E. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.

1. Provide continuity with horizontal joint reinforcement at corners using prefabricated "L" units, in addition to masonry bonding.

F. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:

1. Provide individual metal ties.

2. Provide continuity with horizontal joint reinforcement using prefabricated "T" units.

G. Nonbearing Interior Partitions: Build full height of story to underside of solid floor or roof structure above and as follows:

1. Install pressure-relieving joint filler in joint

between top of partition and underside of structure above.

2. Wedge nonbearing partitions against structure above with small pieces of tile, slate, or metal.

3.7 CAVITIES/AIR SPACES

A. Keep cavities/air spaces clean of mortar droppings and other materials during construction. Strike joints facing cavities/air spaces flush.

B. Tie exterior wythe to backup with individual metal ties. Stagger alternate courses.

C. Tie exterior wythe to backup with continuous horizontal joint reinforcing.

D. Install vents in vertical head joints at the top of each continuous cavity/air space. Space vents and close off cavities/air spaces vertically and horizontally with blocking in manner indicated.

3.8 HORIZONTAL JOINT REINFORCEMENT

A. General: Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcing a minimum of 6 inches.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.9 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.

2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.

3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.10 ANCHORING SINGLE-WYTHE MASONRY VENEER

A. Anchor single-wythe masonry veneer to metal studs with masonry veneer anchors to comply with the following requirements:

1. Fasten each anchor section through sheathing to metal studs with 2 metal fasteners of type indicated.

2. Embed tie section in masonry joints. Provide not less than 2-inch air space between back of masonry veneer wythe and face of sheathing.

3. Locate anchor section relative to course in which tie section is embedded to allow maximum vertical differential movement of tie up and down.

4. Space anchors as indicated but not more than 18 inches o.c. vertically and 24 inches o.c. horizontally with not less than one anchor for each 2 sq. ft. of wall area. Install additional anchors within 1'-0" of openings and at intervals around perimeter not exceeding 8 inches.

B. Install vents at the top of each continuous air space in masonry veneer walls.

3.11 MOVEMENT (CONTROL AND EXPANSION) JOINTS

A. General: Install control and expansion joints in unit masonry where indicated. Build in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Fit bond breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.

2. Install preformed control joint gaskets designed to fit standard sash block.

3. Install special shapes designed for control joints. Install bond breaker strips at joint. Keep head joints free and clear of mortar or rake joint.

C. Form expansion joints in brick made from clay or shale as follows:

1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints, if any.

2. Build flanges of factory-fabricated expansion joint units into masonry.

3. Build in joint fillers where indicated.

4. Form open joint of width indicated but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealers." Maintain joint free and clear of mortar.

D. Build in horizontal pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting nonmetallic 50 percent compressible joint filler of width required to permit installation of sealant and backer rod specified in Division 7 Section "Joint Sealers."

1. Locate horizontal pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

3.12 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and wherever openings of more than 1'-0" for brick size units and 2'-0" for block size units are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.

1. For hollow concrete masonry unit walls, use specially formed bond beam units with reinforcement bars placed as indicated and filled with coarse grout.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.13 FLASHING/WEEP HOLES

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall,

and where indicated.

B. Prepare masonry surfaces so that they are smooth and free from projections that could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with adhesive/sealant/tape as recommended by flashing manufacturer before covering with mortar.

C. Install flashings as follows:

1. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4 inches, and through the inner wythe to within 1/2 inches of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches, unless otherwise indicated.

2. At heads and sills, extend flashing as specified above unless otherwise indicated but turn up ends not less than 2 inches to form a pan.

3. Install flashing in masonry veneer walls as specified above but carry flashing up face of sheathing at least 8 inches and behind air infiltration barrier/building paper.

4. Interlock end joints of ribbed sheet metal flashings by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer and seal lap with elastomeric sealant complying with requirements of Division 7 Section "Joint Sealers" for application indicated.

5. Turn down sheet metal flashings at exterior face of masonry to form drip.

6. Cut off flashing flush with face of wall after masonry wall construction is completed.

D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashings and as follows:

1. Form weep holes with product specified in Part 2 of this Section.

2. Form weep holes by keeping head joints free and clear of mortar.

3. Space weep holes 24 inches o.c.

4. Space weep holes 16 inches o.c.

5. In uninsulated cavities/air spaces place pea gravel to a height equal to height of first course but not less than 2 inches immediately above flashing embedded in the wall, as masonry construction progresses, to splatter mortar droppings and to maintain drainage.

6. In insulated cavities/air spaces cover cavity/air space side of open weep holes with copper or plastic insect screening before placing loose-fill masonry insulation in cavity.

E. Install reglets and nailers for flashing and other related construction where shown to be built into masonry.

3.14 INSTALLATION OF REINFORCED UNIT MASONRY

A. General: Install reinforced unit masonry to comply with requirements of referenced unit masonry standard.

B. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction.

1. Construct formwork to conform to shape, line, and dimensions shown. Make 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.

C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

D. 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.

3.15 FIELD QUALITY CONTROL

A. Testing Frequency: Tests and evaluations listed in this article will be performed during construction for each 5000 sq. ft. of wall area or portion thereof.

1. Mortar properties will be tested per property specification of ASTM C 270.

2. Mortar composition and properties will be evaluated

per ASTM C 780.

3. Grout compressive strength will be sampled and tested per ASTM C 1019.

B. Prism Test Method: For each type of wall construction indicated, masonry prisms will be tested per ASTM E 447, Method B, and as follows:

1. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

C. Evaluation of Quality Control Tests: In absence of other indications of noncompliance with requirements, masonry will be considered satisfactory if results from construction quality control tests comply with minimum requirements indicated.

3.16 PARGING

A. Parge predampened masonry walls where indicated with Type S or N mortar applied in 2 uniform coats to a total thickness of 3/4 inch. Scarify first parging coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

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

3.17 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings, and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.

C. 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. Test cleaning methods on sample wall panel; leave 1/2

panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.

5. Clean brick by means of bucket and brush hand-cleaning method described in BIA "Technical Note No. 20 Revised" using the following masonry cleaner:

   a. Job-mixed detergent solution.

   b. Job-mixed acidic solution.

   c. Proprietary acidic cleaner; apply in compliance with directions of acidic cleaner manufacturer.

6. Clean concrete masonry by means of cleaning method indicated in NCMA TEK 45 applicable to type of stain present on exposed surfaces.

7. Clean limestone units to comply with recommendations in "ILI Handbook" of Indiana Limestone Institute of America, Inc.

D. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION 04200

PART 1: GENERAL

1.1 DESCRIPTION: The work of this section consists of constructing exterior stone cladding for retaining walls and rebuilding existing freestanding wall section.

1.2 QUALITY ASSURANCE: Construct an 8-foot-long sample section, showing color range, texture, bond pattern, and joints for the stone retaining wall. Approved section shall become the standard of comparison and remain in place until completion of wall work. Sample may be incorporated into completed wall.

1.3 PRODUCT HANDLING: Store materials where directed under cover, off the ground, in a dry area.

1.4 PROJECT CONDITIONS: Lay masonry only when ambient temperature is above 40 degrees F. Protect work from cold and frost, ensuring that mortar will harden without freezing. Do not place concrete footings on muddy or frozen surfaces.

1.5 Submit under provisions of Section 01300. Submit four stone samples, 12 x 12 x 3-4 inches, illustrating size, color range and surface texture of units being provided.

PART 2: PRODUCTS

2.1 RETAINING WALL STONE: Match existing stone on adjacent building.

2.2 FREE STANDING WALL STONE: Match stone on adjacent existing stone wall. Stone shall be sound, hard, and well-shaped.

2.3 MORTAR: See Section 04100.

2.4 CONCRETE AND REINFORCEMENT: Section 03300. Minimum compressive strength, 3,000 psi at 28 days.

2.5 PINS: New, 3/4-inch diameter, hot-dipped galvanized steel, 8 inches and 12 inches long as shown.

PART 3: EXECUTION

3.1 EXAMINATION:

A. Examine surfaces to receive stonework, and conditions under which stonework will be installed, for compliance with requirements for installation tolerances and other conditions affecting performance of stonework. Do not proceed with installation until unsatisfactory conditions have been corrected to the satisfaction of the Government.

3.2 EXCAVATION AND BACKFILL: Section 00000.

3.3 FOOTINGS:

A. Concrete: Section 03300. Place reinforcement as shown.

B. Pins: Set 18" long pins for footings of bricksteps 12 inches deep into the concrete footing and 6 inches into the concrete retaining wall. Secure pins firmly into retaining wall and footing with mortar.

3.4 PREPARATION:

A. Protect stonework during construction as follows:

1. Cover top of walls with nonstaining waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches down both sides and hold securely in place.
2. Prevent staining of stone from mortar, grout, sealants and other sources. Immediately remove such materials from stone without damage to latter.
3. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
4. Protect sills, ledges, and projections from droppings of mortar and sealants.
5. When work resumes, clean loose mortar from stone. Where new masonry joins partially or totally set masonry, remove loose mortar and dampen stone before laying new course.

3.5 LAYING STONE - FREESTANDING WALL:

A. Roughly shape stone with a hammer to approximate fit. Knock off weak portions. Knob corners and returns square.

B. Use large stones for bottom courses and large selected stones at the corners. Generally decrease size of stone from bottom to top.

C. Lay stones in random bond matching the existing freestanding wall in stone bond pattern, joint spacing and cap placement.

D. Distribute headers throughout the wall mass. Extend headers through walls.

E. On tops of walls lay select, full width stones to match existing wall cap in size and shape

F. Build walls straight and plumb on both faces, building in anchors, dowels, and work of other trades. Set each stone level in a full bed of mortar; tap to an even bearing. Fill joints with mortar leaving no voids. Keep faces of stone free of

mortar. Rake face stone joints 1 inch in depth. Point joints and rub with a stiff broom or brush to remove trowel sheen.

3.6 LAYING STONE - RETAINING WALL:

A. General:

1. Use power saws to cut stones; for exposed edges, produce edges that are cut straight and true.
2. Exercise extreme care when cutting or working with existing stonework. Repair all damaged stonework as caused by the work of the Contract to the satisfaction of the Government.
3. Set stones to comply with requirements as shown. Install anchors, supports, fasteners, and other attachments as shown or necessary to secure stonework in place. Shim and adjust anchors, supports, and accessories to set stones accurately in locations indicated with uniform joint widths and with edges and faces aligned according to established relationships and indicated tolerances.
4. Provide expansion joints and pressure-relieving joints of widths and locations indicated as shown.

3.7 SETTING EXTERIOR STONEWORK WITH MORTAR:

A. Set stones in full bed of mortar with vertical joints slushed full, unless otherwise indicated.

1. Place setting buttons of adequate size, in sufficient quantity, and of same thickness as indicated joint width, to prevent mortar from squeezing out and to maintain uniform joint widths. Hold buttons at least one joint width back from face of stones.
2. Do not set heavy stones or projecting courses until mortar in courses below has hardened sufficiently to resist being squeezed out of joint.
3. Fill anchor holes with mortar.

B. Support projecting stones by props or anchors until wall above is set.

C. Rake out mortar from joints to depths of not less than 1/2 inch nor less than that required to expose sound mortar for joints pointed with mortar, or to provide sufficient depth for sealant and sealant backing for joints pointed with sealants.

D. Prepare stone joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply first layer of pointing mortar in layers not greater than 3/8 inch until a uniform depth is formed; compact each layer thoroughly and allow to become thumbprint hard before applying next layer.

E. Point stone joints by placing and compacting pointing mortar in layers not greater than 3/8 inch.

3.8 STUCCO VENEER: See Section 00000.

3.9 ADJUSTING AND CLEANING OF NEW STONEWORK:

A. Remove and replace or repair new stonework, including new work abutting existing stonework of the following description:

1. Broken, chipped, stained, or otherwise damaged stones.
2. Defective joints.
3. Stones and joints not matching approved field-constructed mock-ups.
4. Exterior dimension stonework not complying with other requirements indicated

B. Replace in manner that results in stonework's matching approved samples and field-constructed mock-ups, complying with other specified requirements, and showing no evidence of replacement.

C. Clean stonework not less than 6 days after completion of work, using clean water and stiff bristle fiber brushes, using a mild alkaline abrasive cleaner. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone. Begin at top and work down. Clean stone thoroughly, leaving no mortar stains or traces of cleaning compound.

3.10 REPAIRS TO EXISTING STONEWORK:

A. Remove and repair existing freestanding wall stonework as shown and of the following description:

1. Rebuild stone wall section adjacent to Building 35.

B. Rebuild in a manner that results in stonework's matching adjacent existing conditions and complying with specification requirements and showing no evidence of repair.

C. Clean as specified above.

D. Replace or repair existing stonework damaged as a result of the work of the contract and at no additional cost to the Government.

3.11 PROTECTION:

A. Provide final protection and maintain conditions in a manner acceptable to fabricator and installer ensures dimension stonework's being without damage or deterioration at time of substantial completion.

PART 4: MEASUREMENT AND PAYMENT

4.1 STONE LANDSCAPE WALLS:

A. Measurement will be number of linear feet measured along base of wall. No deductions will be made for weep holes, drain pipe, or other openings less than 2 square feet in area of volume of stone in which they occur.

B. Payment will be made at the contract unit price.

END

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. Removing plant growth.
2. Repairing damaged clay masonry.
3. Re-anchoring veneers.
4. Cleaning exposed clay masonry surfaces.
5. Repointing mortar joints.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 4 Section "Unit Masonry" for new unit masonry construction.
2. Division 4 Section "Stone Masonry Restoration and Cleaning."
3. Division 7 Section "Flashing and Sheet Metal" for metal flashing for restored clay masonry construction.
4. Division 7 Section "Joint Sealants" for joint sealants specified for restored clay masonry construction.

1.3 DEFINITIONS

A. Repointing: The process of raking out (removing) mortar and replacing it with new mortar.

B. Pointing: The process of placing new mortar in existing joint spaces, which have previously been raked out. This term does not include the raking out process.

C. Tuckpointing: The process of touching up existing mortar joints by filling in recesses with new mortar, without first raking out the joints.

1.4 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each product indicated including recommendations for their application and use. Include test reports and certifications substantiating that products comply with requirements.

C. Samples for verification purposes, prior to erecting the mockup, of the following:

1. Each new exposed masonry material to be used for replacing existing materials. Include in each set of samples the full range of colors and textures to be expected in the completed Work.

    a. Provide straps or panels containing not less than four brick units.

2. Each type of mortar for pointing and masonry rebuilding and repair in the form of sample mortar strips 6 inches long by 1/2 inch wide set in aluminum or plastic channels.
3. Each type of repair anchor.
4. Each type of chemical cleaning material.

D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include a list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

E. Restoration program for each phase of the restoration process, including protection of surrounding materials on building and site during operations. Describe in detail the materials, methods, and equipment to be used for each phase of the restoration work.

1. If alternative methods and materials to those indicated are proposed for any phase of restoration work, provide a written description, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

F. Cleaning program indicating cleaning process, including protection of surrounding materials on building and site, and control of runoff during operations. Describe in detail the materials, methods and equipment to be used.

1. If alternative methods and materials to those indicated are proposed for any phase of cleaning work, provide a written description, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.5 QUALITY ASSURANCE

A. Restoration Specialist: Engage an experienced masonry restoration and cleaning firm that has specialized in the types of work required for this Project. At Contractor's option, the work may be divided between two specialist firms: one for cleaning work and one for repair work.

1. Field Supervision: Require restoration specialist firm to maintain an experienced full-time supervisor on the job site during times that clay masonry restoration and cleaning are in progress.

B. Field-Constructed Mockups: Prior to starting general masonry restoration, prepare the following sample panels on the building where directed by Architect. Prepare sample panels using same materials and methods proposed for the Work, and under same weather conditions to be expected during the restoration. Obtain Architect's acceptance of visual qualities before proceeding with masonry restoration. Retain acceptable panels in an undisturbed condition, suitably marked, during construction as a standard for judging the completed Work.

1. Notify Architect one week in advance of dates and times when sample panels will be prepared.
2. Cleaning: Demonstrate the materials and methods to be used for cleaning each type of masonry surface and condition on sample panels approximately 25 sq. ft. in area.

   a. Test materials and methods on samples of adjacent nonmasonry materials for possible reaction with cleaning materials, except where materials and methods are known to have a deleterious effect on such materials.
   b. Allow a waiting period of the duration indicated, but not less than 7 calendar days, after completion of sample cleaning to permit a study of sample panels for negative reactions.

3. Repointing: Prepare two separate sample areas approximately 3 feet high by 6 feet wide for each type of repointing required, one for demonstrating methods and quality of workmanship expected in removing mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints.
4. Masonry Repair: Prepare sample panels of size indicated for each type of masonry material indicated to be patched, rebuilt, or replaced. Erect sample panels into an existing wall, unless otherwise indicated, to demonstrate the quality of materials

and workmanship.

C. Masonry Preconstruction Testing: Owner will employ an independent testing agency to perform preconstruction testing.

D. Masonry Preconstruction Testing: Contractor shall employ, at his own expense, an independent testing agency experienced in performing the type of tests indicated and acceptable to Architect to perform the preconstruction tests.

1. Preconstruction brick tests involve testing each type of existing brick indicated for replacement and each type of proposed replacement brick for properties indicated below using the sampling and testing methods in ASTM C 67. Carefully remove existing bricks from locations designated by Architect.

   a. Compressive strength.
   b. 24-hour cold water absorption.
   c. 5-hour boil absorption.
   d. Saturation coefficient.
   e. Initial rate of absorption (suction).

E. Source of Materials: Obtain materials for masonry restoration from a single source for each type material required (face brick, cement, sand, etc.) to ensure a match of quality, color, pattern, and texture.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Carefully pack, handle, and ship masonry units and accessories strapped together in suitable packs or pallets, or in heavy-duty cartons. Unload and handle to prevent chipping and breakage.

B. Deliver other materials to Project site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.

C. Protect masonry restoration materials during storage and construction from rain, snow, and ground water, and from staining and mixing with soil and other materials.

D. Protect grout, mortar, and other materials from deterioration by moisture and temperature. Store in a dry place or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing.

E. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

1.7 PROJECT CONDITIONS

A. Clean masonry surfaces only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried out, but for not less than 7 days after completion of cleaning.

B. Do not repoint mortar joints or repair masonry unless air temperature is between 40 deg F (4 deg C) and 80 deg F (27 deg C) and will remain so for at least 48 hours after completion of work.

C. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Immediately remove grout and mortar in contact with exposed masonry and other surfaces.

D. Protect sills, ledges, and projections from mortar droppings.

1.8 SEQUENCING/SCHEDULING

A. Order replacement materials at the earliest possible date, to avoid delaying completion of the Work.

B. Perform masonry restoration work in the following sequence:

1. Repair existing masonry, including replacing existing masonry with new masonry materials.
2. Rake out existing mortar from joints indicated to be repointed.
3. Repoint existing mortar joints of masonry indicated to be restored.
4. Clean masonry surfaces. Remove plants, paint, and soot prior to general cleaning.
5. Point existing mortar joints of masonry indicated to be restored.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

A. Face Brick and Accessories: Provide face brick and accessories, including units for lintels, arches, corners, and other specially ground, cut, or sawed shapes where required to complete masonry restoration work.

1. Provide units with color, surface texture, and size to match existing brick work and with physical properties not less than those determined from preconstruction testing of selected existing units.
2. Provide units with color, surface texture, and

physical properties to match Architect's sample.

B. Building Brick: Provide building brick complying with ASTM C 62 for masonry work concealed from view of same vertical dimension as face brick.

1. Grade SW where in contact with earth.
2. Grade SW, MW, or NW for concealed back-up.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II.

1. Provide nonstaining white cement complying with staining requirement of ASTM C 91 for not more than 0.03 percent water-soluble alkali.

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

C. Aggregate for Mortar: ASTM C 144, unless otherwise indicated.

1. Colored Mortar Aggregate: Natural or manufactured sand selected to produce mortar color indicated.
2. For pointing mortar, provide sand with rounded edges.
3. Match size, texture, and gradation of existing mortar as closely as possible.

D. Colored Mortar Pigment: Natural and synthetic iron oxides and chromium oxides, compounded for mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.

E. Water: Clean, free of oils, acids, alkalis, and organic matter.

F. Aggregate for Grout: ASTM C 404.

2.3 CLEANING MATERIALS AND EQUIPMENT

A. Water for Cleaning: Clean, potable, free of oils, acids, alkalis, salts, and organic matter.

B. Warm Water: Heat water to a temperature of 140 to 180 deg F (60 to 82 deg C).

C. Brushes: Fiber bristle only.

D. Job-Mixed Detergent Solution: Solution prepared by mixing 3 oz. of trisodium phosphate (TSP), 1 oz. of laundry detergent (Tide, All, etc.), 1 quart of 5 percent sodium hypochlorite (bleach), and 3 quarts of warm water for each gallon of solution required.

E. Nonacidic Gel Cleaner: Manufacturer's standard nonacidic gel containing detergents and cleaning agents and specifically formulated for cleaning masonry surfaces. Cleaner shall have a pH between 6 and 9 and shall not be considered a hazardous waste according to EPA 40 CFR 261.

1. Product: Subject to compliance with requirements, provide Sure Klean 942 Masonry Cleaner, ProSoCo, Inc.

F. Alkaline Prewash Cleaner: Manufacturer's standard alkaline cleaner for prewash applications used only where followed by an acidic cleaner of type indicated for afterwash.

1. Product: Subject to compliance with requirements, provide Sure Klean 766 Prewash, ProSoCo, Inc.

G. Acidic Cleaner: Manufacturer's standard-strength acidic masonry restoration cleaner composed of hydrofluoric acid blended with other acids, including a trace of phosphoric acid, and combined with special wetting systems and inhibitors.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Diedrich 101G Granite, Terra Cotta, and Brick Cleaner, Diedrich Technologies, Inc.
    b. Sure Klean Restoration Cleaner, ProSoCo, Inc.
    c. Prospec Heavy Duty Restoration Cleaner, Watson Bowman Acme Corp.
    d. Prospec Terra Cotta Cleaner, Watson Bowman Acme Corp.

H. Chemical Paint Remover: Manufacturer's standard thixotropic/alkaline formulation for removing paint coatings from masonry.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Diedrich 505/606/606X Paint Remover, Diedrich Technologies, Inc.
    b. Sure Klean Heavy-Duty Paint Stripper, ProSoCo, Inc.

I. Water-Rinsable Chemical Paint Remover: Manufacturer's standard thixotropic water-rinsable solvent formulation for removing paint coatings from masonry.

1. Product: Subject to compliance with requirements, provide Sure Klean 509 Paint Stripper, ProSoCo, Inc.

J. Soot Remover: Manufacturer's standard alkaline cleaner formulated to remove smoke stains and soot encrustation from masonry surfaces.

1. Product: Subject to compliance with requirements, provide Sure Klean Smoke Remover, ProSoCo, Inc.

K. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from the damaging effects of acidic and alkaline masonry cleaners.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Diedrich Acid Guard, Diedrich Technologies, Inc.
b. Sure Klean Acid Stop, ProSoCo, Inc.
c. Prospec Glass Guard II, Watson Bowman Acme Corp.

L. Spray Equipment: Provide equipment for controlled spray application of water and chemical cleaners, if any, at rates indicated for pressure, measured at spray tip, and for volume. Adjust pressure and volume, as required, to ensure that damage to masonry does not result from cleaning methods.

1. For chemical cleaner spray application, provide a low-pressure tank or chemical pump suitable for the chemical cleaner indicated, equipped with a cone-shaped spray tip.
2. For water spray application, provide a fan-shaped spray tip that disperses water at an angle of not less than 15 degrees.
3. For heated water spray application, provide equipment capable of maintaining a temperature at flow rates indicated between 140 and 180 deg F (60 and 82 deg C).
4. For steam application, provide a steam generator capable of delivering live steam at the nozzle head.

2.4 MISCELLANEOUS MATERIALS

A. Masonry Repair Anchors: Mechanical fasteners designed for masonry veneer stabilization. Anchors shall consist of a 1/4-inch-diameter stainless-steel rod with brass expanding shells at each end and a water-shedding washer in the middle. Expanding shells shall be designed to provide positive mechanical anchorage to the veneer on one end and the backup masonry on the other end.

1. Product: Subject to compliance with requirements, provide Mechanical Repair Anchors, Dur-O-Wal, Inc.

2.5 MORTAR MIXES

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

1. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 1 to 2 hours. Add the remaining water in small portions until reaching mortar of the desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

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

1. Colored Mortar Pigment: Where colored mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.

C. Do not use admixtures of any kind in mortar, unless otherwise indicated.

D. Mortar Proportions: Mix mortar materials in the following proportions:

1. Pointing Mortar for Brick: One part white portland cement, two parts lime, and six parts colored or natural mortar aggregate.

a. Add colored mortar pigment to product mortar colors required.

2. Pointing Mortar for Terra Cotta: One part white portland cement, one part lime, and six parts colored or natural mortar aggregate.

a. Add colored mortar pigment to produce mortar color required.

3. Rebuilding Mortar: Same as pointing mortar.
4. Rebuilding Mortar: Comply with ASTM C 270, Proportion Specification, Type N, unless otherwise indicated, with cementitious material content limited to portland cement-lime.
5. Grout: ASTM C 476.

2.6 CHEMICAL CLEANING SOLUTIONS

A. General: Unless otherwise indicated, dilute chemical cleaning materials with water to produce solutions of concentration indicated but not greater than that recommended by chemical cleaner manufacturer.

B. Acidic Cleaner Solution for Brick: Maximum hydrofluoric acid content of 3 percent.

C. Acidic Cleaner Solution for Terra Cotta: In a concentration demonstrated by testing that does not etch or otherwise damage terra cotta surface.

D. Chemical Paint Remover: In a concentration recommended by chemical cleaner manufacturer.

E. Soot Remover: In a concentration recommended by chemical cleaner manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. General: Comply with the chemical cleaner manufacturer's recommendations for protecting building surfaces against damage from exposure to their products.

B. Protect persons, motor vehicles, surrounding surfaces of building whose masonry surfaces are being restored, building site, plants, and surrounding buildings from injury resulting from masonry restoration work.

1. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be injured by such contact.
2. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
3. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building

interiors.

4. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles that must remain in operation during course of masonry restoration work.

C. Protect adjacent surfaces from contact with chemical cleaners by covering them with a liquid strippable masking agent or polyethylene film and waterproof masking tape. Apply masking agent to comply with manufacturer's recommendations. Do not apply liquid masking agent to painted or porous surfaces.

3.2 CLEANING MASONRY, GENERAL

A. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other. Work from bottom to top of the building for each scaffold drop.

B. Use only those cleaning methods indicated for each masonry material and location.

C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.

D. Rinse off chemical residue and soil by working upwards from bottom to top of each treated area at each stage or scaffold setting.

E. Removing Plant Growth: Completely remove plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible prior to removal. Remove loose soil and debris from open masonry joints to whatever depth they occur.

1. Apply ammonium sulfamate or another acceptable root-killing material to plant roots according to manufacturer's instructions. Do not apply materials to remaining plants or vegetation.

F. Water Application Methods: Where water application methods are indicated, comply with the following:

1. Spray Applications: Spray-apply water to masonry surfaces to comply with requirements indicated for location, purpose, water temperature, pressure, volume, and equipment. Unless otherwise indicated, hold spray nozzle no less than 6 inches from surface

of masonry and apply water from side to side in overlapping bands to produce uniform coverage and an even effect.

a. Low-Pressure Spray: 100 to 400 psi; 3 to 6 gal. per minute.
b. Medium-Pressure Spray: 400 to 800 psi; 3 to 6 gal. per minute.
c. High-Pressure Spray: 800 to 1200 psi; 3 to 6 gal. per minute.

2. Steam Wash: Apply steam to masonry surfaces at pressures not exceeding 80 psi. Hold nozzle no less than 6 inches from surface of masonry and apply steam from side to side or in the direction of the tooling in overlapping bands to produce uniform coverage and an even effect.

G. Chemical Cleaner Application Methods: Apply chemical cleaners to masonry surfaces to comply with chemical manufacturer's recommendations using brush or spray application methods, at Contractor's option, unless otherwise indicated. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.

1. Spray Application: Apply chemical cleaners at pressures not exceeding 50 psi, unless otherwise indicated.
2. Reapplying Chemical Cleaners: Do not apply chemical cleaners to same masonry surfaces more than twice. If additional cleaning is required, use a steam wash.

3.3 CLEANING BRICKWORK

A. Cold Water Wash: At locations indicated, clean brick masonry surfaces with cold water applied as follows:

B. Warm Water Wash: At locations indicated, clean brick masonry surfaces with warm water applied as follows:

1. Low-pressure spray.
2. Medium-pressure spray.
3. High-pressure spray.

C. Detergent Cleaning: At locations indicated, clean clay masonry with a detergent solution applied as follows:

1. Wet masonry with cold water applied by low-pressure spray.
2. Wet masonry with warm water applied by low-pressure spray.
3. Scrub masonry with detergent solution using

medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes, as required, to remove soil from mortar joints and crevices. Dip brush in solution often to ensure adequate fresh detergent and that masonry surface remains wet.

4. Rinse masonry with cold water to remove detergent solution and soil, applied as follows:
5. Rinse masonry with warm water to remove detergent solution and soil, applied as follows:

    a. Low-pressure spray.
    b. Medium-pressure spray.
    c. High-pressure spray.

6. Repeat cleaning procedure above where required to produce the effect established by the mockup.

D. Chemical Cleaning: At locations indicated, clean brick masonry surfaces with indicated chemical cleaner applied as follows:

1. Wet masonry with cold water applied by low-pressure spray.
2. Wet masonry with warm water applied by low-pressure spray.
3. Apply acidic cleaner to masonry. Let cleaner remain on surface for period indicated below before rinsing away:

    a. As recommended by chemical cleaner manufacturer.
    b. 2 to 3 minutes.

4. Apply nonacidic gel cleaner in a 1/8-inch thickness by brush, working into joints and crevices. Apply quickly and do not brush out excessively so the area will be uniformly covered with fresh cleaner and dwell time will be uniform throughout the area being cleaned.
5. Let cleaner remain on surface for the period indicated below:

    a. As recommended by chemical cleaner manufacturer.
    b. As established by the mockup.

6. Remove bulk of nonacidic gel cleaner by squeegeeing into containers for disposal.
7. Rinse masonry with cold water to remove chemicals and soil, applied as follows:
8. Rinse masonry with warm water to remove chemicals and soil, applied as follows:

    a. Low-pressure spray.

b. Medium-pressure spray.
c. High-pressure spray.

9. Repeat cleaning procedure above where required to produce the effect established by the mockup. Do not apply more than twice.

E. Paint Removal: At locations indicated, remove paint from masonry surfaces as follows:

1. Apply chemical paint remover to dry painted masonry with brushes.
2. Allow chemical paint remover to remain on surface for period recommended by paint remover manufacturer.
3. Remove chemical and paint residue by rinsing with water applied as follows:

a. Low-pressure spray.
b. Medium-pressure spray.
c. High-pressure spray.

4. Apply an afterwash acidic cleaner to masonry while it is still wet using low-pressure spray equipment or a soft-fiber brush. Let cleaner remain on surface for period recommended by manufacturer, unless otherwise indicated.
5. Rinse masonry with cold water to remove chemicals and soil, applied as follows:

a. Low-pressure spray.
b. Medium-pressure spray.
c. High-pressure spray.

F. Paint Removal with Water-Rinsable Chemical Paint Remover: At locations indicated, remove paint from masonry surfaces as follows:

1. Apply thick coating of water-rinsable chemical paint remover to painted masonry with natural-fiber cleaning brush, deep-nap roller, or large paint brush.
2. Allow chemical paint remover to remain on surface for period recommended by paint remover manufacturer. Agitate periodically with a stiff-bristle brush.
3. Remove chemical and paint residue by rinsing with water applied as follows:

a. Low-pressure spray.
b. Medium-pressure spray.
c. High-pressure spray.

G. Soot Removal: At locations indicated, remove soot from masonry surfaces as follows:

1. Apply chemical soot remover to masonry with brushes.
2. Allow chemical soot remover to remain on surface for period recommended by soot remover manufacturer.
3. Remove chemical and soot residue by rinsing with water applied as follows:

    a. Low-pressure spray.
    b. Medium-pressure spray.
    c. High-pressure spray.

4. Apply an afterwash acidic cleaner to masonry while it is still wet using low-pressure spray equipment or a soft-fiber brush. Let cleaner remain on surface for period recommended by manufacturer, unless otherwise indicated.
5. Rinse masonry with cold water to remove chemicals and soil, applied as follows:

    a. Low-pressure spray.
    b. Medium-pressure spray.
    c. High-pressure spray.

3.4 CLEANING TERRA COTTA

A. Warm Water Wash: At locations indicated, clean terra cotta with warm water applied as follows:

    1. Low-pressure spray.
    2. Medium-pressure spray.

B. Steam Cleaning: At locations indicated, remove soil from terra cotta surfaces by applying live steam.

C. One-Part Acidic Chemical Cleaning: At locations indicated, clean terra cotta surfaces with one-part system using an acidic cleaner of dilution indicated, applied as follows:

    1. Wet terra cotta with cold water applied by low-pressure spray.
    2. Wet terra cotta with warm water applied by low-pressure spray.
    3. Apply acidic cleaner to terra cotta. Let cleaner remain on surface for period indicated below before rinsing away:

        a. As recommended by chemical cleaner manufacturer.
        b. 2 to 3 minutes.

    4. Rinse terra cotta with cold water to remove chemicals and soil, applied as follows:
    5. Rinse terra cotta with warm water to remove chemicals

and soil, applied as follows:

a. Low-pressure spray.
b. Medium-pressure spray.
c. High-pressure spray.

6. Repeat cleaning procedure above, where required, to produce the effect established by the mockup. Do not apply more than twice.

3.5 BRICK REMOVAL AND REBUILDING

A. Carefully remove by hand, at locations indicated, bricks that are damaged, spalled, or deteriorated. Cut out full units from joint to joint and in a manner to permit replacement with full-size units.

B. Support and protect masonry indicated to remain that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

C. Salvage as many whole, undamaged bricks as possible.

D. Remove mortar, loose particles and soil from salvaged brick by cleaning with brushes and water. Store brick for reuse.

E. Clean remaining brick at edges of removal areas by removing mortar, dust, and loose debris in preparation for rebuilding.

3.6 BRICK REBUILDING

A. Install new or salvaged brick to replace removed brick. Fit replacement units into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

B. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet clay bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods that ensure units are nearly saturated but surface dry when laid. Maintain joint width for replacement units to match existing units.

C. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.

D. Point new mortar joints in repaired area to comply with

requirements for repointing existing masonry, and rake out mortar used for laying brick before mortar sets.

3.7 REPOINTING MASONRY

A. Rake out joints as follows:

1. Rake out mortar from joints to depths equal to 2-1/2 times their widths but not less than 1/2 inch nor less than that required to expose sound, unweathered mortar.
2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of masonry units or widen joints. Replace damaged masonry units.

    a. Cut out old mortar by hand with a chisel and mallet, unless otherwise indicated.
    b. Do not use power-operated rotary hand saws and grinders unless specific Architect's written approval is obtained based on submission by Contractor of a satisfactory quality control program and demonstrated ability of operators to use tools without damaging masonry. Quality control program shall include provisions for supervising performance and preventing damage due to worker fatigue.

B. Point joints as follows:

1. Rinse masonry joint surfaces with water to remove dust and mortar particles. Time the rinsing application so that at the time of pointing excess water has evaporated or run off and joint surfaces are damp but free of standing water.
2. Apply the first layer of pointing mortar to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Compact each layer thoroughly and allow it to become thumbprint hard before applying the next layer.
3. After joints have been filled to a uniform depth, place remaining pointing mortar in three layers with each of first and second layers filling approximately two fifths of joint depth and third layer the remaining one fifth. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing bricks have rounded edges recess final layer slightly from face. Take care not to spread mortar over edges onto exposed masonry

surfaces, or to featheredge mortar.

4. When mortar is thumbprint hard, tool joints to match original appearance of joints, unless otherwise indicated. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in a damp condition for not less than 72 hours.
6. Where repointing work precedes cleaning of existing masonry, allow mortar to harden not less than 30 days before beginning cleaning work.

3.8 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water, which is spray-applied at a low pressure.

B. Using metal scrapers or brushes is not permitted.

C. Using acid or alkali cleaning agents is not permitted.

END OF SECTION 04525

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. Removing plant growth.
2. Repairing damaged stone masonry.
3. Cleaning exposed stone masonry surfaces.
4. Repointing mortar joints.
5. Stone consolidation treatment.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 4 Section "Clay Masonry Restoration and Cleaning."
2. Division 7 Section "Water Repellents" for liquid water repellents specified for cleaned and restored stone masonry.
3. Division 7 Section "Joint Sealants" for joint sealants specified for restored stone masonry construction.

1.3 DEFINITIONS

A. Repointing: The process of raking out (removing) mortar and replacing it with new mortar.

B. Pointing: The process of placing new mortar in existing joint spaces that have previously been raked out. This term does not include the raking out process.

C. Tuckpointing: The process of touching up existing mortar joints by filling in recesses with new mortar, without first raking out the joints.

1.4 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each product indicated including recommendations for their application and use. Include

test reports and certifications substantiating that products comply with requirements.

C. Samples for verification purposes, prior to erecting the mockup, of the following:

1. Each new exposed masonry material to be used for replacing existing materials. Include in each set of samples the full range of colors and textures to be expected in the completed Work.

   a. 12-by-12-inch minimum stone samples.

2. Each type of mortar for pointing and masonry rebuilding and repair in the form of sample strips of mortar 6 inches long by 1/2 inch wide set in aluminum or plastic channels.
3. Each type of chemical cleaning material.
4. Each type of adhesive.
5. Each type of anchor.

D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include a list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

E. Restoration program for each phase of the restoration process, including protection of surrounding materials on building and site during operations. Describe in detail the materials, methods, and equipment to be used for each phase of the restoration work.

1. If alternative methods and materials to those indicated are proposed for any phase of restoration work, provide a written description, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

F. Cleaning program indicating cleaning process, including protection of surrounding materials on building and site, and control of runoff during operations. Describe in detail the materials, methods, and equipment to be used.

1. If alternative methods and materials to those indicated are proposed for any phase of cleaning work, provide a written description, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.5 QUALITY ASSURANCE

A. Restoration Specialist: Engage an experienced masonry restoration and cleaning firm that has specialized in the types of work required for this Project. At Contractor's option, the work may be divided between two specialist firms: one for cleaning work and one for repair work.

1. Field Supervision: Require restoration specialist firm to maintain an experienced full-time supervisor on the job site during times that stone masonry restoration and cleaning are in progress.

B. Manufacturer Qualifications: A company regularly engaged in producing masonry cleaning compounds, which have been used on similar projects with successful results, and that retains factory-trained representatives who are available for consultation and jobsite inspection and assistance at no additional cost.

C. Field-Constructed Mockups: Prior to start of general masonry restoration, prepare the following sample panels on the building where directed by Architect. Prepare sample panels using same materials and methods proposed for the Work, and under same weather conditions to be expected during time of the Work. Obtain Architect's acceptance of visual qualities before proceeding with the Work. Retain acceptable panels in an undisturbed condition, suitably marked, during construction as a standard for judging the completed Work.

1. Cleaning: Demonstrate materials and methods to be used for cleaning each type of masonry surface and condition on sample panels approximately 25 sq. ft. in area.

   a. Test cleaners and methods on samples of adjacent nonmasonry materials for possible reaction with cleaners, except where cleaners and methods are known to have a deleterious effect.
   b. Allow a waiting period of the duration indicated, but not less than 7 calendar days, after completion of sample cleaning to permit a study of sample panels for negative reactions.

2. Repointing: Prepare two separate sample areas approximately 3 feet high by 6 feet wide for each type of repointing required, one for demonstrating methods and quality of workmanship expected in removing mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints.
3. Masonry Repair: Prepare sample panels of size indicated for each type of masonry material indicated to be patched, rebuilt, or replaced. Erect mockup

panels into an existing wall, unless otherwise indicated, to demonstrate the quality of materials and workmanship.

4. Stone Consolidation Treatment: Demonstrate materials and methods to be used on a sample panel approximately 25 sq. ft. in area.

D. Masonry Preconstruction Testing: Owner will employ an independent testing agency to perform preconstruction testing.

E. Masonry Preconstruction Testing: Contractor shall employ, at his own expense, an independent testing agency experienced in performing the type of tests indicated and acceptable to Architect to perform the preconstruction tests.

F. Source of Materials: Obtain materials for stone masonry restoration from a single source for each type material required (stone, cement, sand, etc.) to ensure a match of quality, color, pattern, and texture.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Carefully pack, handle, and ship stone and accessories strapped together in suitable packs or pallets, or in crates or heavy-duty containers. Unload and handle to prevent chipping and breaking.

B. Deliver other materials to Project site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.

C. Protect masonry restoration materials during storage and construction from rain, snow, and ground water, and from staining or mixing with soil and other materials.

D. Protect grout, mortar, and other materials from deterioration by moisture and temperature. Store in a dry place or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing.

E. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

1.7 PROJECT CONDITIONS

A. Clean masonry surfaces only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried out, but for not less than 7 days after completion of cleaning.

B. Do not repoint mortar joints or repair masonry unless air temperature is between 40 deg F (4 deg C) and 80 deg F (27 deg C) and will remain so for at least 48 hours after completion of Work.

C. Apply stone consolidation treatment only when surface and air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C) and rain is not expected within 24 hours.

D. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Immediately remove grout and mortar in contact with exposed masonry and other surfaces.

E. Protect sills, ledges, and projections from mortar droppings.

1.8 SEQUENCING/SCHEDULING

A. Order replacement materials at the earliest possible date, to avoid delaying completion of the Work.

B. Perform masonry restoration work in the following sequence:

1. Repair existing masonry, including replacing existing masonry with new masonry materials.
2. Rake out existing mortar from joints indicated to be repointed.
3. Repoint existing mortar joints of masonry indicated to be restored.
4. Clean existing masonry surfaces. Remove plants, paint, and soot prior to general cleaning.
5. Point existing mortar joints of masonry indicated to be restored.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

A. Stone: Provide natural building stone of type (classification), color, surface texture, and size to match existing stone.

B. Stone: Provide natural building stone of type (classification), color, and surface texture to match Architect's sample. Match existing stones in size and shape.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II.

1. Provide nonstaining white cement complying with staining requirement of ASTM C 91 for not more than 0.03 percent water-soluble alkali.

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

C. Aggregate for Mortar: ASTM C 144, unless otherwise indicated.

1. Colored Mortar Aggregate: Natural or manufactured sand selected to produce mortar color indicated.

a. For pointing mortar, provide sand with rounded edges.
b. Match size, texture, and gradation of existing mortar as closely as possible.

D. Colored Mortar Pigment: Natural and synthetic iron oxides and chromium oxides, compounded for mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.

E. Factory-Mixed Patching Mortar: Cement-based mortar, custom-manufactured for patching stone masonry and formulated to match the stone in color and texture. Mortar shall contain no acrylics, polymers, or metal constituents.

1. Product: Subject to compliance with requirements, provide Jahn Restoration Mortar, Cathedral Stone Products, Inc.

F. Water: Clean, free of oils, acids, alkalis, and organic matter.

2.3 CLEANING MATERIALS AND EQUIPMENT

A. Water for Cleaning: Clean, potable, free of oils, acids, alkalis, salts, and organic matter.

B. Warm Water: Heat water to a temperature of 140 to 180 deg F (60 to 82 deg C).

C. Brushes: Fiber bristle only.

D. Job-Mixed Detergent Solution: Solution prepared by mixing 3 oz. of trisodium phosphate (TSP), 1 oz. of laundry detergent (Tide, All, etc.), 1 quart of 5 percent sodium hypochlorite (bleach), and 3 quarts of warm water for each gallon of solution required.

E. Nonacidic Gel Cleaner: Manufacturer's standard nonacidic

gel containing detergents and chelating agents and specifically formulated for cleaning masonry surfaces. Cleaner shall have a pH between 6 and 9 and shall not be considered a hazardous waste according to EPA 40 CFR 261.

1. Product: Subject to compliance with requirements, provide Sure Klean 942 Masonry Cleaner, ProSoCo, Inc.

F. Acidic Cleaner: Manufacturer's standard-strength acidic masonry restoration cleaner composed of hydrofluoric acid blended with other acids, including a trace of phosphoric acid, and combined with special wetting systems and inhibitors.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

   a. Diedrich 101-G Granite, Terra Cotta, and Brick Cleaner, Diedrich Technologies, Inc.
   b. Sure Klean Restoration Cleaner, ProSoCo, Inc.
   c. Prospec Heavy Duty Restoration Cleaner, Watson Bowman Acme Corp.

G. One-Part Limestone Cleaner: Manufacturer's standard one-part acid formulation for cleaning limestone.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

   a. Sure Klean Limestone Restorer, ProSoCo, Inc.
   b. Prospec Limestone and Precast Cleaner, Watson Bowman Acme Corp.

H. Two-Part Limestone Cleaner: Manufacturer's standard two-part system consisting of an alkaline cleaner for prewash and an acid neutralizer for afterwash.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

   a. Diedrich Limestone Cleaner Prerinse and

Afterrinse, Diedrich Technologies, Inc.
b. Sure Klean Limestone Prewash and Afterwash, ProSoCo, Inc.

I. Chemical Paint Remover: Manufacturer's standard thixotropic/alkaline formulation for removing paint coatings from masonry.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Diedrich 505/606/606X Paint Remover, Diedrich Technologies, Inc.
b. Sure Klean Heavy-Duty Paint Stripper, ProSoCo, Inc.

J. Water-Rinsable Chemical Paint Remover: Manufacturer's standard thixotropic water-rinsable solvent formulation for removing paint coatings from masonry.

1. Product: Subject to compliance with requirements, provide Sure Klean 509 Paint Stripper, ProSoCo, Inc.

K. Soot Remover: Manufacturer's standard alkaline cleaner formulated to remove smoke stains and soot encrustation from masonry surfaces.

1. Product: Subject to compliance with requirements, provide Sure Klean Smoke Remover, ProSoCo, Inc.

L. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from the damaging effects of acidic and alkaline masonry cleaners.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Diedrich Acid Guard, Diedrich Technologies, Inc.
b. Sure Klean Acid Stop, ProSoCo, Inc.
c. Prospec Glass Guard II, Watson Bowman Acme Corp.

M. Spray Equipment: Provide equipment for controlled spray application of water and chemical cleaners, if any, at

rates indicated for pressure, measured at spray tip, and for volume. Adjust pressure and volume, as required, to ensure that damage to masonry does not result from cleaning methods.

1. For chemical cleaner spray application, provide low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with a cone-shaped spray tip.
2. For water spray application, provide a fan-shaped spray tip that disperses water at an angle of not less than 15 degrees.
3. For heated water spray application, provide equipment capable of maintaining a temperature at flow rates indicated between 140 and 180 deg F (60 and 82 deg C).
4. For steam application, provide a steam generator capable of delivering live steam at the nozzle head.

2.4 MISCELLANEOUS MATERIALS

A. Stone-to-Stone Adhesive: Two-part polyester resin stone adhesive with a 15- to 30-minute cure at 70 deg F (21 deg C), in formulation (knife or flowing grade) recommended by adhesive manufacturer for type of stone repair indicated, and in color indicated or, if not otherwise indicated, as selected by Architect from tinted or standard colors available from adhesive manufacturer.

1. Product: Subject to compliance with requirements, provide Akemi adhesives distributed by Wood and Stone, Inc., Manassas, VA.

B. Mortar-to-Stone Adhesive: High-modulus, high-strength, moisture-insensitive epoxy adhesive with a pot life of 30 minutes at 40 deg F (4 deg C).

1. Product: Subject to compliance with requirements, provide Sikadur Hi-Mod Epoxy, Sikastix 370, Sika Corporation.

C. Stone Consolidation Treatment: Ready-to-use product designed for the consolidation and water repellant treatment of masonry materials that have deteriorated due to weathering and pollutant exposure. Treatment shall be composed of silicic ethyl esters, a neutral catalyst, a silane water repellant, and solvents.

1. Product: Subject to compliance with requirements, provide Conservare H Stone Strengthener, ProSoCo, Inc.

D. Stone Consolidation Treatment: Ready-to-use product

designed for the consolidation of masonry materials that have deteriorated due to weathering and pollutant exposure. Treatment shall be composed of silicic ethyl esters, a neutral catalyst, and solvents.

1. Product: Subject to compliance with requirements, provide Conservare OH Stone Strengthener, ProSoCo, Inc.

E. Stone Anchors: Type and size indicated or, if not indicated, to match existing in size and type. Fabricate anchors and dowels from AISI Type 302/304 stainless steel.

2.5 MORTAR MIXES

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

1. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 1 to 2 hours. Add remaining water in small portions until reaching mortar of desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

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

1. Colored Mortar Pigment: Where colored mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.

C. Do not use admixtures of any kind in mortar, unless otherwise indicated.

D. Mortar Proportions: Mix mortar materials in the following proportions:

1. Pointing Mortar for Stone: One part white portland cement, one part lime, and six parts colored or natural mortar aggregate.

a. Add colored mortar pigment to produce mortar color required.

2. Rebuilding Mortar: One part white portland cement,

one part lime, and six parts colored or natural mortar aggregate.

3. Rebuilding Mortar: Comply with ASTM C 270, Proportion Specification, Type N, unless otherwise indicated, with cementitious material content limited to portland cement-lime.
4. Patching Mortar for Stone: Provide mix composed of white and gray cement combined with lime and selected aggregates to produce a color matching the color of existing stone. Proportion mix with two parts cement, two parts lime, and six parts aggregate.

2.6 CHEMICAL CLEANING SOLUTIONS

A. General: Unless otherwise indicated, dilute chemical cleaning materials with water to produce solutions of concentration indicated but not greater than that recommended by chemical cleaner manufacturer.

B. Acidic Cleaner Solution for Unpolished Stone: Maximum hydrofluoric acid content of 3 percent.

1. Use acidic cleaner only on unpolished granite, unpolished dolomite marbles, and siliceous sandstone.

C. Acidic Cleaner for Polished Stone: In a concentration demonstrated by testing that does not etch or otherwise damage polished surface.

1. Use acidic cleaner on only polished granites and polished dolomite marbles.

D. Alkaline Cleaner for Prewashing Limestone: In a concentration recommended by chemical cleaner manufacturer.

E. Acid Neutralizer for Afterwashing Limestone: In a concentration recommended by chemical cleaner manufacturer.

F. Chemical Paint Remover: In a concentration recommended by chemical cleaner manufacturer.

G. Soot Remover: In a concentration recommended by chemical cleaner manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. General: Comply with recommendations of cleaner manufacturer's chemical cleaners for protecting building surfaces against damage from exposure to their products.

B. Protect persons, motor vehicles, surrounding surfaces of building whose masonry surfaces are being restored, building site, plants, and surrounding buildings from injury resulting from masonry restoration work.

1. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be injured by such contact.
2. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
3. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
4. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles that must remain in operation during course of masonry restoration work.

C. Protect adjacent surfaces from contact with acidic chemical cleaners by covering them with a liquid strippable masking agent or polyethylene film and waterproof masking tape. Apply masking agent to comply with manufacturer's recommendations. Do not apply liquid masking agent to painted or porous surfaces.

D. Protect adjacent surfaces from contact with alkali chemical cleaners by covering them either with liquid strippable masking agent or polyethylene film and waterproof masking tape.

3.2 CLEANING MASONRY, GENERAL

A. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other. Work from bottom to top of the building for each scaffold drop.

B. Use only those cleaning methods indicated for each masonry material and location.

C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.

D. Rinse off chemical residue and soil by working upwards from bottom to top of each treated area at each stage or scaffold setting.

E. Removing Plant Growth: Completely remove plant, moss, and shrub growth completely from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible prior to removal. Remove loose soil or debris from open masonry joints to whatever depth it occurs.

1. Apply ammonium sulfamate or another acceptable root-killing material to plant roots according to manufacturer's instructions. Do not apply materials to plants or vegetation to remain on or around the building.

F. Water Application Methods: Where water application methods are indicated, comply with the following:

1. Prolonged Spraying: Soak masonry surfaces by applying water continuously and uniformly to a limited area for the time period indicated. Apply water at low pressures and low volumes in multiple fine sprays using perforated hoses or multiple spray nozzles. Erect a protective enclosure constructed of polyethylene sheeting to cover area being sprayed.
2. Spray Applications: Spray-apply water to masonry surfaces to comply with requirements indicated for location, purpose, water temperature, pressure, volume, and equipment. Unless otherwise indicated, hold spray nozzle no less than 6 inches from surface of masonry and apply water from side to side in overlapping bands to produce uniform coverage and an even effect.

    a. Low-Pressure Spray: 100 to 400 psi; 3 to 6 gal. per minute.
    b. Medium-Pressure Spray: 400 to 800 psi; 3 to 6 gal. per minute.
    c. High-Pressure Spray: 800 to 1200 psi; 3 to 6 gal. per minute.

3. Steam Wash: Apply steam to masonry surfaces at pressures not exceeding 80 psi. Hold nozzle no less than 6 inches from surface of masonry and apply steam from side to side or in the direction of the tooling in overlapping bands to produce uniform coverage and an even effect.

G. Chemical Cleaner Application Methods: Apply chemical cleaners to masonry surfaces to comply with chemical manufacturer's recommendations using brush or spray application methods, at Contractor's option, unless otherwise indicated. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.

1. Spray Application: Apply chemical cleaners at pressures not exceeding 50 psi, unless otherwise indicated.
2. Reapplying Chemical Cleaners: Do not apply chemical cleaners to same masonry surfaces more than twice. If additional cleaning is required, use a steam wash.

3.3 CLEANING STONEWORK

A. Cold Water Wash: At locations indicated, clean stone surfaces by the following procedure.

1. Wet masonry with prolonged spraying for duration indicated below.

   a. Continue spraying until surface encrustation has softened sufficiently to permit its removal by water wash.
   b. Continue spraying for 72 hours.

2. Remove soil and softened surface encrustation from stone by applying cold water as follows:

   a. Low-pressure spray.
   b. Medium-pressure spray.
   c. High-pressure spray.

B. Warm Water Wash: At locations indicated, clean stone surfaces with warm water applied as follows:

1. Low-pressure spray.
2. Medium-pressure spray.
3. High-pressure spray.

C. Detergent Cleaning: At locations indicated, clean stone surfaces with a detergent solution applied as follows:

1. Wet masonry with cold water applied by low-pressure spray.
2. Wet masonry with warm water applied by low-pressure spray.
3. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes, as required, to remove soil from mortar joints and crevices. Dip brush in solution often to ensure adequate fresh detergent and that masonry surface remains wet.
4. Rinse masonry with cold water to remove detergent solution and soil, applied as follows:
5. Rinse masonry with warm water to remove detergent solution and soil, applied as follows:

a. Low-pressure spray.
b. Medium-pressure spray.
c. High-pressure spray.

6. Repeat cleaning procedure above where required to produce the effect established by the mockup.

D. Acidic Chemical Cleaning: At locations indicated, clean stone surfaces with an acidic cleaner of dilution indicated, applied as follows:

1. Wet masonry with cold water applied by low-pressure spray.
2. Wet masonry with warm water applied by low-pressure spray.
3. Apply acidic cleaner to stone. Let cleaner remain on surface for period indicated below before rinsing away.

   a. As recommended by chemical cleaner manufacturer.
   b. 2 to 3 minutes.

4. Rinse stone with cold water to remove chemicals and soil, applied as follows:
5. Rinse stone with warm water to remove chemicals and soil, applied as follows:

   a. Low-pressure spray.
   b. Medium-pressure spray.
   c. High-pressure spray.

6. Repeat cleaning procedure above where required to produce the cleaning effect established by mockup. Do not apply more than twice.

E. Nonacidic Gel Chemical Cleaning: At locations indicated, clean stone surfaces with a nonacidic gel cleaner applied as follows:

1. Wet masonry with cold water applied by low-pressure spray.
2. Wet masonry with warm water applied by low-pressure spray.
3. Apply nonacidic gel cleaner in a 1/8-inch thickness by brush, working into joints and crevices. Apply quickly and do not brush out excessively so that the area will be uniformly covered with fresh cleaner and dwell time will be uniform throughout the area being cleaned.
4. Let cleaner remain on surface for period indicated below:

   a. As recommended by chemical cleaner manufacturer.

b. As established by mockup.

5. Remove bulk of nonacidic gel cleaner by squeegeeing into containers for disposal.
6. Rinse masonry with cold water to remove chemicals and soil, applied as follows:
7. Rinse masonry with warm water to remove chemicals and soil, applied as follows:

   a. Low-pressure spray.
   b. Medium-pressure spray.
   c. High-pressure spray.

8. Repeat cleaning procedure above where required to produce the effect established by the mockup. Do not apply more than twice.

F. One-Part Limestone Chemical Cleaning: At locations indicated, clean limestone surfaces with one-part system using one-part limestone cleaner of dilution indicated, applied as follows:

1. Wet stone with cold water applied by low-pressure spray.
2. Wet stone with warm water applied by low-pressure spray.
3. Apply one-part limestone cleaner to stone by using a soft-fiber brush or low-pressure spray equipment. Let cleaner remain on surface for period recommended by manufacturer.
4. Immediately repeat application of one-part limestone cleaner as indicated above over the same area.
5. Rinse stone with cold water applied by medium-pressure spray to remove chemicals and soil.
6. Rinse stone with warm water applied by medium-pressure spray to remove chemicals and soil.

G. Two-Part Limestone Chemical Cleaning: At locations indicated, clean limestone surfaces with two-part systems using chemical cleaners of dilution indicated, applied as follows:

1. Wet stone with cold water applied by low-pressure spray.
2. Wet stone with warm water applied by low-pressure spray.
3. Apply prewash alkaline cleaner to stone by brush or roller. Let cleaner remain on surface for period recommended by cleaner manufacturer, unless otherwise indicated.
4. Rinse stone with cold water applied by medium-pressure spray to remove chemicals and soil.
5. Rinse stone with warm water applied by

medium-pressure spray to remove chemicals and soil.

6. Apply acid neutralizer for afterwash to stone while it is still wet using low pressure spray equipment or deep nap roller or soft-fiber brush. Let neutralizer remain on surface for period recommended by manufacturer, unless otherwise indicated.
7. Rinse stone with cold water applied to medium-pressure spray to remove chemicals and soil.
8. Rinse stone with warm water applied by medium-pressure spray to remove chemicals and soil.
9. Repeat cleaning procedure above where required to produce the cleaning effect established by mockup. Do not apply more than twice.

H. Paint Removal: At locations indicated, remove paint from masonry surfaces as follows:

1. Apply chemical paint remover to dry painted masonry with brushes.
2. Allow chemical paint remover to remain on surface for period recommended by paint remover manufacturer.
3. Remove chemical and paint residue by rinsing with water applied as follows:

   a. Low-pressure spray.
   b. Medium-pressure spray.
   c. High-pressure spray.

4. Apply an afterwash acidic cleaner to masonry while it is still wet using low-pressure spray equipment or a soft-fiber brush. Let cleaner remain on surface for period recommended by manufacturer, unless otherwise indicated.
5. Rinse masonry with cold water to remove chemicals and soil, applied as follows:

   a. Low-pressure spray.
   b. Medium-pressure spray.
   c. High-pressure spray.

I. Paint Removal with Water-Rinsable Chemical Paint Remover: At locations indicated, remove paint from masonry surfaces as follows:

1. Apply thick coating of water-rinsable chemical paint remover to painted masonry with natural-fiber cleaning brush, deep-nap roller, or large paint brush.
2. Allow chemical paint remover to remain on surface for period recommended by paint remover manufacturer. Agitate periodically with a stiff-bristle brush.
3. Remove chemical and paint residue by rinsing with water applied as follows:

a. Low-pressure spray.
b. Medium-pressure spray.
c. High-pressure spray.

J. Soot Removal: At locations indicated, remove soot from masonry surfaces as follows:

1. Apply chemical soot remover to masonry with brushes.
2. Allow chemical soot remover to remain on surface for period recommended by soot remover manufacturer.
3. Remove chemical and soot residue by rinsing with water applied as follows:

a. Low-pressure spray.
b. Medium-pressure spray.
c. High-pressure spray.

4. Apply an afterwash acidic cleaner to masonry while it is still wet using low-pressure spray equipment or a soft-fiber brush. Let cleaner remain on surface for period recommended by manufacturer, unless otherwise indicated.
5. Rinse masonry with cold water to remove chemicals and soil, applied as follows:

a. Low-pressure spray.
b. Medium-pressure spray.
c. High-pressure spray.

3.4 STONE REMOVAL AND REPLACEMENT

A. Carefully remove by hand, at locations indicated, stone that has deteriorated, shifted, or is damaged beyond repair.

B. Remove mortar, loose particles, and other debris from salvaged stone and stone surrounding removed units to prepare for resetting.

C. Replace removed stone with salvaged stone, where possible, or with new stone matching existing, including size. Butter vertical joints for full width before setting and set units in full bed of mortar, unless otherwise indicated.

1. Tool joints after setting to match joints of surrounding stone.
2. Point new mortar joints to comply with requirements for repointing existing masonry, and rake out mortar used to set units before mortar sets.

3.5 STONE REPAIR

A. Carefully remove loose stone fragments in areas to be repaired. Reuse only pieces of spalled stone that are in sound condition.

B. Remove soil, loose stone particles, mortar, and other debris or foreign material from the surfaces to be bonded on both the fragment and the building stone from which fragment was removed by cleaning with a stiff brush.

C. Apply adhesive to comply with adhesive manufacturer's directions. Coat bonding surface of building stone with stone-to-stone adhesive completely filling all voids and covering all surfaces. Fit stone fragments onto building stone while adhesive is still tacky and hold fragment securely in place until adhesive has cured.

D. After adhesive has fully cured, anchor stone fragments further with 1/4-inch-diameter plain stainless steel rods set into 1/4-inch-diameter holes drilled at a 45-degree downward angle through the face of the stone. Center and space anchor rods between 3 and 5 inches apart and not less than 2 inches from any edge. Insert rods not less than 2 inches into backing stone and 2 inches into fragment with end countersunk at least 3/4 inch from the exposed face of the stone.

E. Clean residual adhesive from edges. Wet stone and fill chipped areas and drill holes with patching mortar. Avoid featheredging. Finish patched areas to match texture of and be level with adjoining surrounding stone surfaces. Keep patching mortar damp for 72 hours.

3.6 STONE PATCHING

A. Cut out deteriorated stone and adjacent stone that has begun to deteriorate. Remove additional stone so that patch will not have feathered edges and will be at least 1/4 inch thick.

B. Remove loose particles, soil, debris, oil, and other contaminants from existing stone units at locations indicated by cleaning with a stiff-bristle brush.

C. Brush-coat stone surfaces with mortar-to-stone adhesive complying with manufacturer's directions.

D. Brush-coat stone surfaces with a slurry coat of patching mortar complying with manufacturer's directions.

E. Place patching mortar in layers no thicker than 2 inches. Roughen surface of each layer to provide a key for the next.

F. Build patch up 1/4 inch above surrounding stone and carve surface to match adjoining stone after mortar has hardened.

G. Keep each layer damp for 72 hours or until mortar has set.

H. Unacceptable patches are defined as those with hairline cracks or that show separation from stone at edges, and those that do not match adjoining stone in color or texture. Remove patches and refill to provide patches free of those defects.

3.7 STONE CONSOLIDATION TREATMENT

A. Apply treatment to clean, dry surfaces according to manufacturer's instructions. Remove areas of blind exfoliation and delamination before applying.

B. Apply in cycles (repeated applications) to relatively small sections of masonry, not more than 100 sq. ft. in area. Each cycle shall consist of three successive saturating applications, applied at 5- to 15-minute intervals, depending on drying conditions.

C. Apply by low-pressure spray to the point of rejection in each application. Apply from bottom of section to top.

D. Apply three cycles, allowing treated surface to dry for 60 to 90 minutes between cycles.

E. Protect treated surfaces from rain for 48 hours after treatment.

F. Allow treated surfaces to dry for not less than 21 days before repointing, patching, or applying water repellants or sealants.

3.8 REPOINTING MASONRY

A. Rake out joints as follows:

1. Rake out mortar from joints to depths equal to 2-1/2 times their widths but not less than 1/2 inch nor less than that required to expose sound, unweathered mortar.
2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of masonry units or widen joints. Replace damaged masonry units.

a. Cut out old mortar by hand with a chisel and mallet, unless otherwise indicated.
b. Do not use power-operated rotary hand saws and grinders unless specific Architect's written approval is obtained based on submission by Contractor of a satisfactory quality control program and demonstrated ability of operators to use tools without damaging masonry. Quality control program shall include provisions for supervising performance and preventing damage due to worker fatigue.

B. Point joints as follows:

1. Rinse masonry joint surfaces with water to remove dust and mortar particles. Time the rinsing application so that at the time of pointing excess water has evaporated or run off and joint surfaces are damp but free of standing water.
2. Apply the first layer of pointing mortar to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Compact each layer thoroughly and allow it to become thumbprint hard before applying the next layer.
3. After joints have been filled to a uniform depth, place remaining pointing mortar in three layers with each of first and second layers filling approximately two fifths of joint depth and third layer the remaining one fifth. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing stone has rounded edges, recess final layer slightly from face. Take care not to spread mortar over edges onto exposed masonry surfaces, or to featheredge mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints, unless otherwise indicated. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in a damp condition for not less than 72 hours.
6. Where repointing work precedes cleaning of existing masonry, allow mortar to harden not less than 30 days before beginning cleaning work.

3.9 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water, which is spray-applied at a low pressure.

B. Using metal scrapers or brushes is not permitted.

C. Using acid or alkali cleaning agents is not permitted.

END OF SECTION 04530

PART 1: GENERAL

1.1 DESCRIPTION: Work of this section includes all labor, materials, equipment and services necessary to complete the structural steel work as shown on the drawings and specified herein, including, but not limited to the following:

a. Furnish and deliver for installation by others, anchor bolts, bearing plates and loose lintels with complete instructions and templates to facilitate installation.

b. Furnish and erect all columns, bearing plates, beams, girders, bracing, hangers and all related connections (bolted and welded).

c. Openings (unreinforced and reinforced) in structural steel to accommodate mechanical and electrical work.

d. Shop painting and field touch-up painting.

e. Erection bracing and supports, including steel wedges, shims or nuts required for leveling base plates.

f. Reinforcement of existing beams.

g. Unless specifically excluded, furnish and install all other items for structural steel work indicated on the drawings, specified, or obviously needed to make the work of this Section complete.

1.2 RELATED WORK: Bolts and fastenings less than 1/4-inch diameter, plates and hangers less than 1/4 inch thick - Section 06100, grout under base plates - Section 03301, Metal Decking - Section 05300.

1.3 SUBMITTALS: As specified in Section 01300.

a. Shop Drawings: Submit for approval before fabrication. Show size and weight of members, and types and locations of shop and field connections. Using AWS welding symbols, show type, size, and extent of welds and welding sequence. Approval of shop drawings will be for size and arrangement of members and strength of connections; errors in dimensions will be the responsibility of the Contractor. Do not use reproductions of design as a base for shop drawings.

b. Submit certified copies of each survey conducted by a surveyor licensed in West Virginia and employed by the structural steel subcontractor. Survey shall show elevations and locations of base plates and anchor bolts to receive

structural steel, and final elevations and locations for major members. Indicate discrepancies between actual installation and Contract Documents.

c. Reports:

1. Submit certified copies of mill test reports for all steel furnished. Perform mechanical and chemical tests for all material regardless of thickness or use.

2. Submit anchor bolt checking certification as required.

3. Submit qualification certificates of all welders who will perform work on the project.

4. Submit survey of erected steelwork as required.

d. Manufacturer's Literature: Description, including composition, of shop primer paint.

1.4 SCHEDULING: Coordinate delivery of structural steel items to be built into masonry and concrete with the scheduling of the work of those trades.

PART 2: PRODUCTS

2.1 STRUCTURAL STEEL:

A. Shapes and Plates: ASTM A36-89.

B. Pipe Columns: ASTM A53-90a.

2.2 FASTENERS AND ANCHORS:

A. Bolts and Nuts: ASTM A325SC, for all steel to steel connections.

B Standard Bolts and Nuts: ASTM A307-90, Grade A, for all wood-steel connections.

C. Expansion Bolts or Adhesive Bolts: By Hilti or equal.

D. Kwikcon or Kwikpro screws: By Hilti or Equal.

2.3 FILLER METAL FOR WELDING: Section A3.6 of AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, 1989.

2.4 GROUT: Premixed, nonshrink, nonmetallic grout. Masterflow 928, manufactured by Master Builders, Inc., Cleveland, Ohio, or approved equal.

2.5 PAINT: Structural steel primer paint: rust inhibitive primer conforming to TT-P-86, Type I; or Tnemec Exterior #10-99 or 88-555. Structural steel field paint for exposed members: Tnemec #50-330 Poly-ura-prime.

2.6 GALVANIZING:

A. Steel Shapes: ASTM A123-89a.

B. Hardware: ASTM A153-82.

2.7 FABRICATION:

A. Structural Steel: AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, 1989.

B. All shop connections shall be welded or high strength bolted unless specifically shown otherwise. Fabricate work in shop in as large assemblies as practicable.

C. Camber: All beams, girders and other members shall be fabricated with natural camber up.

D. Mill column ends and bearing stiffeners to give full bearing over the cross section. Plane contact surfaces of bearing plates when required by the AISC Specifications. It is not necessary to plane bottom surfaces of plates on grout beds.

E. Drill or punch holes at right angles to the surface of the metal, not more than 1/16" larger than the connector diameter. Do not make or enlarge holes by burning. Drill material having a thickness in excess of the connector diameter and material thicker than 7/8". Holes shall be clean-cut without torn or ragged edges. Remove out side burrs resulting from drilling operations.

F. Provide holes in members to permit connection of the work of other trades. Use suitable templates for proper location of these holes. Steel requiring adjustment or accurate alignment shall be provided with slotted holes or full bearing shims as shown.

G. Finishes: Do not paint galvanized steel, steel to be encased in concrete, or concealed steel. Apply one coat of shop paint to other structural steel, complying with Section M3 of AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, 1989.

PART 3: EXECUTION

3.1 INSTALLATION:

A. Verify field measurements prior to start of erection. Check the alignment and elevation of all column supports and location of all anchor bolts with transit and level instruments before starting erection. Notify architect of any errors. Obtain architect's approval of methods proposed for correcting errors prior to proceeding with corrections and erection.

B. Erect structural steel in accordance with AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, 1989. When erecting members shown as exposed structural steel, use procedures of Section 10, AISC Code of Standard Practice for Steel Buildings and Bridges, 1986.

C. Align column bases and bearing plates with wedges or shims. When framework is plumb, grout solid under entire bearing surfaces of plates following instructions of grout manufacturer.

D. Erection tolerances shall be within limits described in Article 7.11 of the AISC Code of Standard Practice for Steel Buildings and Bridges, 1986. Provide and remove temporary bracing as described in Article 7.9.

E. Do not use gas cutting torch for field correction of fabrication without approval.

F. Touch up abraded paint and field connections with same type paint as shop primer.

END

PART 1: GENERAL

1.1 DESCRIPTION: Work of this section includes all labor, materials, equipment and services necessary to complete the metal deck work as shown on the drawings as specified herein, including, but not limited to the following:

A. Floor deck

B. All necessary deck supports other than principal framing members including diagonals at columns, angles, plates, etc.

C. Flashing, cell closures, closure plates and sheet metal work required to contain concrete.

D. Ceiling hanger tabs at new decking where new suspended ceilings are required.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

A. Concrete and reinforcement over decking, Section 03301.

1.3 QUALITY ASSURANCE:

A. Except as modified by governing codes and by this specification, comply with the applicable provisions and recommendations of the following codes and standards:

1. American Iron and Steel Institute (AISI) "Specification for the Design of Cold-Formed Steel Structural Members".

2. American Welding Society (AWS), D1.1 "Structural Welding Code" and D1.3 "Structural Welding Code-Sheet Steel".

3. Steel Deck Institute (SDI) "Design Manual for Composite Decks, Form Decks, and Roof Decks.

1.4 SUBMITTALS:

A. Samples of each type of decking material. Product data, including manufacturers specifications, load tables, section properties and installation instructions for each type of decking and accessories.

B. Shop drawings for all installations showing gauges, type of deck, where located, welding details necessary for fabrication to fit in place, and all accessories. Do not use reproductions of the Design Drawings.

C. Ceiling tab, fillers, closures and the like.

D. Certification of specification compliance.

1.5 DELIVERY, STORAGE AND HANDLING:

A. Deliver materials to site at such intervals as to ensure uninterrupted progress of work.

B. Store materials to permit easy access for inspection and identification. Keep deck off ground, using pallets, platforms or other supports. Protect deck and packaged materials from corrosion and deterioration.

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

1.6 COORDINATION REQUIREMENTS:

A. Examine all work prepared by others to receive work of this section and report any defects affecting installation to the contractor for correction. Commencement of work will be construed as complete acceptance of preparatory work by others.

B. If the supporting beams are not properly aligned or sufficiently level to permit proper bearing of the steel decking units, the steel decking contractor shall bring the matter to the attention of the contractor for corrective action. The steel decking units are not to be placed until the necessary correlations are made.

C. Installation of the deck will be inspected by the architect and/or owners's agent.

PART 2 PRODUCTS

2.1 MATERIALS:

A. Galvanized Non-Composite Steel Decking: ASTM A446, Grade A, Coating ASTM A525 G90. The Contract Documents indicate required section profile and minimum gauge. Contractor shall provide heavier gauge if minimum gauge indicated is not adequate to support total loads as shown in load schedule.

B. Anchor clips, vent clips, welding washers, flashing, saddle plates, sump pans, other accessories shall be those types,

sizes, and configurations recommended by the decking manufacturer, and shall be of the same material and finish as the deck units.

C. Cell closure flexible strips, and fillers shall be of material in compliance with applicable building code governing class of construction.

D. Provide metal closure strips at edges of all slabs and openings which serve as pour stops for concrete. Gauge shall be sufficient to span or cantilever from steel beams.

2.2 MANUFACTURE: Deck shall be manufactured by one of the following:

1. Inland Steel Co.

2. Wheeling Corrugating Co.

3. Cyclops Steel Corp.

4. United Steel Deck, Inc.

2.3 FABRICATION:

A. Fabricate deck units in accordance with the AISI's "Specification for the Design of Cold-Formed Steel Structural Members" and accepted shop drawings. Fabricate deck units to the sizes and configurations indicated and cut to lengths which will span not fewer than three supporting members; use only full length units at overhang where indicated in a manner that laps fit tightly. Locate openings for penetrations where indicated and provide support framing and edge reinforcement for all openings.

PART 3 EXECUTION

3.1 INSPECTION:

A. Inspection of the metal deck installation will be performed by an inspection agency retained by the owner at no expense to the contractor. The inspection agency shall work under the direction of the architect. Contractor shall provide the inspection agency with the following:

1. Schedule of all work in both shop and field with at least ten days written notice before commencement of either activity.

2. A complete set of approved shop and erection drawings.

3.2 ERECTION:

A. The erection of the steel decking shall be performed according to the manufacturer's standards. Erection shall closely follow the erection of structural steel.

B. The steel decking units shall be placed on the supporting steel framework and adjusted to final position before being permanently fastened. Each unit shall be brought to proper bearing on the supporting beams.

C. Decking units shall be fastened to the steel framework at ends of units and at all intermediate supports by 3/4 inch diameter puddle welds spaced not more than 12 inch o.c. across width of unit. Deck shall, where possible, span 3 or more supports. Shear studs may be substituted for puddle welds.

D. The side laps of adjacent units shall be fastened by approved method (to be shown on shop drawings) between supports at intervals of 3 feet between supporting beams. End laps of sheets shall be a minimum of inches.

E. All welding shall be done by competent experienced welding mechanics. All welds, shall be given a protective coat of paint as specified in painting article of section 05120.

F. All abraded or damaged protective surfaces of steel decking work and permanent form work shall be touched up with a protective coat of paint by this contractor as erected.

3.3 CLEANING UP:

A. Remove all equipment, unused materials and debris from the site immediately upon the completion of this work.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes the following metal fabrications:

1. Rough hardware.
2. Ladders.
3. Ship's ladders.
4. Nosings.
5. Loose bearing and leveling plates.
6. Loose steel lintels.
7. Miscellaneous framing and supports for the following:
    a. Suspended toilet partitions.
    b. Applications where framing and supports are not specified in other sections.
8. Prefabricated building columns.
9. Miscellaneous steel trim.
10. Shelf and relieving angles.
11. Steel pipe railings.
12. Cast treads and thresholds.
13. Metal stairs.
14. Pipe bollards.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 5 Section "Structural Steel" for structural steel framing system components.

1.3 DEFINITIONS

A. Definitions in ASTM E 985 for railing-related terms apply to this section.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Structural Performance of Handrails and Railing Systems: Design, engineer, fabricate, and install handrails and railing systems to comply with requirements of ASTM E 985 for structural performance based on testing performed in accordance with ASTM E 894 and E 935.

B. Structural Performance: Design, engineer, fabricate, and install the following metal fabrications to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication.

1. Top Rail of Guardrail Systems: Capable of withstanding the following loads applied as indicated:

a. Concentrated load of 300 lbf applied at any point nonconcurrently, vertically downward, or horizontally.

b. Uniform load of 100 lbf per linear ft. applied nonconcurrently, vertically downward or horizontally.

c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:

a. Concentrated load of 200 lbf applied at any point nonconcurrently, vertically downward or horizontally.

b. Uniform load of 50 lbf per linear foot applied nonconcurrently, vertically downward or horizontally.

c. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Infill Area of Guardrail Systems: Capable of withstanding a horizontal concentrated load of 200

lbf applied to one sq. ft. at any point in the system including panels, intermediate rails balusters, or other elements composing the infill area.

a. Above load need not be assumed to act concurrently with uniform horizontal loads on top rails of railing systems in determining stress on guard.

4. Treads of Steel Stairs: Capable of withstanding a uniform load of 100 lbf per sq. ft. or a concentrated load of 300 lbf on a area of 4 sq. inches located in the center of the tread, whichever produces the greater stress.

5. Platforms of Steel Stairs: Capable of withstanding a uniform load of 100 lbf per sq. ft.

1.5 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for products used in miscellaneous metal fabrications, including paint products and grout.

C. Shop drawings detailing 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. Provide templates for anchors and bolts specified for installation under other sections.

1. Where installed metal fabrications are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and sealed by the qualified professional engineer who was responsible for their preparation.

D. Samples representative of materials and finished products as may be requested by Architect.

E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" article.

F. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project name, addresses, names of Architects

and Owners, and other information specified.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in successfully producing metal fabrications similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

B. Installer Qualifications: Arrange for installation of metal fabrications specified in this section by same firm that fabricated them.

C. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel," D1.3 "Structural Welding Code - Sheet Steel", and D1.2 "Structural Welding Code - Aluminum."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

D. Engineer Qualifications: Professional engineer licensed to practice in jurisdiction where project is located and experienced in providing engineering services of the kind indicated that have resulted in the successful installation of metal fabrications similar in material, design, and extent to that indicated for this Project.

1.7 PROJECT CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

1.8 SEQUENCING AND SCHEDULING

A. Sequence and coordinate installation of wall handrails as follows:

1. Mount handrails only on completed walls. Do not

support handrails temporarily by any means not satisfying structural performance requirements.

2. Mount handrails only on gypsum board assemblies reinforced to receive anchors, and where the location of concealed anchor plates has been clearly marked for benefit of Installer.

PART 2 PRODUCTS

2.1 FERROUS METALS

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

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

C. Rolled Steel Floor Plates: ASTM A 786.

D. Steel Bars for Gratings: ASTM A 569 or ASTM A 36.

E. Wire Rod for Grating Cross Bars: ASTM A 510.

F. Steel Tubing: Product type (manufacturing method) and as follows:

1. Cold-Formed Steel Tubing: ASTM A 500, grade as indicated below:

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

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

2. Hot-Formed Steel Tubing: ASTM A 501.

a. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.

G. Uncoated Structural Steel Sheet: Product type (manufacturing method), quality, and grade, as follows:

1. Cold-Rolled Structural Steel Sheet: ASTM A 611, grade as follows:

a. Grade A, unless otherwise indicated or required by design loading.

2. Hot-Rolled Structural Steel Sheet: ASTM A 570, grade as follows:

a. Grade 30, unless otherwise indicated or required by design loading.

H. Uncoated Steel Sheet: Commercial quality, product type (method of manufacture) as follows:

1. Cold-Rolled Steel Sheet: ASTM A 366.

2. Hot-Rolled Steel Sheet: ASTM A 569

I. Galvanized Steel Sheet: Quality as follows:

1. Structural Quality: ASTM A 446; Grade A, unless another grade required for design loading, and G90 coating designation unless otherwise indicated.

2. Commercial Quality: ASTM A 526, G90 coating designation unless otherwise indicated.

J. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

1. Black finish, unless otherwise indicated.

2. Galvanized finish for exterior installations and where indicated.

3. Type F, standard weight (schedule 40), unless otherwise indicated, or another weight, type, and grade required by structural loads.

4. Type S, Grade A, standard weight (schedule 40), unless otherwise indicated, or another grade or weight or both required by structural loads.

5. Type S, Grade B, standard weight (schedule 40), unless otherwise indicated, or another weight required by structural loads.

K. Gray Iron Castings: ASTM A 48, Class 30.

L. Malleable Iron Castings: ASTM A 47, grade 32510.

M. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

N. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

O. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.

2.2 STAINLESS STEEL

A. Bar Stock: ASTM A 276, Type 302 or 304.

B. Plate: ASTM A 167, Type 302 or 304.

2.3 ALUMINUM

A. Extruded Bars and Shapes: ASTM B 221, alloys as follows:

1. 6061-T6 or 6063-T6 for bearing bars of gratings and shapes.

2. 6061-T1 for grating cross bars.

B. Aluminum-Alloy Rolled Tread Plate: ASTM B 632, alloys as follows:

1. 6061-T6 for platforms.

2. 6061-T4 for treads.

C. Aluminum Rivets: ASTM B 316, alloy 6053-T4 or 6061-T6.

D. Aluminum Sheet for Expanded Aluminum Grating: ASTM B 209, alloy 5052-H32.

E. Fasteners for Aluminum Gratings: Use fasteners made of same basic metal as fastened metal except use galvanized fasteners complying with ASTM A 153 for exterior aluminum units, unless otherwise indicated. Do not use metals that are corrosive or incompatible with metals joined.

2.4 GROUT AND ANCHORING CEMENT

A. Nonshrink Metallic Grout: Premixed, factory-packaged, ferrous aggregate grout complying with CE CRD-C 621, specifically recommended by manufacturer for heavy duty loading applications of type specified in this section.

B. Nonshrink Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD- C 621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

C. Interior Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Use for interior applications only.

D. Erosion-Resistant Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating and is recommended for exterior use by manufacturer.

E. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include but are not limited to the following:

F. Products: Subject to compliance with requirements, provide one of the following:

1. Nonshrink Metallic Grouts:

2. "Metox RM"; Chem-Masters Corp.
3. "Hi Mod Grout"; Euclid Chemical Co.
4. "Embeco 885 and 636"; Master Builders.
5. "Ferrolith G Redi-Mix and G-NC"; Sonneborn Building Products Div., Rexnord Chemical Products, Inc.
6. "Stoncrete MG1"; Stonhard, Inc.

7. Nonshrink Nonmetallic Grouts:

8. "Bonsal Construction Grout"; W. R. Bonsal Co.
9. "Diamond-Crete Grout"; Concrete Service Materials Co.
10. "Euco N-S Grout"; Euclid Chemical Co.
11. "Kemset"; Chem-Masters Corp.
12. "Crystex"; L & M Construction Chemicals, Inc.
13. "Masterflow 713"; Master Builders.
14. "Sealtight 588 Grout"; W. R. Meadows, Inc.
15. "Sonogrout"; Sonneborn Building Products Div., Rexnord Chemical Products,Inc.
16. "Stoncrete NM1"; Stonhard, Inc.
17. "Five Star Grout"; U. S. Grout Corp.
18. "Vibropruf #11"; Lambert Corp.
19. Interior Anchoring Cement:
20. "Bonsal Anchor Cement"; W. R. Bonsal Co.
21. "Por-Rok"; Minwax Construction Products Division.
22. Erosion-Resistant Anchoring Cement:
23. "Super Por-Rok"; Minwax Construction Products Division.

2.5 FASTENERS

A. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.

C. Lag Bolts: Square head type, FS FF-B-561.

D. Machine Screws: Cadmium plated steel, FS FF-S-92.

E. Wood Screws: Flat head carbon steel, FS FF-S-111.

F. Plain Washers: Round, carbon steel, FS FF-W-92.

G. Drilled-In Expansion Anchors: Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion, [nondrilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade 5.

H. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class, and style as required.

I. Lock Washers: Helical spring type carbon steel, FS FF-W-84.

2.6 PAINT

A. Shop Primer for Ferrous Metal: Manufacturer's or fabricator's standard, fast-curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure complying with performance requirements of FS TT-P-645.

B. 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. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

D. Zinc Chromate Primer: FS TT-P-645.

2.7 CONCRETE FILL AND REINFORCING MATERIALS

A. Concrete Materials and Properties: Comply with requirements of Division 3 section "Concrete Work" for normal weight, ready-mix concrete with minimum 28-day

compressive strength of 2,500 psi, 440 lb cement per cu. ft. minimum, and W/C ratio of 0.65 maximum, unless higher strengths indicated.

B. Nonslip Aggregate Finish: Factory-graded, packaged material containing fused aluminum oxide grits or crushed emery as abrasive aggregate; rust-proof and nonglazing; unaffected by freezing, moisture, or cleaning materials.

C. Reinforcing Bars: ASTM A 615, Grade 60, unless otherwise indicated.

2.8 FABRICATION, GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 100 deg F (55.5 deg C).

D. Shear and punch metals cleanly and accurately. Remove burrs.

E. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

F. Remove sharp or rough areas on exposed traffic surfaces.

G. Weld corners and seams continuously to comply with AWS recommendations and 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 that no roughness shows after finishing and contour of welded surface matches those adjacent.

H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

J. 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.

K. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.9 ROUGH HARDWARE

A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.

B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.10 STEEL LADDERS

A. General: Fabricate ladders for the locations shown, with dimensions, spacings, details and anchorages as indicated. Comply with requirements of ANSI A14.3.

B. Siderails: Continuous steel flat bars, 1/2 inch x 2-1/2 inches, with eased edges, spaced 18 inches apart.

C. Bar Rungs: Round steel bars, 3/4 inch diameter, spaced 12 inches o.c.

D. Bar Rungs: Square steel bars, 3/4 inch, spaced 12 inches o.c.

E. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.

F. Support each ladder at top and bottom and at intermediate points spaced not more than 5'-0" o.c. by means of welded or bolted steel brackets.

1. Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7 inches.

2. Extend side rails 42 inches above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent structure does not extend above the top rung, goose-neck the extended rails back to the structure to provide secure ladder access.

G. Provide non-slip surface on top of each rung, either by coating the rung with aluminum oxide granules set in epoxy resin adhesive, or by using a type of manufactured rung which is filled with aluminum oxide grout.

2.11 SHIP'S LADDERS

A. Provide ship's ladders where indicated. Fabricate of open type construction with structural steel channel or steel plate stringers, pipe handrails, and open steel grating treads, unless otherwise indicated. Provide all necessary brackets and fittings for installation.

B. Galvanize ladders, including, brackets and fasteners; in the following locations:

1. Exterior locations.

2. Interior locations where indicated.

2.12 NOSINGS

A. Fabricate curb nosings from structural steel shapes as indicated, of all welded construction with mitered corners and continuously welded joints. Provide anchors welded to nosings for embedding in concrete or masonry construction,

spaced not more than 6 inches from each curb end, 6 inches from corners and 24 inches o.c., unless otherwise indicated.

B. Galvanize nosings in the following locations:

1. Exterior locations.

2. Interior locations where indicated.

2.13 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

2.14 LOOSE STEEL LINTELS

A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels for equal bearing of one inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.

D. Galvanize loose steel lintels located in exterior walls.

2.15 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

a. Except as otherwise indicated, space anchors 24

inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide x 1/4 inch x 8 inches long.

C. Fabricate support for suspended toilet partitions as follows:

1. Beams: Continuous steel shapes of size required to limit deflection to L/360 between hangers, but use not less than C 8 x 11.5 channels or another shape with equivalent structural properties.

2. Hangers: Steel rods, 1/2 inch in diameter, spaced not more than 36 inches o.c. Thread rods to receive anchor and stop nuts. Fit hangers with wedge shape washers for full bearing on sloping flanges of support beam.

3. Braces and Angles: Steel angles of size required for rigid support of beam and for secure anchorage.

D. Galvanize miscellaneous framing and supports in the following locations:

1. Exterior locations.

2. Interior locations where indicated.

2.16 MISCELLANEOUS STEEL TRIM

A. Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination of assembly and installation with other work.

B. Galvanize miscellaneous framing and supports in the following locations:

1. Exterior locations.

2. Interior locations where indicated.

2.17 PREFABRICATED BUILDING COLUMNS

A. Definition: Prefabricated building columns consist of assemblies composed of loadbearing steel structural member protected by manufacturer's standard insulating concrete fireproofing, encased in outer non-loadbearing steel shell.

B. Fire Performance Characteristics: Provide prefabricated building columns that are identical to those tested for the following fire resistance ratings per ASTM E 119 test method by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify columns with appropriate markings of applicable testing and inspecting organization.

1. Fire Resistance Rating: 4 hours.
2. Fire Resistance Rating: 3 hours.
3. Fire Resistance Rating: 2 hours.
4. Fire Resistance Rating: As indicated.

C. Column Configuration: Provide columns of sizes and shapes indicated; fabricate connections to comply with details shown or required to suit type of structure indicated.

1. Concrete Fill: Manufacturer's standard structural concrete filling for pipe and tubular sections, with minimum compressive strength of 4,200 psi, machine mixed and mechanically vibrated during placement to produce concrete core free of voids.

D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering prefabricated building columns which may be incorporated in the Work include, but are not limited to, the following:

E. Manufacturers: Subject to compliance with requirements, provide prefabricated building columns by one of the following:

1. Bridgeport Column Co., Inc.
2. Dean: George A. Dean Inc.
3. Lally Tubular Div., LB Industries, Inc.

2.18 SHELF AND RELIEVING ANGLES

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

B. For cavity walls, provide vertical channel brackets to support shelf/relieving angles from back-up masonry and concrete. Align expansion joints in angles with indicated expansion joints in cavity wall exterior wythe.

C. Galvanize shelf angles to be installed on exterior concrete framing.

D. Furnish wedge-type concrete inserts, complete with

fasteners, for attachment of shelf angles to cast-in-place concrete.

2.19 STEEL PIPE RAILINGS AND HANDRAILS

A. General: Fabricate pipe railings and handrails to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of pipe, post spacings, and anchorage, but not less than that required to support structural loads.

B. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

1. At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.

C. Form changes in direction of railing members as follows:

1. By insertion of prefabricated elbow fittings.

2. By radius bends of radius indicated.

3. By mitering at elbow bends.

4. By bending.

5. By any method indicated above, applicable to change of direction involved.

D. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.

E. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

F. Close exposed ends of pipe by welding 3/16 inch thick steel plate in place or by use of prefabricated fittings, except where clearance of end of pipe and adjoining wall surface is 1/4 inch or less.

G. Toe Boards: Where indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated, or if not indicated, use 4 inches high x 1/8 inch steel plate welded to, and centered between, each railing post.

H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.

1. For railing posts set in concrete fabricate sleeves from steel pipe not less than 6 inches long and with an inside diameter not less than 1/2 inch greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.

   a. Provide friction fit, removable covers designed to keep sleeves clean and hold top edge of sleeve 1/2 inch below finished surface of concrete.

2. For removable railing posts, fabricate slip-fit sockets from steel pipe whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height. Provide socket covers designed and fabricated to resist accidental dislodgement.

I. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.

J. For exterior steel railings and handrails formed from steel pipe with galvanized finish, galvanize fittings, brackets, fasteners, sleeves, and other ferrous components.

K. For interior steel railings and handrails formed from steel pipe with galvanized finish, galvanize fittings, brackets, fasteners, sleeves, and other ferrous components.

L. For interior steel railings formed from steel pipe with black finish, provide nongalvanized ferrous metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

2.20 CAST TREADS AND THRESHOLDS

A. Fabricate units of material, sizes, and configurations

indicated. If not indicated, provide cast-iron units with integral abrasive finish. Furnish in lengths as required to accurately fit each opening or conditions.

1. Cast units with an integral abrasive grit consisting of aluminum oxide, silicone carbide, or a combination of both.

B. 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:

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

1. American Abrasive Metals Co.
2. American Mason Safety Tread Co.
3. American Safety Tread Co., Inc.
4. Armstrong Products, Inc.
5. Safe-T-Metal Co., Inc.
6. Wooster Products Inc.

D. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with the manufacturer.

E. Drill for mechanical anchors with countersunk holes located not more than 4 inches from ends and not more than 12 inches o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by the manufacturer.

1. Provide 2 rows of holes for units over 5 inches wide, with 2 holes aligned at ends and staggered intermediate holes.

F. Apply black asphaltic coating to concealed bottoms, sides, and edges of cast-iron units set into concrete.

G. Provide a plain surface texture, except where fluted or cross- hatched surfaces are indicated.

2.21 STEEL FRAMED STAIRS

A. General: Construct stairs to conform to sizes and arrangements indicated. Join pieces together by welding, unless otherwise indicated. Provide complete stair assemblies, including metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates, and other components necessary for the support of stairs and platforms, and as required to anchor and contain the stairs on the supporting structure.

1. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM "Metal Stair Manual" for class of stair designated, except where more stringent requirements are indicated:

   a. Commercial class, unless otherwise indicated.

   b. Architectural class where indicated.

2. Fabricate treads and platforms of exterior stairs to accommodate slopes to drain in finished traffic surfaces.

B. Stair Framing: Fabricate stringers of structural steel channels, or plates, or a combination thereof, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to strings, newels, and framing members to strings and headers; fabricate and join so that bolts, if used, do not appear on finish surfaces.

   1. Where masonry walls support steel stairs, provide temporary supporting struts designed for erection of steel stair components before installation of masonry.

C. Metal Pan Risers, Subtreads, and Subplatforms: Shape metal pans for risers and subtreads to conform to configuration shown. Provide thicknesses of structural steel sheet for metal pans indicated, but not less than that required, to support total design loading.

   1. Form metal pans of uncoated cold-rolled steel sheet, unless otherwise indicated.

   2. Form metal pans of uncoated hot-rolled steel sheet, unless otherwise indicated.

   3. Form metal pans of galvanized steel sheet, where indicated.

   4. Directly weld risers and subtreads to stringers; locate welds on side of metal pans to be concealed by concrete fill.

   5. Attach risers and subtreads to stringers by means of brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting or bolting.

      a. At Contractor's option, provide prefabricated

stair assemblies with prefilled treads consisting of prepoured reinforced concrete fill, with non-slip aggregate finish, in welded sheet metal pan, attached to installed stringers using manufacturer's standard connection detail.

1) Product: Subject to compliance with requirements, provide Speedstair by American Stair Corp., Inc.

6. Provide subplatforms of configuration and construction indicated; if not indicated, of same metal as risers and subtreads, in thicknesses required to support design loading. Attach subplatform to platform framing members with welds.

a. Smooth Soffit Construction: Construct subplatforms with smooth soffits.

D. Steel Floor Plate Treads and Platforms: Provide raised pattern steel floor plate in pattern indicated or, if not indicated, as selected from manufacturer's standard patterns.

1. Form treads of 1/4 inch thick raised pattern steel floor plate with integral nosing and back edge stiffener. Weld steel supporting brackets to stringers and treads to brackets.

2. Fabricate platforms of raised pattern steel floor plate of thickness indicated. Provide nosing matching that on treads at all landings. Secure to platform framing members with welds.

E. Floor Grating Treads and Platforms: Provide patterns, spacing, and bar sizes indicated; fabricate to comply with NAAMM "Metal Bar Grating Manual."

1. Finish: Shop prime paint.

2. Finish: Painted.

F. Fabricate grating treads with steel plate nosing on one edge and with steel angle or steel plate carrier at each end for stringer connections. Secure treads to stringers with bolts.

G. Fabricate grating platforms, with nosing matching that on grating treads, at all landings. Provide toe plates at open-sided edges of grating platform. Secure grating to platform frame with welds.

H. Stair Railings and Handrails: Comply with applicable

requirements specified elsewhere in this section for steel pipe railings and handrails, and as follows:

1. Fabricate newels of steel tubing and provide newel caps of gray-iron castings, as shown.

2. Railings may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.

3. Connect railing posts to stair framing by direct welding, unless otherwise indicated.

2.22 PIPE BOLLARDS

A. Fabricate pipe bollards from Schedule 80 steel pipe. Cap bollards with 1/4 inch minimum thickness steel base plate.

B. Fabricate sleeves for bollard anchorage from steel pipe with 1/4 inch thick steel plate welded to bottom of sleeve.

2.23 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

B. Finish metal fabrications after assembly.

2.24 STEEL AND IRON FINISHES

A. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process compliance with the following requirements:

1. ASTM A 153 for galvanizing iron and steel hardware.

2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.

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-SP6 "Commercial Blast Cleaning."

2. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool

Cleaning:

C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

1. Stripe paint all edges, corners, crevices, bolts, welds, and sharp edges.

2.25 ALUMINUM FINISHES

A. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.

B. As Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

C. Class I Clear Anodized Finish: AA-M12C22A41 (Mechanical Finish: as fabricated, nonspecular; Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural: clear film thicker than 0.7 mil) complying with AAMA 607.1.

PART 3. EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

B. Center nosings on tread widths with noses flush with riser faces and tread surfaces.

C. Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

3.2 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous 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 as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication 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 the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and 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 that no roughness shows after finishing and contour of welded surface matches those adjacent.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.

3.3 SETTING LOOSE PLATES

A. Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

B. Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not

remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

1. Use metallic nonshrink grout in concealed locations where not exposed to moisture; use nonmetallic nonshrink grout in exposed locations, unless otherwise indicated.

2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 INSTALLATION OF SUPPORTS FOR TOILET PARTITIONS

A. Anchor supports securely to, and rigidly brace from, overhead building structure.

3.5 INSTALLATION OF PREFABRICATED BUILDING COLUMNS

A. Install prefabricated building columns to comply with AISC "Code of Standard Practice for Steel Building Construction," AISC "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings," and requirements of the testing and inspecting agency that apply to the fire resistance rating indicated.

3.6 INSTALLATION OF STEEL PIPE RAILINGS AND HANDRAILS

A. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:

1. Anchor posts in concrete by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.

2. Anchor posts in concrete by core drilling holes not less than 5 inches deep and 3/4 inch greater than outside diameter of post. Clean holes of all loose material, insert posts and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's directions.

   a. Nonshrink, nonmetallic grout.

   b. Nonshrink, nonmetallic grout or anchoring cement.

c. Cover anchorage joint with a round steel flange attached to post as follows:

1) Welded to post after placement of anchoring material.

2) By set screws.

d. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8 inch build-up, sloped away from post. For installations exposed on exterior, or to flow of water, seal anchoring material to comply with grout manufacturer's directions.

3. Anchor posts to steel with steel oval flanges, angle type or floor type as required by conditions, welded to posts and bolted to steel supporting members.

4. Anchor rail ends into concrete and masonry with steel round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.

5. Anchor rail ends to steel with steel oval or round flanges welded to rail ends and bolted to structural steel members, unless otherwise indicated.

6. Install removable railing sections where indicated in slip-fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.

B. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1-1/2 inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated, or if not indicated, at spacing required to support structural loads. Secure wall brackets and wall return fittings to building construction as follows:

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

2. Use type of bracket with pre-drilled hole for exposed bolt anchorage.

3. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.

4. For hollow masonry anchorage, use toggle bolts having square heads.

5. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with stud installations for accurate location of backing members.

6. For steel framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self- tapping screws of size and type required to support structural loads.

C. Expansion Joints: Provide expansion joints at locations indicated, or if not indicated, at intervals not to exceed 40 feet. Provide slip joint with internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches of posts.

3.7 INSTALLATION OF CAST TREADS AND THRESHOLDS

A. Install cast treads and thresholds with anchorage system indicated to comply with manufacturer's recommendations.

B. Seal thresholds exposed to exterior with elastomeric sealant complying with Division 7 Section "Joint Sealers" to provide a watertight installation.

3.8 INSTALLATION OF BOLLARDS

A. Anchor bollards in concrete by means of pipe sleeves preset and anchored into concrete. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solid with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's directions.

3.9 ADJUSTING AND CLEANING

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces.

1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touch-Up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of the shop paint on miscellaneous metal is specified in Division 9 Section "Painting" of these specifications.

C. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to

comply with ASTM A 780.

END OF SECTION 05500

PART 1: GENERAL

1.1 DESCRIPTION: The work of this section consists of rough carpentry work.

1.2 RELATED WORK: Fastenings 1/4-inch in diameter and greater, plates and hangers 1/4-inch thick and over - Section 05120; finish carpentry - Section 06200.

1.3 SUBMITTALS: As specified in Section 01300.

A. Shop Drawings: Show dimensions, framing connection details, and fastener connections.

1.4 QUALITY ASSURANCE: Identify lumber and plywood by official grade mark.

A. Lumber: Grade stamp containing, where applicable, symbol of grading agency, rules under which graded, mill number or name, grade of lumber, species or species grouping, and condition of seasoning.

B. Plywood: APA grade trademark, including type, grade, class, identification or span rating, and inspection and testing agency mark.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING: Store materials a minimum of 6 inches above ground in area protected from weather. Protect with waterproof covering allowing adequate air circulation. Do not store seasoned materials in wet or damp environments.

PART 2: PRODUCTS

2.1 LUMBER: PS-20-86.

A. Moisture Content: 19 percent maximum (dry) at time of manufacture for lumber 2 inches or less in thickness.

B. Surfacing: S4S, unless otherwise specified.

C. Dimensions: All dimensions are nominal.

D. Species: As specified or shown on drawings.

E. Structural:

1. Load-Bearing Studs: Southern Pine stud grade, Standard grade, or No. 3 grade.

2. Joists and Rafters: Southern Pine No. 2 Grade.

3. Beams, Posts, and Timbers: Southern Pine No. 1 grade.

4. All Other Structural Lumber: Southern Pine No. 2 grade.

5. Laminated veneer lumber (LVL): Min. (Fb)=2800 psi as manufactured by Trus-Joist.

F. Non-Structural:

1. Nonload-Bearing Studs, Plates, Bracing, and Nailers: Southern Pine stud grade.

2. Blocking and Miscellaneous Lumber: Southern Pine utility grade.

3. Furring, Grounds, Bracing, and Bridging: stud grade.

2.2 PLYWOOD: PS-1-83.

A. Roof Sheathing: CC-exterior, Span Rating 32/16.

B. Wall Sheathing: CC-exterior, Span Rating 24/0.

2.3 PRESERVATIVE: Provide treated wood for all framing, blocking, furring, nailing strips built into exterior masonry walls, wood in contact with masonry walls, wood in contact with concrete, wood nailers used with roofing, and as shown. (Reference Section 06300)

2.4 ROUGH HARDWARE: Unless otherwise specified, use galvanized steel hardware for exterior use as manufactured by Basch or approved equal.

2.5 MISCELLANEOUS HARDWARE: Provide nails, spikes, screws, bolts, nuts, washers, anchors, and similar items of type, size, and strength required to secure members rigidly in place.

2.6 INSECT SCREEN: 18 X 16 Aluminum.

PART 3: EXECUTION

3.1 CONDITION OF SURFACES: Verify that surfaces to receive rough carpentry materials are prepared to exact grade and dimensions.

3.2 GENERAL INSTALLATION: Install rough carpentry work in accordance with the West Virginia Building Code (latest edition), unless otherwise shown or specified.

3.3 FRAMING:

A. Sills: Place sill directly on base material. Set sills level, 1/16 inch in 6 feet tolerance.

B. Construct framing members full length without splice.

3.4 ROOF SHEATHING: Follow recommendations of APA. Install plywood with face grain perpendicular to supports, and with end joints staggered and located over supports. Allow 1/8 inch space between panel ends and edges. Support edge joints with plywood panel clips centered between each support.

3.5 WALL SHEATHING: Follow recommendations of APA. Install plywood with face grain horizontal or vertical to supports. Allow minimum 1/16 inch space at end joints and 1/8 inch at edge joints.

3.6 All plywood shall be continous over two supports.

END

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of 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 standing and running trim and rails.

2. Interior standing and running trim and rails.

3. Lumber siding.

4. Hardboard siding.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 6 Section "Rough Carpentry" for furring, blocking, and other carpentry work that is not exposed to view.

2. Division 7 Section "Flashing and Sheet Metal" for flashing and other sheet metal work.

3. Division 7 Section "Joint Sealants" for sealants.

4. Division 9 Section "Painting" for back priming and finishing of finish carpentry.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of factory-fabricated product and process specified, including details of construction relative to materials, dimensions of individual components, profiles, textures, and colors.

C. Wood treatment data as follows including chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material:

1. For each type of preservative treated wood product include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

2. For water-borne treated products include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to Project site.

3. For fire-retardant-treated wood products include certification by treating plant that treated materials comply with specified standard and other requirements.

4. Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.

5. Warranty of chemical treatment manufacturer for each type of treatment.

D. Samples for initial selection purposes of the following in form of manufacturer's color charts consisting of actual units or sections of units showing full range of colors, textures, and patterns available for each type of material indicated.

E. Samples for verification purposes of the following:

1. Lumber and panel products for non-factory-applied finish, 50 square inches for lumber and 8-1/2 inches by 11 inches for panels for each species and cut, finished on one side and one edge, with one-half of exposed surface finished.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Arrange for installation of finish carpentry by a firm that can demonstrate successful experience in installing finish carpentry items similar in type and quality to those required for this Project.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels. Provide for air circulation within and around stacks and under temporary coverings including

polyethylene and similar materials.

B. Do not deliver interior finish carpentry until environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified for installation areas.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Obtain and comply with finish carpentry manufacturer's and installer's coordinated advice for optimum temperature and humidity conditions for finish carpentry during its storage and installation.

B. Weather Conditions: Proceed with finish carpentry only when existing and forecasted weather conditions will permit exterior finish carpentry to be installed in compliance with manufacturer's recommendations and when substrate is completely dry.

1.7 WARRANTY

A. Special Project Warranty for Siding: Submit a written warranty, executed by manufacturer, agreeing to repair or replace siding that fails in materials or workmanship within the specified warranty period. Failures include, but are not limited to, deformation or deterioration of siding beyond normal weathering. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the Contract Documents.

1. Warranty period for siding (excluding finish) is 25 years after date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber Standards: Comply with PS 20 "American Softwood Lumber Standard" for lumber and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.

B. Plywood Standards: Comply with PS 1 "U.S. Product Standard for Construction and Industrial Plywood" for plywood and, for products not manufactured under PS 1, with APA PRP-108.

C. Inspection Agencies: Inspection agencies and the abbreviations used to reference them with lumber grades

and species include the following:

1. RIS - Redwood Inspection Service.

2. SPIB - Southern Pine Inspection Bureau.

3. WCLIB - West Coast Lumber Inspection Bureau.

4. WWPA - Western Wood Products Association.

D. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.

E. Formaldehyde Emission Levels: Comply with formaldehyde emission requirements of each voluntary standard referenced below:

1. Particleboard: NPA 8.

2. Medium-Density Fiberboard: NPA 9.

3. Hardwood Plywood: HPMA FE.

2.2 EXTERIOR STANDING AND RUNNING TRIM AND RAILS

A. Trim and Rails: For trim and rails in form of boards and worked products, provide lumber complying with the following requirements including those of the grading agency listed with species.

1. Species: Redwood; RIS.

a. Grade: Clear All Heart VG (Vertical Grain).

b. Grade: Clear All Heart.

c. Grade: Clear VG (Vertical Grain).

d. Grade: Clear.

e. Grade: B Grade.

2. Species: Western red cedar; WCLIB OR WWPA.

a. Grade: B and Better, 1 and 2 Clear VG (Vertical

Grain).

b. Grade: B and Better, 1 and 2 Clear.

c. Grade: C Select VG (Vertical Grain).

d. Grade: C Select.

e. Grade: D Select.

3. Texture: Surfaced (smooth).

4. Texture: One face saw-textured, the other surfaced (smooth).

5. Lumber for Transparent Finish (Stained or Clear): Solid lumber stock.

6. Lumber for Painted Finish: Glued-up lumber or solid lumber stock.

2.3 INTERIOR STANDING AND RUNNING TRIM AND RAILS

A. Trim and Rails: For trim in form of boards and worked products, provide lumber complying with the following requirements.

1. Species: Western Red Cedar; WWPA.
2. Species: Ponderosa Pine; WWPA.
3. Species: Douglas Fir; WWPA.

4. Select Grade: B and Better.
5. Select Grade: C Select.
6. Select Grade: D Select.

7. Finish Grade: Superior.
8. Finish Grade: Prime.
9. Finish Grade: E.

10. Select Grade: Supreme.
11. Select Grade: Choice.
12. Select Grade: Quality.

13. Species and Appearance: Clear dry red oak free from defects and selected for compatible grain and color.

14. Texture: Surfaced (smooth).

15. Lumber for Transparent Finish (Stained or Clear): Solid lumber stock.

16. Lumber for Painted Finish: Glued-up lumber or solid

lumber stock.

B. Wood Molding Patterns: For stock molding patterns included in Wood Moulding and Millwork Producers Association WM 7 and graded under WM 4, provide the following grade based on finish indicated and fabricated from species specified:

1. Moldings for Transparent Finish: N-Grade.

2. Moldings for Painted Finish: P-Grade.

2.4 SIDING

A. Lumber Siding: Kiln-dried wood lumber for siding in size and pattern as shown on drawings.

1. Redwood Bevel Siding: Redwood Inspection Service Grade "Clear All Heart," S1S2E.

2. Southern Pine Bevel Siding: Southern Pine Inspection Bureau Grade "B&B," S1S2E.

3. Western Red Cedar Bevel Siding: West Coast Lumber Inspection Bureau Grade "Clear VG Heart," S1S2E.

B. Hardboard Siding: Wood textured hardboard, in size and pattern as shown on drawings complying with ANSI/AHA A135.6.

1. Type: Lap siding.
2. Type: Square edge panels.
3. Type: Shiplap edge panel siding.

4. Type: 7/16 inch thick, channel-grooved with grooves 4 inches on center, 48 inches by 96 inches with panel manufacturer's standard exterior enamel primer.

5. Texture: Smooth.
6. Texture: Rough.

C. Siding Colors, Textures, and Patterns: Where manufacturer's standard products are indicated, provide siding with the following requirements:

1. Match Architect's samples.

2. Match colors, textures, and patterns indicated by reference to manufacturer's standard designations for these characteristics.

3. Provide selections made by Architect from manufacturer's full range of standard colors,

textures, and patterns for siding indicated.

D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering materials that may be incorporated in the Work include, but are not limited to, the following:

E. Manufacturer: Subject to compliance with requirements, provide materials by one of the following:

1. Lumber Siding:

   a. Abitibi-Price Corp.
   b. Champion International Corp.
   c. Georgia-Pacific Corp.
   d. Masonite Corp.

2. Plywood Siding:

   a. Abitibi-Price Corp.
   b. Champion International Corp.
   c. Georgia-Pacific Corp.

3. Hardboard Siding:

   a. Abitibi-Price Corp.
   b. Champion International Corp.
   c. Georgia-Pacific Corp.
   d. Masonite Corp.
   e. Weyerhaeuser.

2.5 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Stainless steel, noncorrosive aluminum or hot-dip galvanized nails, in sufficient length to penetrate minimum of 1-1/2 inches into substrate unless recommended otherwise by manufacturer.

1. Provide prefinished nails for face nailing of material to receive stain in color to match where face nailing is unavoidable.

2. Countersink nails and fill surface where face nailing is unavoidable.

B. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

1. Countersink nails, fill surface flush, and sand where face nailing is unavoidable.

2. Where finish carpentry materials are exposed in areas of high humidity, provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A 153.

C. Felt Underlayment: Asphalt-saturated organic felts, unperforated, conforming to requirements of ASTM D 26, Type 1, No. 15.

D. Adhesives: Comply with manufacturer's recommendations for adhesives.

E. Flashing: Comply with requirements of Division 7 Section "Flashing and Sheet Metal" for flashing materials installed in finish carpentry.

1. Horizontal Joint Flashing for Siding: Preformed galvanized steel or aluminum Z-shaped flashing.

F. Sealants: Comply with requirements of Division 7 Section "Joint Sealants" for materials required for sealing siding work.

2.6 PRESERVATIVE TREATMENT BY NONPRESSURE METHOD

A. Treatment Standard: Comply with NWWDA I.S.4 for exterior finish carpentry to receive water-repellent preservative treatment.

1. Water-Repellent Preservative: NWWDA tested and accepted preservative and water-repellent formulation containing 3-iodo-2-propynyl butyl carbamate (IPBC) as its active ingredient.

2. Water-Repellent Preservative/Insecticide: NWWDA tested and accepted preservative and water-repellent formulation containing 3-iodo-2-propynyl butyl carbamate (IPBC) as its active ingredient, combined with an insecticide containing chlorpyrifos as its active ingredient.

3. Extent of Treatment: Treat each item of exterior finish carpentry regardless of species from which it is fabricated.

4. Extent of Treatment: As indicated.

2.7 FABRICATION

A. Wood Moisture Content: Comply with requirements of specified inspection agencies and manufacturer's recommendations for moisture content of finish carpentry in relation to relative humidity conditions existing

during time of fabrication and in installation areas. Provide finish carpentry with moisture content that is compatible with Project requirements.

B. Fabricate finish carpentry to dimensions, profiles and details indicated. Ease edges to radius indicated for the following:

1. Lumber less than 1 inch in nominal thickness: 1/16 inch.

2. Lumber 1 inch or more in nominal thickness: 1/8 inch.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting installation and performance of finish carpentry. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Condition finish carpentry to average prevailing humidity conditions in installation areas before installation for a minimum of 24 hours unless longer conditioning recommended by manufacturer.

C. Backprime lumber for painted finish exposed on the exterior. Comply with requirements for surface preparation and application in Section "Painting."

3.3 INSTALLATION, GENERAL

A. Do not use finish carpentry materials that are unsound, warped, bowed, twisted, improperly treated or finished, not adequately seasoned, or too small to fabricate with proper jointing arrangements.

1. Do not use manufactured units with defective surfaces, sizes, or patterns.

B. Install finish carpentry plumb, level, true, and aligned with adjacent materials. Use concealed shims where required for alignment.

1. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.

2. Install to tolerance of 1/8 inch in 8 feet for plumb and level. Install adjoining finish carpentry with 1/16 inch maximum offset for flush installation and 1/8 inch maximum offset for reveal installation.

3. Coordinate finish carpentry with materials and systems that may be in or adjacent to standing and running trim and rails. Provide cutouts for mechanical and electrical items that penetrate exposed surfaces of trim and rails.

C. Finish in accordance with specified requirements.

D. Refer to Division 9 Sections for final finishing of finish carpentry.

3.4 STANDING AND RUNNING TRIM AND RAILS

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Stagger joints in adjacent and related standing and running trim and rails. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane back of casings to provide uniform thickness across joints if required.

1. Match color and grain pattern across joints.

2. Install trim after drywall joint finishing operations are completed.

3. Drill pilot holes in hardwood prior to nailing or fastening to prevent splitting. Fasten to prevent movement or warping. Countersink nail heads on exposed carpentry work and fill holes.

4. Fit exterior joints to exclude water. Apply flat grain lumber with bark side exposed to weather.

3.5 SIDING

A. Underlayment: Apply one layer of felt underlayment horizontally over entire surface to receive siding, lapping ends and succeeding courses a minimum of 2 inches. Fasten felt with sufficient number of galvanized roofing nails or noncorrosive staples to hold underlayment in place until siding application.

B. Lumber Siding: Apply starter strip along bottom edge of sheathing or sill. Install first course of siding with lower edge at least 1/8 inch below starter strip and subsequent courses lapped 1 inch over course below. Nail at each stud.

1. Leave 1/8-inch gap at trim and corners unless recommended otherwise by manufacturer and apply sealant.

2. Butt joints only at stud locations, nailing top and bottom on each side and staggering joints in subsequent courses.

3. Install prefabricated outside corners as recommended by manufacturer of siding materials.

C. Hardboard Siding: Install hardboard siding complying with AHA "Recommended Basic Application Instructions for Hardboard Siding." Install panels with edges backed by solid lumber framing or blocking. Leave 3/16-inch space at perimeter and openings unless recommended otherwise by panel manufacturer.

1. Seal butt joints at inside and outside corners and at trim locations.

2. Install continuous metal flashing at horizontal panel joints with 1/8-inch expansion gap.

3. Apply battens and corner trim as detailed on the drawings.

4. Conceal fasteners to greatest extent practical by countersinking and filling, by placing in grooves of siding pattern, or by concealing with applied trim or battens as detailed.

D. Flashing: Install metal flashing as indicated on the drawings and recommended by siding manufacturer.

E. Finish: Apply finish within 2 weeks of installation.

F. Install siding to comply with manufacturer's warranty requirements.

3.6 ADJUSTING

A. Repair damaged or defective finish carpentry where possible to eliminate functional or visual defects. Where not possible to repair, replace finish carpentry. Adjust joinery for uniform appearance.

3.7 CLEANING

A. Clean finish carpentry on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.8 PROTECTION

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

END OF SECTION 06200

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following: Type and application of preservative wood treatments.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 6 Section "Rough Carpentry" for structural and non-structural carpentry items.

2. Division 6 Section "Finish Carpentry" for nonstructural carpentry items exposed to view and not specified in another Section.

1.3 DEFINITIONS

A. Preservative Treatment:

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for the following products:

1. Wood treatment presrvative process.

C. Wood treatment data as follows including chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material:

1. For each type of preservative treated wood product include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

2. For water-borne treated products include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to

project site.

3. Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.

4. Warranty of chemical treatment manufacturer for each type of treatment.

1.5 QUALITY ASSURANCE

A. Treatment manufacturer and applicator shall be experienced in the field of wood treatments with at least 5 years experience with the treatment of wood.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 PRODUCTS

2.1 CHEMICALS: Preservative Wood Treatment: Wolmonize or approved equal.

PART 3 EXECUTION

3.01 PRESERVATIVE WOOD TREATMENT BY PRESSURE PROCESS

A. General: Where lumber or plywood is indicated as preservative- treated wood or is specified herein to be treated, comply with applicable requirements of AWPA Standards C1 (Process), C2 (Lumber) and C9 (Plywood). Mark each treated item with the AWPB or SPIB Quality Mark Requirements.

B. Pressure-treat above-ground items with water-borne preservatives to a minimum retention of 0.25 pcf. For interior uses, after treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

3. Wood framing members less than 18 inches above grade.

4. Wood floor plates installed over concrete slabs directly in contact with earth.

C. Pressure-treat wood members in contact with the ground or fresh water with water-borne preservatives to a minimum retention of 0.40 pcf.

D. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces to comply with AWPA M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

END OF SECTION 06310

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of 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. Insulation under slabs-on-grade.
2. Foundation wall insulation (supporting backfill).
3. Block/board cavity wall insulation.
4. Loose cavity wall insulation.
5. Safing insulation.
6. Concealed building insulation in board form.
7. Exposed building insulation in board form.
8. Building insulation in batt form.
9. Loose-fill building insulation.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 4 Section "Unit Masonry" for loose granular insulation installed in cavity walls and masonry cells.
2. Division 4 Section "Unit Masonry" for polystyrene board insulation installed in cavity walls and masonry cells.
3. Division 6 Section "Rough Carpentry" for foam plastic board sheathing.
4. Division 9 Section indicated below for thermal insulation and sound attenuation insulation installed as part of metal-framed wall and partition assemblies:

a. "Lath and Plaster."

b. "Gypsum Drywall."

1.3 DEFINITIONS

A. Thermal Resistivity: Where the thermal resistivity of insulation products are designated by "r-values," they represent the reciprocal of thermal conductivity (k-values). Thermal conductivity is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivities are expressed by the temperature difference in degrees F between the two exposed faces required to cause one BTU to flow through one square foot per hour at mean temperatures indicated.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of insulation product specified.

C. Samples of exposed insulation for initial selection purposes consisting of actual units or sections of units showing full range of colors available for each type of exposed insulation indicated.

D. Samples for verification purposes in full-size units of each type of exposed insulation indicated for each color specified.

E. Product test reports from and based on tests performed by qualified independent testing laboratory evidencing compliance of insulation products with requirements including r-values (aged values for plastic foam insulations), fire performance characteristics, perm ratings, water absorption ratings, and other properties, based on comprehensive testing of current products.

F. Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence compliance of plastic foam insulations with building code in effect for Project.

1.5 QUALITY ASSURANCE

A. Fire Performance Characteristics: Provide insulation materials identical to those whose indicated fire

performance characteristics have been determined per the ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristic: ASTM E 84.

2. Fire Resistance Ratings: ASTM E 119.

3. Combustion Characteristics: ASTM E 136.

B. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

1.6 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 recommendations for handling, storage, and protection 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 ahead of installation time.

3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 : PRODUCTS

A. MANUFACTURERS

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering insulation products that may be incorporated in the work include, but are not limited to, the following:

C. Manufacturers: Subject to compliance with requirements, provide insulation products of one of the following:

1. Extruded Polystyrene Board Insulation:

a. Amoco Foam Products Co.
b. DiversiFoam Products.
c. Dow: The Dow Chemical Company.
d. UC Industries, Inc.

2. Molded Polystyrene Board Insulation:

a. AFM Corporation.
b. DiversiFoam Products.
c. Grace Construction Products Div., W.R. Grace & Co.
d. Manufacturers with a third party certification program satisfying mandatory requirements for foam plastics of model building codes.

3. Phenolic Board Insulation:

a. Manville: Building Insulation Div., Manville Sales Corp.

4. Polyisocyanurate Board Insulation:

a. Celotex: Building Products Div., The Celotex Corporation.

5. Cellular Glass Block Insulation:

a. Pittsburgh Corning Corp.

6. Manufacturers of Glass Fiber Insulation:

a. CertainTeed Corp.
b. Knauf Fiber Glass GmbH.
c. Manville: Building Insulations Div., Manville Sales Corp.
d. Owens/Corning Fiberglas Corp.

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. Extruded Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation with closed-cells and integral high density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C 578 for type indicated; with 5-year aged r-values of 5.4 and 5 at 40 and 75 deg F (4.4 and 23.9 deg C), respectively; and as follows:

1. Type IV, 1.6 pcf min. density, unless otherwise indicated.

2. Type V, 3.0 pcf min. density where indicated.

3. Type VI, 1.8 pcf min. density.

4. Type VII, 2.2 pcf min. density.

5. Type X, 1.35 pcf min. density.

6. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 75 and 450, respectively.

C. Molded Polystyrene Board Insulation: Rigid, cellular thermal insulation formed by the expansion of polystyrene resin beads or granules in a closed mold to comply with ASTM C 578 for type indicated; and as follows:

1. Type I, 0.9 pcf min. density, aged r-values of 4.0 and 3.6 at 40 and 75 deg F (4.4 and 23.9 deg C), respectively.

2. Type II, 1.35 pcf min. density, aged r-values of 4.4 and 4.0 at 40 and 75 deg F (4.4 and 23.9 deg C), respectively.

3. Type VIII, 1.15 pcf min. density, aged r-values of 4.2 and 3.8 at 40 and 75 deg F (4.4 and 23.9 deg C), respectively.

4. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 75 and 450, respectively.

D. Phenolic Board Insulation: Rigid, cellular thermal insulation with thermoset phenolic-based closed-cell foam core and 2-ply foil-kraft-liner facing laminated to both sides, in board form complying with ASTM C 1126 for Type II, Grade 1; with r-value of 8.33 at 75 deg F (23.9 deg C).

1. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 35, respectively.

E. Polyisocyanurate Board Insulation: Rigid, cellular thermal insulation with glass-fiber-reinforced polyisocyanurate closed-cell foam core and aluminum foil facing laminated to both sides; complying with FS HH-I-1972/1, Class 2; aged r-values of 8 and 7.2 at 40 and 75 deg F (4.4 and 23.9 deg C), respectively; and as

follows:

1. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 20 and 200, respectively.

F. Unfaced Mineral Fiber Blanket/Batt Insulation: Thermal insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing); and as follows:

1. Mineral Fiber Type: Fibers manufactured from glass or slag.

2. Mineral Fiber Type: Fibers manufactured from glass.

3. Mineral Fiber Type: Fibers manufactured from slag.

4. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50, respectively.

G. Faced Mineral Fiber Blanket/Batt Insulation: Thermal insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type III, Class A (blankets with reflective vapor-retarder membrane facing with flame spread of 25 or less); foil-scrim-kraft or foil-scrim- polyethylene vapor-retarder membrane on one face, and as follows:

1. Mineral Fiber Type: Fibers manufactured from glass or slag.

2. Mineral Fiber Type: Fibers manufactured from glass.

3. Mineral Fiber Type: Fibers manufactured from slag.

4. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50, respectively.

5. Flanged Units: Provide blankets/batts fabricated with facing incorporating 4-inch-wide flanges along their edges for attachment to framing members.

2.2 SAFING INSULATION AND ACCESSORIES

A. Semi-Refractory Fiber Board Safing Insulation: Semi-rigid boards designed for use as a fire stop at openings between edge of slab and exterior wall panels, produced by combining semi-refractory mineral fiber manufactured from slag with thermosetting resin binders to comply with

ASTM C 612, Class 1 and 2; nominal density of 4.0 pcf; passing ASTM E 136 for combustion characteristics; r-value of 4.0 at 75 deg F (23.9 deg C).

B. Calking Compound: Material approved by manufacturer of safing insulation for sealing joint between foil backing of safing insulation and edge of concrete floor slab against penetration of smoke.

C. Safing Clips: Galvanized steel safing clips approved by manufacturer of safing insulation for holding safing insulation in place.

2.3 VAPOR RETARDERS

A. Polyethylene Vapor Retarder: ASTM D 4397, 6.0 mils thick, with a maximum permeance rating of 0.13 perms.

B. Tape for Vapor Retarder: Pressure sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

1. Reinforced Polyethylene Vapor Retarder:

a. "Griffolyn T-65," Griffolyn Div., Reef Industries, Inc.
b. "Griffolyn T-85," Griffolyn Div., Reef Industries, Inc.

D. Eave Ventilation Troughs: Preformed rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

PART 3 : EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions with Installer present, for compliance with requirements of the Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections that might puncture vapor retarders.

B. Close off openings in cavities receiving poured-in-place insulation to prevent the escape of insulation. Provide bronze or stainless steel screen (inside) where openings must be maintained for drainage or ventilation.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's instructions applicable to products and application indicated. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with installation of insulation.

B. Extend insulation full thickness as 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.

C. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

A. On vertical surfaces, set units in adhesive applied in accordance with manufacturer's instructions. Use type of adhesive recommended by manufacturer of insulation.

B. Protect below-grade insulation on vertical surfaces (from damage during back-filling) by application of protection board. Set in adhesive in accordance with recommendations of manufacturer of insulation.

C. Protect top surface of horizontal insulation (from damage during concrete work) by application of protection board.

3.5 INSTALLATION OF CAVITY-WALL AND MASONRY-CELL INSULATION

A. On units of plastic insulation, install small pads of adhesive spaced approximately 1'-0" o.c. both ways on inside face, as recommended by manufacturer. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for

this purpose and specified under Division 4 "Unit Masonry."

3.6 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. 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. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Set vapor retarder faced units with vapor retarder to warm side of construction, except as otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

D. Set reflective, foil-faced units accurately with not less than 0.75-inch air space in front of foil as indicated.

E. Place glass fiber loose fill insulation into spaces and onto surfaces as shown, either by pouring or by machine-blowing. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not excessively compact.

F. Stuff glass fiber loose fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume (to a density of approximately 2.5 pcf).

3.7 INSTALLATION OF SAFING INSULATION

A. Install safing insulation to fill gap between edge of concrete floor slab and back of exterior spandrel panels on safing clips spaced as needed to support insulation but not further apart then 24 inches o.c. Cut safing insulation wider than gap to be filled to ensure compression fit and seal joint between insulation and edge of slab with calking approved by safing insulation manufacturer for this purpose. Leave no voids in completed installation.

3.8 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping not less than 2 wall studs. Fasten vapor retarders to framing at top, end, and bottom edges, at perimeter of wall openings, and at lap joints; space fasteners 16 inches o.c.

C. Seal overlapping joints in vapor retarders with adhesives or tape per vapor retarder manufacturer's printed directions. Seal butt joints and fastener penetrations with tape of type recommended by vapor retarder manufacturer. Locate all joints over framing members or other solid substrates.

D. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.

E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with tape of type recommended by vapor retarder manufacturer to create an airtight seal between penetrating objects and vapor retarder.

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

2.10 PROTECTION

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

END OF SECTION 07210

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 slate shingle roofing.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 6 Section "Rough Carpentry" for roof deck, cant strips, and nailers.

2. Division 7 Section "Flashing and Sheet Metal" for metal flashing, valleys, gutters, and downspouts.

1.3 DESCRIPTION

A. Graduated Slate Roofs: Rough-textured slate of various sizes, colors, and thicknesses from 3/16 inch to 3/8 inch, with the longer and thicker shingles at the eaves, graduated to the ridges.

1.4 SUBMITTALS

A. General: Submit the following according to the Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product specified. Submit manufacturer's detailed technical product data, installation instructions and recommendations, including necessary data to document that materials comply with requirements.

C. Samples for initial selection purposes in the form of manufacturer's color charts showing full range of colors, textures, shapes, and sizes available for each type of slate shingle indicated.

D. Samples for verification purposes in full-size units of each type of slate shingle indicated; in sets for each color, texture, shape, and sizes specified, showing full range of variations expected in these characteristics. Prepare samples from same material to be used for the Work.

1.5 QUALITY ASSURANCE

A. Field-Constructed Mockup: Prior to installing slate shingles, erect a 4-by-4-foot mockup pitched roof panel, with a 3/4-inch exterior grade plywood base for each color, texture, shape, size, and type of slate shingles selected to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockup to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate mockup on site in location and of size indicated or, if not indicated, as directed by Architect.

2. Notify Architect one week in advance of the dates and times when mockup will be erected.

3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Obtain Architect's acceptance of mockup before start of final unit of Work.

5. Retain and maintain mockup during construction in undisturbed condition as a standard for judging completed unit of Work.

a. When directed, demolish and remove mockup from Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver slate shingles to Project site and store as close as possible to the point of installation to minimize damage while handling.

1.7 SEQUENCING AND SCHEDULING

A. Substrate: Proceed with slate shingle roofing installation only after substrate construction, vent stacks, and other penetrating work is complete, and when substrate materials are dry.

1.8 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage, and identified with labels clearly describing contents.

1. Slate Shingles: Furnish quantity of full-size units

equal to 2 percent of amount installed.

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. Anthony Dally & Sons, Inc.
2. Buckingham - Virginia Slate Corp.
3. Burlington Natstone Inc.
4. Echeguren Slate Co.
5. Evergreen Slate Co., Inc.
6. Hilltop Slate Co.
7. Slate International, Inc.
8. Structural Slate Co.
9. Vermont Structural Slate Company Inc.
10. Williams & Sons Slate & Tile, Inc.

2.2 SHINGLES

A. Slate Shingles: Hard, dense, sound rock, machine-punched or -drilled for two nails located for proper head lap. No broken or cracked slates, no broken exposed corners, and no broken corners on covered ends that could sacrifice nailing strength or the laying of a water-tight roof. No ribbons in exposed portion of shingle, and curvature not to exceed 1/8 inch per 12 inches.

1. Classification: According to ASTM C 406.

   a. Grade S1: Expected service life over 75 years.
   b. Grade S2: Expected service life from 40 to 75 years.
   c. Grade S1 or S2: Expected service life of Grade S1 or upper limits of Grade S2.

2. Thickness: As indicated on Drawings.

3. Length: 18 inches, 7-1/2-inch exposure with 3-inch lap.

4. Width: Random, but not less than 1/2 length.

5. Butt Shape: Standard square cut.

6. Weather Exposure Color Change: Weathering; to degree indicated by manufacturer.

7. Color: Match color range of Architect's samples.

2.3 FLASHING, SHEET METAL, AND ACCESSORIES

A. Felt Underlayment: No. 30 minimum, asphalt-saturated organic roofing felt, complying with ASTM D 226, Type II, 36-inch-wide rolls.

B. Mastic: Nonasbestos, fibrated, asphalt cement complying with ASTM D 4586, designed for trowel application.

C. Lead-Coated Copper Flashing: ASTM B 101, Type I, Grade 2 (cold-rolled), except where Grade 2 (soft) temper is required for forming, Class A lead weight, 16 oz. per sq. ft. (0.0216-inch-thick) bare copper for total 17.1 oz. per sq. ft. of lead-coated copper, except as otherwise indicated.

D. Roofing Nails: 12-gage, hot-dip galvanized steel, Type ES, barbed-shank roofing nails, minimum 3/8-inch-diameter head, and long enough to penetrate 3/4 inch into solid decking or to penetrate through plywood sheathing.

E. Slating Nails: 10-gage, diamond-point, smooth-shaft, hard copper-wire slating nails with large head (minimum 5/16-inch-diameter) and long enough to penetrate either completely through or at least 3/4 inch into sheathing.

1. Minimum Nail Length for Shingles More Than 3/16-Inch Thick: Two times the shingle thickness plus 1 inch.

F. Snow Guards: Prefabricated, noncorrosive units, designed to use with slate shingle roofing, and complete with predrilled holes or hooks for anchoring.

G. Perimeter Underlayment: Polyethylene-sheet-backed rubberized asphalt membrane, 40 mils thick. Provide primer when recommended by manufacturer.

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

2. Products: Subject to compliance with requirements, provide one of the following:

a. Bituthene Ice & Water Shield, W.R. Grace & Co.
b. Polyken 640 Underlayment Membrane, Polyken Technologies.
c. Polyguard Deck Guard, Polyguard Products, Inc.

H. Plastic Cement: One-part, nonsag, solvent-release-curing, polymerized butyl sealant complying with ASTM C 1085 and formulated with minimum of 75 percent solids, to be

nonstaining, and have a tack-free time of 24 hours or less.

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. BC-158, Pecora Corp.
    b. PSI 301, Polymeric Systems, Inc.
    c. PTI 757, Protective Treatments, Inc.
    d. Sonneborn Multi-Purpose Sealant, Sonneborn Building Products Div., ChemRex, Inc.
    e. Elastomeric Butyl Caulk, W. R. Meadows, Inc.
    f. Tremco Butyl Sealant, Tremco, Inc.

PART 3 : EXECUTION

3.1 EXAMINATION

A. Examine substrate and conditions under which slate roof shingle Work is to be performed; notify Contractor in writing of unsatisfactory conditions. Do not proceed with slate shingle Work until unsatisfactory conditions have been corrected.

B. Cover or otherwise plug drains to prevent entrance of slate shingle trimmings and debris.

3.2 INSTALLATION

A. Sheet Metal Flashing Installation: Install sheet metal flashing, vent flashing, and edge protection as indicated and in compliance with details and recommendations of the "NRCA Steep Roofing Manual."

1. Fabricate metal flashings at open valleys with a minimum 1-inch-high standing rib at center of valley to break force of water flow. Extend metal flashing a minimum of 12 inches onto roof deck on each side of valley.

2. Where flashings occur perpendicular to slope, return sheet metal a minimum of 4 inches under shingles.

3. If open valley length exceeds 12 feet, taper valleys by increasing width of valley flashing by 2 inches (1 inch each side) for each 8 feet of valley.

B. Felt Underlayment Installation: Apply one layer of felt over entire roof surface, beginning at eaves, with courses perpendicular to slope of roof. Lap succeeding courses 2 inches minimum, with 6-inch minimum end laps. Fasten with

sufficient nails to hold in place until slate shingles are installed.

1. For graduated slate roofs and for slopes 4 inches per foot or less, apply double felt layer adhered with mastic, with joints staggered between layers.

C. Ice Protection Underlayment: In addition to felt underlayment, install continuous strip of ice protection underlayment, consisting of an additional strip of No. 30 roofing felt (to form a 2-ply membrane) along eaves to a point at least 24 inches beyond inside face of outside wall. Set in a continuous bed of mastic and secure with roofing nails at 6 inches o.c. along top edges. Provide minimum 2-inch side laps, sealed with mastic.

D. Perimeter Underlayment: From eaves, apply to a minimum of 24 inches inside the inside face of exterior wall line.

1. In addition to eaves, apply minimum 24-inch-wide layer at entire perimeter of surfaces to receive roofing slate, including ridges, valleys, and rakes.

E. Slate Shingle Installation: Beginning at eaves, install slate roofing shingles according to recommendations of manufacturer and with details and recommendations of "NRCA Steep Roofing Manual." Unless otherwise indicated, provide at least 3-inch lap between succeeding courses of slate shingles and break (stagger) joints between courses a minimum of 3 inches. Provide 2-inch projection of slate at eaves and 1 inch projection at gables. Cut and fit slate neatly around roof vents, pipes, ventilators and other projections through roof.

1. Nail slate shingles so nail heads just touch slate lightly--do not drive nails home or draw slates downward.

2. Install slate at ridges and hips in saddle pattern. Lay ridge and hip slates in plastic cement spread generously over unexposed surfaces of lower course of slate. Nail ridge slates in place through joints of underlying slate. Nail hip slates to supporting wood blocking. Align butts of combing slates at hips with butts of coursed shingles. Cover heads of exposed nails with plastic cement.

3. Cut slate at valleys to form open valleys with a straight border. Taper valleys from a 2-inch exposure of metal flashing on each side of valley at top and increasing exposure by 1 inch (each side) per 8 feet of valley length.

F. Install snow guards as field slate is installed according to installation instructions and recommendations of manufacturer and the "NRCA Steep Roofing Manual." Unless otherwise indicated, locate snow guards at 18 inches o.c. horizontally, and at every other course vertically, beginning at second course from gutter. Stagger snow guard location by 9 inches between courses.

3.3 ADJUST AND CLEAN

A. Remove and replace damaged or broken slates.

B. Remove excess slate and debris from site.

END OF SECTION 07315

PART 1 : GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Metal counter flashing and base flashing (if any).
2. Metal wall flashing and expansion joints.
3. Built-in metal valleys, gutters, and scuppers.
4. Gutters and downspouts (rain drainage).
5. Exposed metal trim/fascia units.
6. Miscellaneous sheet metal accessories.
7. Elastic flashing.
8. Elastic roof/wall expansion joint systems.
9. Laminated and composition flashing.

B. Integral masonry flashings are specified as masonry work in sections of Division 4.

C. Roofing accessories installed integral with roofing membrane are specified in roofing system sections as roofing work.

D. Roof accessory units of premanufactured, set-on type are specified in Division 7 Section "Roof Accessories."

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data, Flashing, Sheet Metal, and Accessories: Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.

C. Samples of the following flashing, sheet metal, and accessory items:

1. 8-inch-square samples of specified sheet materials to be exposed as finished surfaces.

2. 12-inch-long samples of factory-fabricated products exposed as finished work. Provide complete with specified factory finish.

D. Shop drawings showing layout, profiles, methods of joining, and anchorages details, including major counterflashings, trim/fascia units, gutters, downspouts, scuppers, and expansion joint systems. Provide layouts at 1/4-inch scale and details at 3-inch scale.

1.4 PROJECT CONDITIONS

A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

PART 2 : PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM MATERIALS

A. Copper: ASTM B 370; temper H00 (cold-rolled) except where temper 060 is required for forming; 16 oz. (0.0216-inch thick) except as otherwise indicated.

1. Provide lead coating of 0.06 psf on exposed copper surfaces.

B. Lead: ASTM B 749, Type L51121, copper-bearing sheet lead, minimum 4 lb/sq ft (0.0625-inch thick) except not less than 6 lb/sq ft (0.0937-inch thick) for burning (welding) unless otherwise indicated.

C. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealers."

D. Epoxy Seam Sealer: 2-part noncorrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior nonmoving joints including riveted joints.

E. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.

F. Paper Slip Sheet: 5-lb. rosin-sized building paper.

G. Polyethylene Underlayment: Minimum 6-mil carbonated polyethylene film resistant to decay when tested in accordance with ASTM E 154.

H. Reglets: Metal or plastic units of type and profile indicated, compatible with flashing indicated, noncorrosive.

I. 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 gage required for performance.

J. Cast-Iron Drainage Boots: Grey iron castings of size and pattern indicated, ASTM A 48, bituminous shop-coated.

K. Gutter and Conductor-Head Guards: 20-gage bronze or nonmagnetic stainless steel mesh or fabricated units, with selvaged edges and noncorrosive fasteners. Select materials for compatibility with gutters and downspouts.

L. Elastic Flashing Filler: Closed-cell polyethylene or other soft closed-cell material recommended by elastic flashing manufacturer as filler under flashing loops to ensure movement with minimum stress on flashing sheet.

M. Roofing Cement: ASTM D 2822, asphaltic.

2.2 FABRICATED UNITS

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

D. Sealant Joints: Where movable, nonexpansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

2.3 ELASTIC EXPANSION JOINTS

A. General: Provide factory-fabricated units of size and profile indicated, complete with prefabricated corner units, intersection units, and splicing materials. Provide complete with elastic sheet flashing forming the primary joint membrane, in a supported, "bellows" arrangement designed for securement to both sides of expansion joints. Underside of bellows insulated with adhesively applied, flexible, closed-cell rubber or plastic not less than 3/8-inch thick.

B. Type: Plain sheet or encapsulated metal flanged edges, for embedment in other construction or nailing to substrates, 4-inches minimum flange width.

C. Type: Metal flanged edges, 3 to 4 inches wide, formed to profiles as indicated to fit curbs and designed for nailing to curb substrate. Provide metal flanges in the following thicknesses:

1. Copper: 16 oz.

D. Looped Bellows Width: 5 to 6 inches, exclusive of flanges.

E. 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:

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

1. Afco Products, Inc.
2. Celotex Corporation

3. International Permalite/Roofing Components Group.
4. Manville/Roofing Systems Division.
5. Phoenix Building Products, Inc.
6. York Manufacturing, Inc.

PART 3 : EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA "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. Underlayment: Where copper is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of polyethylene underlayment.

C. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.

D. Install reglets to receive counterflashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of Division 3 sections. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of Division 4 sections.

E. Install counterflashing in reglets, either by snap-in seal arrangement or by welding in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.

F. Install elastic flashing in accordance with manufacturer's recommendations. Where required, provide for movement at joints by forming loops or bellows in width of flashing. Locate cover or filler strips at joints to facilitate complete drainage of water from flashing. Seam adjacent flashing sheets with adhesive, seal and anchor edges in accordance with manufacturer's recommendations.

G. Nail flanges of expansion joint units to curb nailers, at maximum spacing of 6 inches o.c. Fabricate seams at joints between units with minimum 3-inch overlap, to form a continuous, waterproof system.

H. Install continuous gutter guards on gutters, arranged as hinged units to swing open for cleaning gutters. Install

"beehive"-type strainer-guard at conductor heads, removable for cleaning downspouts.

3.2 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Protection: Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

END OF SECTION 07600

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes joint sealants for the following locations:

1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:

a. Control and expansion joints in cast-in-place concrete.

b. Control and expansion joints in unit masonry.

c. Joints of stonework set with mortar including copings and cornices.

d. Joints between different materials listed above.

e. Perimeter joints between materials listed above and frames of doors and windows.

f. Control and expansion joints in ceiling and overhead surfaces.

g. Other joints as indicated.

2. Exterior joints in horizontal traffic surfaces as indicated below:

a. Control and expansion joints in brick pavers.

b. Control, expansion, and isolation joints in cast-in-place concrete slabs.

c. Joints between different materials listed above.

d. Other joints as indicated.

3. Interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:

a. Control and expansion joints on exposed interior

surfaces of exterior walls.

b. Perimeter joints of exterior openings where indicated.

c. Joints between tops of non-load-bearing unit masonry walls and underside of cast-in-place concrete slabs and beams.

d. Tile control and expansion joints.

e. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.

f. Joints on underside of precast beams and planks.

g. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.

h. Perimeter joints of toilet fixtures.

i. Other joints as indicated.

4. Interior joints in horizontal traffic surfaces as indicated below:

a. Control and expansion joints in cast-in-place concrete slabs.

b. Control and expansion joints in tile flooring.

c. Other joints as indicated.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 7 Section "Flashing and Sheet Metal" for sealing joints related to flashing and sheet metal for roofing.

2. Division 8 "Glass and Glazing" for sealants used in glazing.

3. Division 9 Section "Gypsum Drywall" for sealing concealed perimeter joints of gypsum board partitions to reduce sound transmission.

4. Division 9 Section "Tile" for sealing tile joints.

5. Division 9 Section "Chemical-Resistant Brick Flooring" for sealing flooring joints.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

B. Provide joint sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water resistant and cause no staining or deterioration of joint substrates.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data from manufacturers for each joint sealant product required.

1. Certification by joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.

C. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.

D. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

E. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.

F. Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project names addresses, names of Architects and Owners, plus other information specified.

G. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation

needed to obtain adhesion.

H. Product test reports for each type of joint sealants indicated, evidencing compliance with requirements specified.

I. Preconstruction field test reports indicating which products and joint preparation methods demonstrate acceptable adhesion to joint substrates.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

B. Testing Laboratory Qualifications: To qualify for acceptance, an independent testing laboratory must demonstrate to Architect's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying progress of the Work.

C. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

D. Preconstruction Compatibility and Adhesion Testing: Submit to joint sealant manufacturers samples of materials that will contact or affect joint sealants for compatibility and adhesion testing as indicated below:

1. Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

    a. Perform tests under normal environmental conditions that will exist during actual installation.

2. Submit not less than 9 pieces of each type of material, including joint substrates, shims, joint sealant backings, secondary seals, and miscellaneous materials.

3. Schedule sufficient time for testing and analysis of results to prevent delay in the progress of the Work.

4. Investigate materials failing compatibility or adhesion tests and obtain joint sealant manufacturer's written recommendations for corrective measures, including use of specially formulated primers.

5. Testing will not be required when joint sealant manufacturer is able to submit joint preparation data required above that are acceptable to Architect and are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

E. Product Testing: Provide comprehensive test data for each type of joint sealant based on tests conducted by a qualified independent testing laboratory on current product formulations within a 24-month period preceding date of Contractor's submittal of test results to Architect.

1. Test elastomeric sealants for compliance with requirements specified by reference to ASTM C 920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C 719), low-temperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.

2. Include test results performed on joint sealants after they have cured for 1 year.

F. Preconstruction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:

1. Locate test joints where indicated or, if not indicated, as directed by Architect.

2. Conduct field tests for each application indicated below:

a. Each type of elastomeric sealant and joint substrate indicated.

b. Each type of non-elastomeric sealant and joint substrate indicated.

3. Notify Architect one week in advance of the dates and times when mock-ups will be erected.

4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.

5. Test Method: Test joint sealants by hand pull method described below:

   a. Install joint sealants in 5-feet joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealants to cure fully before testing.

   b. Make knife cuts horizontally from one side of joint to the other followed by 2 vertical cuts approximately 2 inches long at side of joint and meeting horizontal cut at top of 2-inch cuts. Place a mark 1 inch from top of 2-inch piece.

   c. Use fingers to grasp 2-inch piece of sealant just above 1-inch mark; pull firmly down at a 90-degree angle or more while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.

6. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.

7. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

G. Field-Constructed Mock-Ups: Prior to installation of joint sealants, apply elastomeric sealants as follows to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution:

   1. Joints in field-constructed mock-ups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants specified in this Section.

H. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of the Division 1 Section covering this activity.

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 period for use, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.

2. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F (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 allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.8 SEQUENCING AND SCHEDULING

A. Sequence installation of joint sealants to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

PART 2 PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, joint fillers, 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: Provide color of exposed joint sealants to comply with the following:

1. Provide custom colors to match Architect's samples.

2.2 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C 920 and other requirements indicated on each Elastomeric Joint Sealant Data Sheet at end of this Section, including those requirements referencing ASTM C 920 classifications for Type, Grade, Class, and Uses.

1. Additional Movement Capability: Where additional movement capability is specified in Elastomeric Joint Sealant Data Sheet, 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 of ASTM C 920 for Uses indicated.

B. Available Products: Subject to compliance with requirements, elastomeric sealants that may be incorporated in the Work include, but are not limited to, the products specified in each Elastomeric Sealant Data Sheet.

C. Products: Subject to compliance with requirements, provide one of the products specified in each Elastomeric Joint Sealant Data Sheet.

2.3 SOLVENT-RELEASE-CURING JOINT SEALANTS

A. Acrylic Sealant: Manufacturer's standard one-part, nonsag, solvent-release-curing acrylic terpolymer sealant complying with AAMA 808.3 or FS TT-S-00230 or both, with capability when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the following percentage change in joint width existing at time of application and remain adhered to joint substrates indicated for Project without failing cohesively:

1. 12-1/2 percent movement in both extension and compression for a total of 25 percent.

B. Butyl Sealant: Manufacturer's standard one-part, nonsag, solvent-release-curing, polymerized butyl sealant complying with ASTM C 1085 and formulated with minimum of 75 percent solids to be nonstaining, paintable, and have a

tack-free time of 24 hours or less.

C. Pigmented Narrow Joint Sealant: Manufacturer's standard, solvent-release-curing, pigmented synthetic rubber sealant complying with AAMA 803.3 and formulated for sealing joints 3/16 inch or smaller in width.

D. Available Products: Subject to compliance with requirements, solvent-release-curing joint sealants that may be incorporated in the Work include, but are not limited to, the following:

E. Products: Subject to compliance with requirements, provide one of the following:

1. Acrylic Sealant:

   a. "60+Unicrylic," Pecora Corp.
   b. "PTI 738," Protective Treatments, Inc.
   c. "PTI 767," Protective Treatments, Inc.
   d. "Mono," Tremco, Inc.

2. Butyl Sealant:

   a. "BC-158," Pecora Corp.
   b. "PTI 757," Protective Treatments, Inc.
   c. "Sonneborn Multi-Purpose Sealant," Sonneborn Building Products Div., ChemRex, Inc.
   d. "Tremco Butyl Sealant," Tremco, Inc.

3. Pigmented Narrow Joint Sealant:

   a. "PTI 200," Protective Treatments, Inc.

2.4 LATEX JOINT SEALANTS

A. General: Provide manufacturer's standard one-part, nonsag, mildew-resistant, paintable latex sealant of formulation indicated that is recommended for exposed applications on interior and protected exterior locations and that accommodates indicated percentage change in joint width existing at time of installation without failing either adhesively or cohesively.

B. Acrylic-Emulsion Sealant: Provide product complying with ASTM C 834 that accommodates joint movement of not more than 5 percent in both extension and compression for a total of 10 percent.

C. Silicone Emulsion Sealant: Provide product complying with ASTM C 834 and, except for weight loss measured per ASTM C 792, with ASTM C 920 that accommodates joint movement of not more than 25 percent in both extension and

compression for a total of 50 percent.

D. Available Products: Subject to compliance with requirements, latex joint sealants that may be incorporated in the Work include, but are not limited to, the following:

E. Products: Subject to compliance with requirements, provide one of the following:

1. Acrylic-Emulsion Sealant:

a. "AC-20," Pecora Corp.
b. "Sonolac," Sonneborn Building Products Div., ChemRex, Inc.
c. "Tremco Acrylic Latex 834," Tremco, Inc.

2. Silicone-Emulsion Sealant:

a. "Trade Mate Paintable Glazing Sealant," Dow Corning Corp.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:

1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90.

2. Product has flame spread and smoke developed ratings of less than 25 per ASTM E 84.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

C. Available Products: Subject to compliance with requirements, acoustical joint sealants that may be incorporated in the Work include, but are not limited to, the following:

D. Products: Subject to compliance with requirements, provide one of the following:

1. Acoustical Sealant:

a. "SHEETROCK Acoustical Sealant," United States

Gypsum Co.

b. "AC-20 FTR Acoustical and Insulation Sealant," Pecora Corp.

2. Acoustical Sealant for Concealed Joints:

a. "BA-98," Pecora Corp.
b. "Tremco Acoustical Sealant," Tremco, Inc.

2.6 TAPE SEALANTS

A. Tape Sealant: Manufacturer's standard, solvent-free, butyl-based tape sealant with a solids content of 100 percent formulated to be nonstaining, paintable, and nonmigrating in contact with nonporous surfaces with or without reinforcement thread to prevent stretch and packaged on rolls with a release paper on one side.

B. Available Products: Subject to compliance with requirements, tape sealants that may be incorporated in the Work include, but are not limited to, the following:

C. Products: Subject to compliance with requirements, provide one of the following:

1. "Extru-Seal Tape," Pecora Corp.
2. "Shim-Seal Tape," Pecora Corp.
3. "PTI 606," Protective Treatments, Inc.
4. "Tremco 440 Tape," Tremco, Inc.
5. "MBT-35," Tremco, Inc.

2.7 PREFORMED FOAM SEALANTS

A. Preformed Foam Sealants: Manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellent agent; factory-produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following requirements:

1. Properties: Permanently elastic, mildew-resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.

2. Impregnating Agent: Manufacturer's standard.
3. Impregnating Agent: Latex-modified asphalt.
4. Impregnating Agent: Chemically stabilized acrylic.
5. Impregnating Agent: Neoprene rubber suspended in water-based emulsion.

6. Density: Manufacturer's standard.
7. Backing: Pressure-sensitive adhesive factory applied to one side with protective wrapping.
8. Available Products: Subject to compliance with requirements, preformed foam sealants that may be incorporated in the Work include, but are not limited to, the following:

9. Products: Subject to compliance with requirements, provide one of the following:

   a. "Emseal," Emseal Corp.
   b. "Emseal Greyflex," Emseal Corp.
   c. "Wil-Seal 150," Wil-Seal Construction Foams Div., Illbruck.
   d. "Wil-Seal 250," Wil-Seal Construction Foams Div., Illbruck.

2.8 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. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

   1. Proprietary, reticulated, closed-cell polymeric foam, nonoutgassing, with a density of 2.5 pcf and tensile strength of 35 psi per ASTM D 1623, and with water absorption less than 0.02 gms/cc per ASTM C 1083.

C. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26 deg F (-32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape as 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.

2.9 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 in any way joint substrates and adjacent nonporous surfaces, 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. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer 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 concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of

developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

3. Remove laitance and form release agents from concrete.

4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other 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.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where 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. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to

joint widths that allow optimum sealant movement capability.

a. Do not leave gaps between ends of joint fillers.

b. Do not stretch, twist, puncture, or tear joint fillers.

c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.

E. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

F. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

2. Provide flush joint configuration, per Figure 5B in ASTM C 1193, where indicated.

a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

3. Provide recessed joint configuration, per Figure 5C in ASTM C 1193, of recess depth and at locations indicated.

G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce

seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved 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 or from damage resulting from construction operations or other causes so that they 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 that and installations with repaired areas are indistinguishable from original work.

END OF SECTION 07901

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following products manufactured in accordance with SDI Recommended Standards:

1. Doors: Flush, hollow or composite construction standard steel doors for interior and exterior locations.

2. Doors: Seamless, hollow or composite construction standard steel doors for interior and exterior locations.

3. Frames: Pressed steel frames for doors, transoms, sidelights, mullions,interior glazed panels, and other interior and exterior openings of following type:

   a. Welded unit type.

   b. Knockdown field assembled type.

   c. Drywall Slip-On type.

4. Assemblies: Provide standard steel door and frame assemblies as required for the following:

   a. Labeled and fire rated.

   b. Thermal rated (insulated).

   c. Sound rated (acoustical).

5. Provide factory primed doors and frames to be field painted.
6. Provide factory finished doors and frames.

B. Painting primed doors and frames is specified in Division 9 Section "Painting."

C. Custom steel doors and frames are specified in another Division 8 Section.

D. Wood doors are specified in another Division 8 Section.

E. Door hardware is specified in another Division 8 Section.

F. Glass and Glazing are specified in another Division 8 Section.

G. Building in of anchors and grouting of frames in masonry construction is specified in Division 4.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.

C. Shop drawings showing fabrication and installation of standard steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

1. Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.

2. Indicate coordinate of glazing frames and stops with glass and glazing requirements.

D. Samples for initial selection purposes in form of manufacturer's color charts showing full range of colors available for factory-finished doors and frames.

E. Samples for verification purposes of each type of exposed finish required, prepared on samples not less than 3 inches by 5 inches and of same thickness and material indicated for final unit of Work. Where finishes involve normal color and texture variations, include sample sets showing full range of variations expected.

F. Label Construction Certification: For door assemblies required to be fire-rated and exceeding limitations of

labeled assemblies, submit manufacturer's certification that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to requirements for labeled construction.

1.4 QUALITY ASSURANCE

A. Provide doors and frames complying with Steel Door Institute "Recommended Specifications Standard Steel Doors and Frames" ANSI/SDI-100 and as herein specified.

B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies whose fire resistance characteristics have been determined per ASTM E 152 and which are labeled and listed by UL, Factory Mutual, Warnock Hersey, or other testing and inspecting organization acceptable to authorities having jurisdiction.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide manufacturer's certification that doors conform to all standard construction requirements of tested and labeled fire-rated door assemblies except for size.

2. Temperature Rise Rating: At stairwell enclosures, provide doors which have Temperature Rise Rating of 450 deg F (232 deg C) maximum in 30 minutes of fire exposure.

3. Temperature Rise Rating: At stairwell enclosures, provide doors which have Temperature Rise Rating of 250 deg F (121 deg C) maximum in 30 minutes of fire exposure.

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 upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4-inches high wood blocking. Avoid use of non-vented plastic or canvas shelters which could

create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4-inches spaces between stacked doors to promote air circulation.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering standard steel doors and frames which may be incorporated in the work include; but are not limited to, the following:

B. Manufacturer: Subject to compliance with requirements, provide standard steel doors and frames by one of the following:

1. Standard Steel Doors and Frames:

   a. Amweld Building Products, Inc.
   b. Ceco Corp.
   c. Copco Door Co.
   d. Curries Company.
   e. Deansteel Manufacturing Co.
   f. Fenestra Corp.
   g. Kewanee Corp.
   h. Mesker Door Co.
   i. Pioneer Industries.
   j. Premier Products, Inc. (Formerly Dittco).
   k. Republic Builders Products.
   l. Steelcraft Manufacturing Co.

2. Prefinished Interior Steel (Door) Frames Only:

   a. Dunbarton Corp. (Rediframe Product).
   b. Timely.

2.2 MATERIALS

A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.

B. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 366 and ASTM A 568.

C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526, or drawing quality, ASTM A 642, hot dipped galvanized in

accordance with ASTM A 525, with A60 or G60 coating designation, mill phosphatized.

D. Supports and Anchors: Fabricate of not less than 18-gage sheet steel; galvanized where used with galvanized frames.

E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize in compliance with ASTM A 153, Class C or D as applicable.

F. Shop Applied Paint: Apply after fabrication.

1. Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints complying with ANSI A224.1, "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames."

2. Finish: Manufacturer's standard baked-on enamel paint.

2.3 DOORS

A. Provide metal doors of types and styles or grades and models indicated on drawings or schedules.

B. Provide metal doors of SDI grades and models specified below or as indicated on drawings or schedules:

1. Interior Doors: ANSI/SDI-100, Grade II, heavy-duty, Model 3 or 4, minimum 18-gage cold-rolled sheet steel faces.

2. Exterior Doors: ANSI/SDI-100, Grade III, extra heavy-duty, Model 4, minimum 16-gage galvanized steel faces.

C. Door Louvers: Provide sightproof stationary louvers for interior doors where indicated, constructed of inverted V-shaped or Y-shaped blades formed of 24-gage cold-rolled steel set into minimum 20-gage steel frame.

2.4 FRAMES

A. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 18-gage cold-rolled steel.

1. Fabricate frames with mitered, coped, or welded corners.

2. Fabricate frames with mitered or coped corners knocked-down, for field assembly.

3. Fabricate frames with mitered or coped corners, welded construction for exterior applications and knocked-down for field assembly at interior applications.

4. Form exterior frames from 16-gage galvanized steel.

B. Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.

C. Plaster Guards: Provide minimum 26-gage steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

2.5 FABRICATION

A. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, 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. Comply with ANSI/SDI-100 requirements.

1. Internal Construction: Manufacturer's standard honeycomb, polyurethane, polystyrene, unitized steel grid, vertical steel stiffeners, or rigid mineral fiber core with internal sound deadener on inside of face sheets where appropriate in accordance with SDI standards.

2. Clearances: Not more than 1/8 inch at jambs and heads except between non-fire-rated pairs of doors not more than 1/4 inch. Not more than 3/4 inch at bottom.

B. Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel.

C. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel.

E. Fabricate exterior doors, panels, and frames from galvanized sheet steel in accordance with SDI-112. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16-gage inverted steel channels.

F. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

G. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal insulating door and frame assemblies and tested in accordance with ASTM C 236 or ASTM C 976 on fully operable door assemblies.

1. Unless otherwise indicated, provide thermal-rated assemblies with U factor of 0.41 Btu/(hr x sq ft x deg F.) or better.

H. Sound-Rated (Acoustical) Assemblies: Where shown or scheduled, provide door and frame assemblies fabricated as sound-reducing type, tested in accordance with ASTM E 90, and classified in accordance with ASTM E 413.

1. Unless otherwise indicated, provide acoustical assemblies with sound ratings of STC 33 or better.

I. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware in accordance with final Door Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 Series Specifications for door and frame preparation for hardware.

1. For concealed overhead door closers, provide space, cutouts, reinforcing and provisions for fastening in top rail of doors or head of frames, as applicable.

J. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at project site.

K. Locate hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware on Standard Steel Doors and Frames," published by Door and Hardware Institute.

L. Shop Painting: Clean, treat, and paint exposed surfaces

of steel door and frame units, including galvanized surfaces.

1. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.

2. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

3. Apply finish coat to doors indicated to be prefinished by spraying and baking, to produce a paint thickness of 1.25 mils.

M. Glazing Stops: Minimum 20 gage steel or .040-inch-thick aluminum.

1. Provide non-removable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.

2. Provide screw applied removable glazing beads on inside of glass, louvers, and other panels in doors.

PART 3 EXECUTION

3.1 INSTALLATION

A. General: Install standard steel doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.

B. Placing Frames: Comply with provisions of SDI-105 "Recommended Erection Instructions For Steel Frames," unless otherwise indicated.

1. Except for frames located at existing concrete, masonry or drywall installations, place frames prior to construction of enclosing walls and ceilings. 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.

2. In masonry construction, locate 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry Tee anchors.

3. At existing concrete or masonry construction, provide 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb, set frames and secure to adjacent construction with bolts and masonry anchorage devices.

4. Install fire-rated frames in accordance with NFPA Standard No. 80.

5. In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In closed steel stud partitions, attach wall anchors to studs with screws.

6. In in-place drywall partitions install knock down slip-on drywall frames

C. Door Installation: Fit hollow metal doors accurately in frames, within clearances specified in ANSI/SDI-100.

1. Install fire-rated doors with clearances as specified in NFPA Standard No. 80.

3.2 ADJUST AND CLEAN

A. Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

B. Protection Removal: Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.

C. Final Adjustments: Check and readjust operating hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

END OF SECTION 08111

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUMMARY:

A. Extent and location of each type of panel wood doors is indicated on drawings and in schedules.

B. Types of panel wood doors required include the following:

1. Exterior stile and rail doors with raised panels.
2. Exterior stile and rail doors with flat panels.
3. Interior stile and rail doors with raised panels.
4. Interior stile and rail doors with flat panels.
5. Interior stile and rail fire doors with raised panels.

C. Shop-priming of panel wood doors is included in this section.

D. Factory-finishing of panel wood doors is included in this section.

E. Factory-prefitting to frames and factory-premachining for hardware of panel wood doors is included in this section.

F. Wood door frames and other woodwork in juxtaposition to panel wood doors is specified in Division-6 section "Architectural Woodwork".

1.3 SUBMITTALS:

A. Product Data: Door manufacturer's technical data for each type of door required, including details of construction relative to materials, dimensions of individual components, profiles and finishes.

B. Shop Drawings: Indicate location and size of each door;

elevation of each door; construction details not covered in product data including those for stiles, rails, panels, and moldings (sticking); location and extent of hardware cutouts; fire ratings; and factory finishing requirements.

C. Samples: Corner section, 1'-0" square, showing edges, faces, joinery and material qualities of typical stile, rail, molding and panel for each exposed material, door type and finish required; and as follows:

1. Doors for Transparent Finish: Door faces representing typical range of color and grain for each veneer and lumber species required.

2. Factory-Finished Doors: Finished door faces representing typical factory finish.

D. Certificate of Product Compliance: Manufacturer's certificate evidencing compliance of panel wood doors with requirements.

1.4 QUALITY ASSURANCE:

A. Single Source Responsibility: Obtain panel wood doors from a single manufacturer.

B. Fire-Rated Panel Wood Doors: Provide panel wood doors which are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152 and which are labeled and listed for fire ratings indicated by UL, Warnock Hersey or other testing and inspection agency acceptable to authorities having jurisdiction.

C. Product Certification: Require door manufacturer to certify that doors comply with specified requirements including those of referenced door standard.

1. Mark, label or otherwise identify panel wood doors as complying with NWWDA I.S.6.

D. Safety Glazing Standard: Provide safety glass of type indicated or required by authorities having jurisdiction for doors and sidelights; comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials except where those of Category I are expressly indicated and permitted.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with

NWWDA pamphlet "How to Store, Handle, Finish, Install and Maintain Wood Doors" and with manufacturer's instructions and with applicable requirements of referenced door standard.

B. Identify each door with individual opening numbers which correlate with shop drawing designation system for doors, frames and hardware, using temporary, removable or concealed markings.

1.6 PROJECT CONDITIONS:

A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period to comply with requirements of the following quality standard applicable to project's geographical location.

1. "Architectural Woodwork Quality Standards" including Section 100-S-3 "Moisture Content" of Architectural Woodwork Institute (AWI).

2. "Section 1 - General Information - Technical Bulletin" in "Manual of Millwork" of Woodwork Institute of California (WIC).

PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering panel wood doors which may be incorporated in the work include, but are not limited to, the following:

B. Manufacturer: Subject to compliance with requirements, provide panel wood doors of one of the following:

1. Panel Wood Doors of Stock Design and Construction:

2. Jeld-Wen, Inc.
3. Louisiana Pacific Corp.
4. Maywood, Inc.
5. McPhillips Manufacturing Co., Inc.
6. Morgan Products, Ltd.
7. Nicolai Company.
8. Patelos Industries, Ltd.
9. Premium Forest Products Limited.
10. Sauder Industries Limited, Door Division.

11. F. E. Schumacher Co., Inc.
12. Semling-Menke Co., Inc.
13. Simpson Door Company.
14. Temple Products, Inc.
15. West Valley Woodworks, Inc.

16. Panel Wood Doors of Special Design and Construction:

17. ENJO Custom Interiors Inc.
18. International Wood Products.
19. Karona, Inc.
20. Michael Maiman Co., Inc.
21. Sun-Dor-Co.
22. Willdon Creative Woodworking.

2.2 PANEL WOOD DOORS OF STOCK DESIGN AND CONSTRUCTION:

A. NWWDA Quality Standard: Comply with NWWDA I.S.6 "Industry Standard for Wood Stile and Rail Doors" of National Wood Window and Door Association (NWWDA).

B. Exterior Doors: Assemble doors with "wet-use" adhesives and comply with the following requirements:

1. NWWDA Grade of Doors for Transparent Finish: Premium or select.

2. NWWDA Grade of Doors for Opaque Finish: Standard.

3. Wood Species of Doors for Transparent Finish: Idaho White, Lodgepole, Ponderosa of Sugar Pine, plain sawn/sliced.

4. Wood Species of Doors for Transparent Finish: American Mahogany, plain sawn/sliced.

5. Wood Species of Doors for Opaque Finish: Manufacturer's standard softwood species and cut for stiles and rails; with panels of same species or wood base construction materials, as standard with manufacturer.

6. Panel Configuration: Raised.

   a. Raised Panel Thickness: Manufacturer's standard but not less than that required by referenced NWWDA standard for design group indicated.

   b. Raised Panel Thickness: As indicated.

7. Panel Configuration: Flat.

a. Flat Panel Thickness: Manufacturer's standard but not less than that required by referenced NWWDA standard for design group indicated.

b. Flat Panel Thickness: As indicated.

8. Design and Layout: Panel design as described below under NWWDA design group, with minimum dimensions for stiles, rails, panels, mullions and bars complying with referenced NWWDA standard.

a. NWWDA Design Group: "1-3/4 Front Entrance Doors (Exterior)":

1) Panel Design: As indicated.

2) Panel Design: "2130-110".

9. NWWDA Design Group: "1-3/4 Entrance Doors (Exterior)":

a. Panel Design: As indicated.

b. Panel Design: "144-559" with 1/4" thick uncoated clear fully-tempered float glass for openings.

10. NWWDA Design Group: "French or Casement Doors":

a. Panel Design: As indicated.

b. Panel Design: 1510-625 with 1/4" thick uncoated clear fully-tempered float glass for openings.

11. NWWDA Design Group: "Sidelights".

a. Panel Design: As indicated.

b. Panel Design: 1510-625 with 1/4" thick uncoated clear fully-tempered float glass.

12. NWWDA Design Group: "1-3/4 Thermal (Insulated-Glass) Doors (Exterior)":

a. Panel Design: As indicated.

b. Panel Design: 1510-625 with uncoated insulating glass units composed of 1/8" thick uncoated clear fully-tempered float glass for both interior and exterior panes with 1/4" thick air space.

C. Interior Doors: Comply with the following requirements:

1. NWWDA Grade of Doors for Transparent Finish: Premium or select.

2. NWWDA Grade of Doors for Opaque Finish: Standard.

3. Wood Species for Transparent Finish: Manufacturer's standard softwood species and cut.

4. Wood Species for Transparent Finish: Idaho White, Lodgepole, Ponderosa or Sugar Pine, plain sawn/sliced.

5. Wood Species for Transparent Finish: Douglas Fir or Western Hemlock, vertical sawn/sliced.

6. Wood Species for Transparent Finish: Red oak, quarter sawn/sliced.

7. Wood Species for Opaque Finish: Manufacturer's standard softwood species and cut for stiles and rails; with panels of same species or wood base construction materials, as standard with manufacturer.

8. Panel Configuration: Raised.

   a. Raised Panel Thickness: Manufacturer's standard but not less than 7/16" required by referenced NWWDA standard for design group indicated.

   b. Raised Panel Thickness: As indicated.

9. Panel configuration: Flat.

   a. Flat Panel Thickness: Manufacturer's standard but not less than 1/4" required by referenced NWWDA standard for design group indicated.

   b. Flat Panel Thickness: As indicated.

10. Design and Layout: Panel design as described below under NWWDA design group, with minimum dimensions for stiles, rails, panels, and other elements complying with referenced NWWDA standard.

    a. NWWDA Design Group: "1-3/8 Interior Panel Doors".

       1) Panel Design: As indicated.

       2) Panel Design: 44-106.

    b. NWWDA Design Group: "French or Casement Doors".

1) Panel Design: As indicated.

2) Panel Design: 1510-625.

c. NWWDA Design Group: "Bifold Doors".

1) Panel Design: As indicated.

2) Panel Design: 1460-1108.

d. NWWDA Design Group: "Louver Doors".

1) Panel Design: As indicated.

2) Panel Design: 1202-730.

D. Interior Fire Doors: Fire-rated doors with 1-3/4" thick stiles and rails and 1-3/8" thick raised panels, complying with requirements indicated for interior doors of NWWDA Design Group "1-3/8 Interior Panel Doors".

2.3 PANEL WOOD DOORS OF SPECIAL DESIGN AND CONSTRUCTION:

A. AWI Quality Standard: Comply with "Architectural Woodwork Quality Standards" including Section 1400 "Stile and Rail Doors" of Architectural Woodwork Institute (AWI).

B. WIC Quality Standard: Comply with "Manual of Millwork" including Section 20 "Doors", Para. VII "Stile and Rail Doors - Special Design and Construction", of Woodwork Institute of California (WIC).

C. Exterior Doors: Comply with the following requirements:

1. Grade of Doors for Transparent Finish: Premium.

2. Grade of Doors for Opaque Finish: Custom.

3. Wood Species of Doors for Transparent Finish: Red oak, plain sawn/sliced.

4. Wood Species of Doors for Opaque Finish: Idaho White, Lodgepole, Ponderosa or Sugar Pine, plain sawn/sliced.

5. Stile, Rail and Mullion Dimensions: Comply with the following requirements:

a. Widths: As indicated.

b. Widths: As standard with the manufacturer but not less than the following:

1) Stiles and Intermediate Rails: 5-3/8".
2) Bottom Rails: 11-3/8".

c. Thickness: As indicated.
d. Thickness: 1-3/4".
e. Thickness: 1-3/8".

6. Raised Panel Characteristics: Comply with the following requirements:

a. Molding Profile: Manufacturer's standard.
b. Molding Profile: As indicated.

c. Panel Thickness: As indicated.
d. Panel Thickness: 1-3/4".
e. Panel Thickness: 1-3/8".
f. Panel Thickness: Manufacturer's standard but not less than 1-1/8".

g. Panel Design: As indicated.

7. Flat Panel Characteristics: Comply with the following requirements:

a. Molding Profile: Manufacturer's standard.
b. Molding Profile: As indicated.

c. Panel Thickness: As indicated.
d. Panel Thickness: 1/2".
e. Panel Thickness: Manufacturer's standard but not less than 3/8" for panels 3 sq. ft. or less, 1/2" for panels over 3 sq. ft.

f. Panel Design: As indicated.

g. Glass for Openings: 1/4" thick laminated safety glass.

D. Interior Doors: Comply with the following requirements:

1. Grade of Doors for Transparent Finish: Premium.

2. Grade of Doors for Opaque Finish: Custom.

3. Wood Species of Doors for Transparent Finish: Walnut, plain sawn/sliced.

4. Wood Species of Doors for Opaque Finish: Idaho White, Lodgepole, Ponderosa or Sugar Pine, plain sawn/sliced.

5. Stile, Rail and Mullion Dimensions: Comply with the following requirements:

a. Widths: As indicated.

b. Widths: As standard with the manufacturer but not less than the following:

1) Stiles and Intermediate Rails: 4-1/2".
2) Bottom Rails: 9".

c. Thickness: As indicated.
d. Thickness: 1-3/4".
e. Thickness: 1-3/8".

6. Raised Panel Characteristics: Comply with the following requirements:

a. Molding Profile: Manufacturer's standard.
b. Molding Profile: As indicated.

c. Panel Thickness: As indicated.
d. Panel Thickness: 1-3/4".
e. Panel Thickness: 1-3/8".
f. Panel Thickness: Manufacturer's standard but not less than 1-1/8".

g. Panel Design: As indicated.

7. Flat Panel Characteristics: Comply with the following requirements:

a. Molding Profile: Manufacturer's standard.
b. Molding Profile: As indicated.

c. Panel Thickness: As indicated.
d. Panel Thickness: 1/2".
e. Panel Thickness: Manufacturer's standard but not less than 3/8" for panels 3 sq. ft. or less, 1/2" for panels over 3 sq. ft.

f. Panel Design: As indicated.

E. Interior Fire Doors: Fire-rated doors with 1-3/4" thick stiles and rails and raised panels of thickness standard with manufacturer but not less than 1-3/8", complying with requirements indicated for interior doors with raised panels.

2.4 FABRICATION:

A. Fabricate panel wood doors to produce doors complying with following requirements:

1. In sizes indicated for job-site fitting.

2. Factory-prefit doors to fit frame opening sizes indicated with uniform clearances and bevels as indicated below:

   a. Fitting Clearances for Non-rated Doors: Provide 1/8" at jambs and heads; 1/16" per leaf at meeting stiles for pairs of doors; and 1/8" from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4" clearance from bottom of door to top of threshold.

   b. Fitting Clearances for Fire-rated Doors: Comply with NFPA 80.

   c. Bevel non-rated doors 1/8" in 2" at lock and hinge edges.

   d. Bevel fire-rated doors 1/8" in 2" at lock edge; trim stiles and rails only to extent permitted by labeling agency.

B. Factory-premachine panel wood doors for hardware; comply with final hardware schedule, door frame shop drawings and hardware templates.

C. Glazed Openings: Factory-preglaze doors for applications indicated. Comply with requirements of Division-8 section "Glass and Glazing".

D. Glazed Openings: Trim glazed openings with solid wood moldings of profile indicated, removable one side.

E. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish and quality of construction.

F. Exterior Doors: Factory-treat exterior doors after fabrication with water repellent to comply with NWWDA I.S.4. Flash top of outswinging doors with manufacturer's standard metal flashing.

2.5 SHOP PRIMING:

A. Doors for Field-Applied Opaque Finish: Shop prime faces and edges of doors with one coat of wood primer specified in Division-9 section "Painting".

B. Doors for Field-Applied Transparent Finish: Shop seal faces and edges of doors with stain (if required) and other pretreatments and first coat of finish specified in the following:

a. Division-9 section "Painting".

b. Division-9 section "Exterior Wood Stains".

2.6 FACTORY FINISHING:

A. Quality Standard: Comply with "Architectural Woodwork Quality Standards" including Section 1500 "Factory Finishing" of Architectural Woodwork Institute (AWI).

B. Prefinish panel wood doors at factory.

C. Prefinish panel wood doors at factory where indicated on schedules or drawings as "prefinished".

D. Transparent Finish: Comply with requirements indicated for grade, finish system, staining effect and sheen:

1. AWI Grade: Premium.

2. AWI Grade: Custom.

3. Finish: Manufacturer's standard finish with performance requirements comparable to either AWI System #2 catalyzed lacquer or AWI System #3 alkyd urea conversion varnish.

4. Finish: AWI System #2 catalyzed lacquer.
5. Finish: AWI System #3 alkyd-urea conversion varnish.
6. Finish: AWI System #2 catalyzed lacquer or #3 alkyd-urea conversion varnish as standard with manufacturer.
7. Staining: None required.
8. Staining: Match approved sample for color.
9. Staining: Match Architect's sample.

10. Effect: Open grain finish.
11. Effect: Filled finish.

12. Sheen: Satin-medium rubbed effect.
13. Sheen: Semi-gloss.

E. Opaque Finish: Comply with requirements indicated for grade, finish system, color and sheen.

1. AWI Grade: Premium.

2. AWI Grade: Custom.

3. Finish: Manufacturer's standard finish with performance requirements comparable to AWI System #7 catalyzed lacquer.

4. Finish: AWI System #7 catalyzed lacquer.
5. Finish: AWI System #7 standard lacquer.
6. Finish: AWI System #8 synthetic enamel.

7. Color: Match approved sample for color selected by Architect from manufacturer's standard colors.

8. Color: Match Architect's sample.

9. Sheen: Semi-gloss.
10. Sheen: Gloss.
11. Sheen: Full gloss.

PART 3 EXECUTION

3.1 EXAMINATION:

A. Examine installed door frames prior to hanging doors:

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.

2. Reject doors with defects.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

A. Hardware: For installation see Division-8 "Builder's Hardware" section of these specifications.

B. Manufacturer's Instructions: Install panel wood doors to comply with manufacturer's instructions, applicable requirements of referenced quality standard, and as indicated.

1. Install fire-rated doors to comply with NFPA 80.

C. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1. Fitting Clearances for Non-rated Doors: Provide 1/8" at jambs and heads; 1/16" per leaf at meeting stiles for pairs of doors; and 1/8" from bottom of door to

top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4" clearance from bottom of door to top of threshold.

2. Fitting Clearances for Fire-rated Doors: Comply with NFPA 80.

3. Bevel non-rated doors 1/8" in 2" at lock and hinge edges.

4. Bevel fire-rated doors 1/8" in 2" at lock edge.

D. Prefit Doors: Fit to frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at job site.

F. Field-Finished Doors: Refer to the following for finishing requirements:

1. Division-9 section "Painting".

2. Division-9 section "Exterior Wood Stains".

3.3 ADJUSTING AND PROTECTION:

A. Operation: Rehang or replace doors which do not swing or operate freely.

B. Finish Doors: Refinish or replace doors damaged during installation.

C. Protect doors as recommended by door manufacturer to ensure that doors are without damage at time of Substantial Completion.

END OF SECTION 08212

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following prime-coated wood window types:

B. This Section includes the following aluminum-clad wood window types:

C. This Section includes the following vinyl-clad wood window types:

1. Awning Window Units.
2. Casement Window Units.
3. Double-Hung Window Units.
4. Horizontal Sliding Window Units.
5. Nonoperative (Fixed) Window Units.
6. Decorative Window Units.
7. Bow Windows.
8. Bay Windows.

D. Related Sections: The following sections contain requirements that relate to this section:

1. Interior and exterior wood trim that is not included as part of the wood window units is specified in Division 6 Section "Finish Carpentry."
2. Joint sealing between wood windows and adjacent materials is specified in Division 7 Section "Joint Sealers."
3. Glazing requirements for wood windows, including those specified to be factory glazed, are specified

in Division 8 Section "Glass and Glazing."

4. Field painting factory prime-coated wood windows is specified in Division 9 Section "Painting."

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Standards: Performance requirements for structural performance, air infiltration, and water penetration for wood windows are those specified in NWWDA I.S. 2 "Industry Standard for Wood Window Units."

1. Provide wood window units bearing the NWWDA "Hallmark Program" label certifying compliance with requirements of NWWDA I.S. 2 for the performance grade indicated.

B. Testing: Manufacturer's stock units of each grade of required wood window shall have been tested by a recognized testing laboratory or agency in accordance with ASTM E 283 for air infiltration, ASTM E 547 for water penetration, and ASTM E 330 for structural performance. Test samples shall comply with requirements in NWWDA I.S. 2 for test sample sizes and methods.

C. Performance Requirements (Grade 20 Windows): Each required window unit shall comply with the following performance requirements:

1. Air Infiltration: Not more than 0.34 cfm per sq. ft. of overall frame area at an inward test pressure of 1.57 lbf per sq. ft.

2. Water Penetration: No water penetration as defined in the test method at an inward test pressure of 2.86 lbf per sq. ft.

3. Structural Performance: No glass breakage, damage to hardware, permanent deformation that would impair operation of the unit, or residual deflection greater than 0.4 percent of the span at a positive (inward) and negative (outward) test pressure of 20 lbf per sq. ft.

D. Performance Requirements (Grade 40 Windows): Each required window unit shall comply with the following performance requirements:

1. Air Infiltration: Not more than 0.25 cfm per sq. ft. of overall frame area at an inward test pressure of 1.57 lbf per sq. ft.

2. Water Penetration: No water penetration as defined in the test method at an inward test pressure of 4.43 lbf per sq. ft.

3. Structural Performance: No glass breakage, damage to hardware, permanent deformation that would impair operation of the unit, or residual deflection greater than 0.4 percent of the span at a positive (inward) and negative (outward) test pressure of 40 lbf per sq. ft.

E. Performance Requirements (Grade 60 Windows): Each required window unit shall comply with the following performance requirements:

1. Air Infiltration: Not more than 0.10 cfm per sq. ft. of overall frame area at an inward test pressure of 1.57 lbf per sq. ft.

2. Water Penetration: No water penetration as defined in the test method at an inward test pressure of 6.24 lbf per sq. ft.

3. Structural Performance: No glass breakage, damage to hardware, permanent deformation that would impair operation of the unit, or residual deflection greater than 0.4 percent of the span at a positive (inward) and negative (outward) test pressure of 60 lbf per sq. ft.

4. Forced Entry Resistance: Provide window units that comply with requirements for Performance Level 10 when tested in accordance with ASTM F 588.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections:

1. Product data for each type of wood window required, including:

a. Standard construction details and fabrication methods.

b. Profiles and dimensions of individual components.

c. Data on hardware, accessories, and finishes.
d. Recommendations for maintenance and cleaning exterior surfaces.

2. Shop drawings for each type of window specified.

   a. Layout and installation details, including anchors.

   b. Typical window unit elevations at 3/4-inch scale.

   c. Full-size details of typical and composite members.

   d. Hardware, including operators.

   e. Glazing details.

   f. Accessories.

3. Samples for Initial Color Selection: Submit samples of each required finish on 12-inch-long sections of window members. Where finishes involve normal color variations, include sample sets showing the full range of expected variations.

4. Samples for Verification Purposes: The Architect reserves the right to require additional samples that show fabrication techniques and workmanship and design of hardware and accessories.

5. Certification: Provide certification by a recognized independent testing laboratory or agency certifying that each required type and grade of window complies with performance requirements indicated.

6. Material Test Reports: Engage a recognized independent testing laboratory or agency to perform tests specified. Provide certified test results showing that each required type and grade of window complies with performance requirements indicated.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms whose windows have been certified under the NWWDA "Hallmark Program" for wood window units are listed in the current NWWDA "Membership and Product Directory" and comply with requirements indicated.

   1. Provide only wood window units bearing a NWWDA "Hallmark Program" label certifying compliance with requirements of NWWDA I.S. 2.

B. Wood Window Standard: Comply with NWWDA I.S. 2 for

standards of performance and fabrication workmanship for wood windows.

C. Safety Glass Standard: Provide the type of products indicated that comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.

1. Provide safety glass permanently marked with the certification label of the Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.

D. Glazing Standards: Comply with recommendations of the Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated.

E. Insulating Glass Certification Program: Provide insulating glass units permanently marked with the appropriate certification label of the either the Insulating Glass Certification Council (IGCC) or the Associated Laboratories, Inc. (ALI). Provide the certification label either on spacers or at least one component pane of each unit.

F. Single Source Responsibility: Provide windows produced by a single fabricator who is capable of indicating prior successful production of units similar to those required.

G. Design Concept: The drawings indicate window sizes, profiles, and dimensional requirements and are based on the specific types and models indicated. Window units by other manufacturers having equal performance characteristics may be considered, provided deviations from indicated dimensions and profiles are minor and do not change the design concept or intended performance as judged by the Architect. The burden of proof for equality is on the proposer.

1.6 PROJECT CONDITIONS

A. Field Measurements: Check actual window openings by accurate field measurement before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

1. Where necessary, proceed with fabrication without measurements, and coordinate tolerances to ensure proper fit of window units.

1.7 WARRANTY

A. Wood Window Warranty: Submit a written warranty, executed by the window manufacturer, agreeing to repair or replace units that fail in materials or workmanship within the specified warranty period. Failures include, but are not necessarily limited to:

1. Structural failures, including excessive deflection, excessive leakage, or air infiltration.

2. Faulty operation of window sash or hardware.

3. Deterioration of metals, finishes, and other materials beyond normal weathering.

B. Warranty Period: 3 years after the date of Substantial Completion.

C. The warranty shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering window units that may be incorporated in the Work include, but are not limited to, the following:

B. Manufacturer: Subject to compliance with requirements, provide window units by one of the following:

1. Prime-Coated Wood Window Units:

a. BiltBest Window Co.
b. Caradco Window Corp.
c. Hurd Millwork Co.
d. Malta Division Philips Industries, Inc.
e. Marvin Windows.
f. Norco Windows, Inc.
g. Pozzi Wood Windows.
h. Rolscreen Co. (Pella).
i. Weather Shield Mfg., Inc.

2. Aluminum-Clad Wood Window Units:

a. BiltBest Window Co.
b. Caradco Window Corp.
c. Hurd Millwork Co.
d. Marvin Windows.
e. Norco Windows, Inc.
f. Pozzi Wood Windows.
g. Rolscreen Co. (Pella).
h. Weather Shield Mfg., Inc.

3. Vinyl-Clad Wood Window Units:

a. Andersen Corp.
b. Malta Division, Phillips Industries, Inc.
c. Weather Shield Mfg., Inc.

2.2 MATERIALS

A. General: Comply with requirements of NWWDA I.S. 2.

B. Wood: Clear Ponderosa Pine or other suitable fine-grain lumber that has been kiln dried to a moisture content of 6 to 12 percent at time of fabrication and is free of visible finger joints, blue stain, knots, pitch pockets and surface checks larger than 1/32 inch wide by 2 inches long.

1. Lumber shall be water-repellent preservative treated after machining in accordance with NWWDA I.S. 4.

C. Aluminum Cladding: Manufacturer's standard aluminum formed sheet or extruded cladding mechanically bonded to exterior wood sash and frame members.

1. Trim members: Aluminum-clad wood trim.

2. Trim members: Hollow aluminum extrusions for trim.

3. Trim members: Roll-formed aluminum trim.

4. Trim members: Provide either aluminum-clad wood, hollow aluminum extrusions, or roll-formed aluminum trim members.

5. Finish: Factory-applied, baked-on enamel finish.

a. Color: White.

b. Color: Bronze.

c. Color: Brown.

d. Color: Custom color as selected by the

Architect from the manufacturer's standard color range.

D. Vinyl Cladding: Manufacturer's bonded vinyl cladding on exterior exposure of wood members, consisting of a rigid polyvinyl chloride sheath, complying with ASTM D 1784, Class 14344-C, not less than 35-mil average thickness, in permanent white paintable finish.

1. Trim Members: Vinyl-clad wood trim.

2. Trim Members: Hollow vinyl extrusions.

3. Trim Members: Vinyl-clad wood trim or hollow vinyl extrusions.

E. Anchors, Clips, and Accessories: Fabricate anchors, clips and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with the requirements of ASTM B 633 for SC 3 (severe) service condition; provide strength sufficient to withstand design pressure indicated.

F. Fasteners: Comply with NWWDA I.S.2 for fabrication and with manufacturer's recommendations and standard industry practices for type and size of installation fasteners.

1. Use zinc-coated or nonferrous nails and screws for window fabrication and installation.

2. Use brass screws for hardware and accessory installation.

G. Hardware: Manufacturer's standard hardware, necessary to operate, tightly close, and securely lock windows. Do not use aluminum in frictional contact with other metals.

1. Provide solid white-metal hardware with a special coating finish with plated steel or brass/bronze operating bars and rods.

2. Provide solid bronze hardware, with plated steel or brass/bronze operating bars and rods.

H. Sill Cap (Track) for Sliding Units: Provide extruded aluminum track of profile indicated with natural anodized finish.

I. Sill Cap (Track) for Sliding Units: Provide rigid polyvinyl chloride, or other weather-resistant plastic track, as recommended by manufacturer.

J. Compression Weatherstripping: Provide compressible

weatherstripping, designed for permanently resilient sealing under bumper or wiper action, completely concealed when sash is closed.

1. Weatherstripping material: Nonferrous spring metal.

2. Weatherstripping material: Molded PVC gaskets complying with ASTM D 2287.

3. Weatherstripping material: Molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

K. Sliding Weatherstripping: Provide woven pile weatherstripping of polypropylene, wool, or nylon pile, with resin-impregnated backing fabric; comply with AAMA 701.2.

1. Provide weatherstripping with integral, center-line barrier fin of semirigid plastic polypropylene sheet.

L. Insect Screens: Provide removable insect screen panel for each movable glazed sash. Comply with requirements of SMA 2005.

1. Screen Fabric: 18 by 14 or 18 by 16 mesh of plastic-coated glass fiber threads, woven and fused to form a screen which is resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration; black or dark grey. Comply with requirements of FS L-S-125.

2. Screen Fabric: 18 by 14 or 18 by 16 mesh of 0.013-inch-diameter aluminum wire; comply with FS RR-W-365, Type VII; except black anodized or "gun metal" coating on wire.

3. Insect Screens Frames: Provide formed or extruded aluminum frames and removable vinyl fabric-retainer spline. Comply with requirements of SMA 1004.

a. Finish: Anodized to match window members.

b. Finish: Anodized aluminum or baked-on organic coating in manufacturer's standard color.

c. Finish: Anodized aluminum or baked-on organic coating in color selected by Architect from manufacturer's standards.

M. Glass and Glazing Materials: Refer to "Glass and Glazing" section for glass and glazing requirements applicable to wood window units.

N. Glass and Glazing Materials: Provide the manufacturer's standard clear, sealed, insulating safety glazing material that complies with ANSI Z97.1 and the "Glass and Glazing" Section.

1. Dual-Glazing System for Venetian Blinds: Provide manufacturer's standard dual-glazing system with 2 lites of clear float glass, complying with ASTM C 1036, Type I, Quality q3, glazed independently into the sash and separated by a minimum dead air space of 1-1/2 inches.

2. Triple-Glazing System for Venetian Blinds: Provide manufacturer's standard insulated glass of the type specified above, combined with an auxiliary lite of clear float glass complying with ASTM C 1036, Type I, Quality q3, retained in a separate glazing channel or frame and separated from the insulated glass panel by a minimum dead air space of 1-1/2 inches.

O. Glazing Seal: Provide the manufacturer's standard extruded vinyl or butyl glazing gasket providing weather weathertight seal.

2.3 AWNING WINDOWS

A. Window Grade: Comply with the requirements of NWWDA Performance Grade 20.

B. Hardware: Provide awning window units with the following equipment and operating hardware:

1. Operating Device: Gear-type rotary operator located on the jamb at the sill.

2. Operating Device: Push-bar-type operator located on the jamb at the sill.

3. Operating Device: Lever-type operator located on the jamb at the sill.

4. Hinges: Concealed friction hinge (2 per ventilator) located on each jamb near the top rail.

5. Limit Device: Manufacturer's standard limit device (2 per ventilator) located on each jamb.

6. Cam latch or other latching hardware with lever handle or pull.

a. Provide latch with eye for pole operation for operable sash located more than 6 feet above the

floor.

2.4 CASEMENT WINDOWS

A. Window Grade: Comply with the requirements of NWWDA Performance Grade 60.

B. Hardware: Provide casement window units with the following equipment and operating hardware:

1. Operating Device: Gear-type rotary operator located on the jamb at the sill.

2. Operating Device: Combination lever handle and cam-type latch.

3. Hinges: Concealed four-bar friction hinges with adjustable slide shoe (2 per ventilator).

4. Hinges: Heavy duty 2-knuckle butt hinges (2 per ventilator).

a. Provide ventilator operation that provides access for cleaning.

5. Lock: Lift-type cam action lock.

6. Limit Device: Stay bar with an adjustable hold-open device.

2.5 DOUBLE-HUNG WINDOWS

A. Window Grade: Comply with the requirements of NWWDA Performance Grade 40.

1. Provide window units that have "tilt-in" feature permitting both sides of the sash to be cleaned from the interior.

B. Hardware: Provide the following equipment and operating hardware:

1. Sash Balances: Manufacturer's standard concealed, counterbalancing mechanism-type sash balances (2 per sash).

2. Lock: Cam action sweep lock and keeper on the meeting rail.

3. Lock: Spring-loaded plunger lock on meeting rail of lower sash (2 per sash).

4. Lock: Pole-operated, cam action locking device on meeting rail of windows with meeting rail more than 6 feet above the floor.

5. Lift Handle: Applied sash lifts on bottom rail of lower sash (2 per sash).

6. Pull-down Handles: Applied handles on bottom rail of upper sash (2 per sash).

7. Pole Socket: Provide a pole socket or groove on the inside face of top rail of the upper sash on window units with meeting rails more than 6 feet above the floor.

2.6 HORIZONTAL SLIDING WINDOWS

A. Window Grade: Comply with the requirements of NWWDA Performance Grade 40.

B. Horizontal Sliding Windows: Provide units containing one or more horizontal sliding sash with the following equipment and hardware:

1. Upper and lower track and glider mechanism designed for removal of sliding sash without tools from inside.

2. Sash pull and latch for each sliding sash.

2.7 FIXED WINDOWS

A. Window Grade: Comply with the requirements of NWWDA Performance Grade 60.

2.8 ACCESSORIES

A. Grilles (False Muntins): Provide grilles in designs shown, for removable application to inside of each sash light.

1. Material: Extruded rigid polyvinyl chloride.

2. Material: Prefinished wood.

3. Design: Rectangular.

4. Design: Diamond.

5. Color: White.

6. Color: Bronze.

B. Storm Panels: Provide removable auxiliary glazing panels of clear float glass for each fixed and operating sash of window units. Glass shall comply with ASTM C 1036, Type I, Quality q3. Frame, preglaze, and attach storm windows to the sash in accordance with the fabricator's published standards.

1. Omit storm window panels on sash glazed with insulating glass.

C. Pole Operator: Provide one pole operator and pole hanger for each room where pole-operated hardware is provided on window sash more than 6 feet above floor. Provide a tubular anodized aluminum pole of proper length, with push-pull hook at top and rubber cap at bottom.

D. Insect Screens: Provide insect screens for each operable exterior sash or ventilator. Locate screens on the inside or outside of the window sash or ventilator, depending upon window type. Design windows and hardware to accommodate screens in a tight-fitting removable arrangement, with a minimum of exposed fasteners and latches.

1. Wickets: Provide either sliding or hinged wickets, framed and trimmed for a tight fit and durability during handling.

2. Screen Frames: Fabricate frames of tubular-shaped extruded or formed aluminum members of 0.040-inch minimum wall thickness, with mitered or coped joints and concealed mechanical fasteners. Provide removable PVC spline/anchor concealing the edge of the screen frame. Comply with requirements of SMA 1004.

a. Finish: Anodize frames to match window members.

b. Finish: Anodized aluminum or baked on organic coating in the manufacturer's standard color.

c. Finish: Anodized aluminum or baked-on organic coating in color selected by the Architect from manufacturer's standards.

E. Integral Venetian Blinds: Provide remotely operated horizontal venetian blinds in the space between two panes of glass. Construct blinds of aluminum slats, approximately 1 inch wide, with polyester fiber cords, equipped for tilting, raising and lowering by standard operating hardware located on the inside face of the sash.

2.9 FABRICATION

A. General: Provide the manufacturer's standard fabrication of units. Comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.

1. Comply with requirements of referenced standards for moisture content of lumber at time of fabrication and for relative humidity conditions in the installation areas.

B. Fabricate windows to produce units that are reglazable without dismantling sash framing. Provide openings and mortises precut, where possible, to receive hardware and other items.

C. Each window unit includes sash, frame, stops, sill (including undersill or nosing), exterior casing and moldings, integral mullions and muntins, hardware, and accessories.

1. Provide weatherstripping at perimeter of each operating sash.

a. For double/single-hung sash, provide weatherstripping only at horizontal rails of operable sash.

2. Provide removable insect screen for each operating sash, with location determined by manufacturer.

3. Provide glazing stops, nailed or snap-on type, coordinated with glass selection and glazing system indicated.

4. Preglazed Window Units: Except for light sizes in excess of 100 united inches, preglaze window units at the shop before delivery, unless preglazing is not available from the fabricator.

a. Groove Glazing: Preglazed units without removable stops or other provision permitting convenient field disassembly to facilitate replacement of broken glass will not be accepted.

5. Bay and Bow Wood Window Units: Provide units containing fixed and operating sash in bay or bow window configuration indicated. Provide window frames, sash, operating hardware and other trim and components necessary for a complete, secure and

weathertight installation, including the following:

a. Angled mullion posts with interior and exterior trim.

b. Angled interior and exterior extension and trim.

c. Clear pine head and seat boards.

d. Top and bottom plywood platforms.

e. Exterior head and sill casings and trim.

f. Support brackets.

D. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to the project site, to the maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

2.10 FINISHES

A. Wood Finish: Provide the following finish on exposed wood in units:

1. Shop-Primed Units: Provide the fabricator's standard shop prime coat on exterior wood surfaces only.

2. Shop-Finished Units: Provide fabricator's standard shop finish, consisting of prime coat and 2 finish coats, 3-mils dry film thickness, applied to both exterior and interior wood surfaces.

a. Color: White.

b. Color: Brown.

c. Color: Grey.

d. Color: As selected by the Architect from the manufacturer's standard.

PART 3 EXECUTION

3.1 INSPECTION

A. Inspect openings before beginning installation. Verify

that the opening is correct and the sill plate is level. Do not proceed with installation of window units until unsatisfactory conditions have been corrected.

1. Masonry surfaces shall be visibly dry, and free of excess mortar, sand, and other construction debris.

2. Wood frame walls shall be dry, clean, sound and well-nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in the opening and within 3 inches of the corner.

3. Coordinate window installation with wall flashings and other built-in components.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation of window units, hardware, operators, accessories, and other window components.

B. Set units plumb, level, true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.

C. Set sill members in a bed of compound or with joint fillers or gaskets as indicated, to provide weathertight construction.

3.3 ADJUSTING

A. Adjust operating sash and hardware to provide a tight fit at contact points and weatherstripping, and to provide smooth operation and a weathertight closure. Lubricate hardware and moving parts.

3.4 CLEANING

A. Clean interior and exterior surfaces promptly after installation. Take care to avoid damage to protective coatings and finishes. Remove excess glazing and sealants, dirt, and other substances.

B. Clean glass of preglazed window units promptly after installation. Wash and polish glass on both faces before Substantial Completion. Comply with manufacturer's recommendations for final cleaning and maintenance. Remove nonpermanent labels from glass surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded or damaged during the construction period.

3.5 PROTECTION

A. Protect window units from damage or deterioration until time of substantial completion.

END OF SECTION 08610

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

B. This Section includes the following:

1. Hinges.
2. Pivots.
3. Spring hinges.
4. Key control system.
5. Lock cylinders and keys.
6. Lock and latch sets.
7. Bolts.
8. Exit devices.
9. Push/pull units.
10. Closers.
11. Overhead holders.
12. Miscellaneous door control devices.
13. Door trim units.
14. Protection plates.
15. Sliding door equipment.

16. Bifold door hardware.

17. Weatherstripping for exterior doors.

18. Sound stripping for interior doors.

19. Automatic drop seals (door bottoms).

20. Astragals or meeting seals on pairs of doors.

21. Thresholds.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 6 Section "Interior Architectural Woodwork" for cabinet hardware.

2. Division 8 Section "Standard Steel Doors and Frames" for silencers integral with hollow metal frames.

3. Division 8 Section "Custom Steel Doors and Frames" for silencers integral with hollow metal frames.

4. Division 8 Section "Flush Wood Doors" for factory prefitting and factory premachining of doors for door hardware.

5. Division 8 Section "Panel Wood Doors" for factory prefitting and factory premachining of doors for hardware.

6. Division 8 Section "Aluminum Entrances and Storefronts" for aluminum entrance door hardware, except cylinders.

7. Division 8 Section "All-Glass Entrances" for entrance door hardware, except cylinders.

8. Division 8 Section "Power Door Operators" for automatic door operators.

D. Products furnished but not installed under this Section include:

1. Cylinders for locks on entrance doors.

2. Final replacement cores and keys to be installed by Owner.

1.3 HARDWARE ALLOWANCE

A. Selection and Ordering: Furnish door hardware as selected by Architect and in such quantities as provided for under Division 1 Section "Allowances" and other general provisions of the Contract.

B. Door hardware supplier's responsibilities shall be as follows:

1. Submittals: Submit through Contractor required product data, final hardware schedule, separate keying schedule, and samples as specified in this Section, unless otherwise indicated.

2. Construction Schedule: Inform Contractor promptly of estimated times and dates that will be required to process submittals, to furnish templates, to deliver hardware, and to perform other work associated with furnishing door hardware for purposes of including this data in construction schedule. Comply with this schedule.

3. Coordination and Templates: Assist Contractor as required to coordinate hardware with other work in respect to both fabrication and installation. Furnish Contractor with templates and deliver hardware to proper locations.

4. Product Handling: Package, identify, deliver, and inventory door hardware specified in this Section.

5. Discrepancies: Based on requirements indicated in Contract Documents in effect at time of door hardware selection, furnish types, finishes, and quantities of door hardware, including fasteners, and Owner's maintenance tools required to comply with specified requirements and as needed to install and maintain hardware. Furnish or replace any items of door hardware resulting from shortages and incorrect items at no cost to the Owner or Contractor. Obtain signed receipts from Contractor for all delivered materials.

C. Contractor's responsibilities shall be as follows:

1. Submittals: Coordinate and process submittals for door hardware in same manner as submittals for other work.

2. Construction Schedule: Cooperate with door hardware supplier in establishing scheduled dates for submittals and delivery of templates and door hardware. Incorporate in construction schedule the times and dates related to furnishing hardware by door hardware supplier.

3. Coordination: Coordinate door hardware with other Work. Furnish hardware supplier or manufacturer with shop drawings of other work where required or requested. Verify completeness and suitability of hardware with supplier.

4. Product Handling: Provide secure lock-up for hardware delivered to the site. Inventory hardware jointly with representative of hardware supplier and issue signed receipts for all delivered materials.

5. Installation Information: The general types and approximate quantities of hardware required for this Project are indicated at the end of this Section in order to establish Contractor's costs for installation and other work not included in allowance.

6. No adjustments in Contract sum will be made for costs other than those covered by the allowances for subsequent increases or decreases in quantity of one or more hardware types that do not exceed 5 percent.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.

B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:

a. Type, style, function, size, and finish of each hardware item.

b. Name and manufacturer of each item.

c. Fastenings and other pertinent information.

d. Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule.

e. Explanation of all abbreviations, symbols, and codes contained in schedule.

f. Mounting locations for hardware.

g. Door and frame sizes and materials.

h. Keying information.

2. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.

3. Submittal Sequence: Submit initial draft of final schedule along with essential product data in order to facilitate the fabrication of other work that is critical in the Project construction schedule. Submit final schedule after samples, product data, coordination with shop drawings of other work, delivery schedules, and similar information has been completed and accepted.

4. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

D. Samples of each type of exposed hardware unit in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule.

1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.

E. Templates for doors, frames, and other work specified to be factory prepared for the installation of 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.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.

1. Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.

C. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels.

1.6 PRODUCT HANDLING

A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).

E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and

installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.7 MAINTENANCE

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 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. Butts and Hinges:

   a. Bommer Industries, Inc.
   b. Cal-Royal Products, Inc.
   c. Hager Hinge Co.
   d. Lawrence Brothers, Inc.
   e. McKinney Products Co.
   f. H. Soss & Company.
   g. Stanley Hardware, Div. Stanley Works.

2. Pivots:

   a. Glynn-Johnson Corp.
   b. Hager Hinge Co.
   c. LCN, Div. Ingersoll-Rand Door Hardware Group.
   d. Norton Door Controls, Div. Yale Security Inc.
   e. Rixson-Firemark, Div. Yale Security Inc.
   f. Stanley Hardware, Div. Stanley Works.

3. Key Control System:

   a. Key Control Systems, Inc.
   b. Telkee Inc.

4. Cylinders and Locks:

a. Arrow Lock Manufacturing Co.
b. Best Lock Corp.
c. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.
d. Falcon Lock Co.
e. Sargent Manufacturing Company.
f. Schlage Lock, Div. Ingersoll-Rand Door Hardware Group.
g. Yale Security Inc.

5. Bolts:

a. Builders Brass Works Corp.
b. Glynn-Johnson Corp.
c. Hager Hinge Co.
d. H. B. Ives, A Harrow Company.
e. Quality Hardware Mfg. Co., Inc.; Div. Newman Tonks, Inc.
f. Stanley Hardware, Div. Stanley Works.

6. Exit/Panic Devices:

a. Adams Rite Manufacturing Co.
b. Arrow Lock Manufacturing Co.
c. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.
d. Dor-O-Matic.
e. Monarch Hardware & Mfg. Co., Div Newman Tonks, Inc.
f. Precision Hardware, Inc.
g. Reed Exit Hardware, Div. Yale Security Inc.
h. Sargent Manufacturing Company.
i. Von Duprin, Div. Ingersoll-Rand Door Hardware Group.
j. Yale Security Inc.

7. Push/Pull Units:

a. Baldwin Hardware Corp.
b. Brookline Industries, Div. Yale Security Inc.
c. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.
d. Hager Hinge Co.
e. Hiawatha, Inc.
f. H. B. Ives, A Harrow Company.
g. Triangle Brass Manufacturing Company (Trimco).

8. Overhead Closers:

a. Arrow Lock Manufacturing Co.
b. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.
c. Dorma Door Controls International.

d. International Door Closers, Inc.
e. LCN, Div. Ingersoll-Rand Door Hardware Group.
f. Monarch Hardware & Mfg. Co., Div Newman Tonks, Inc.
g. Norton Door Controls, Div. Yale Security Inc.
h. Rixson-Firemark, Div. Yale Security Inc.
i. Sargent Manufacturing Company.
j. Yale Security Inc.

9. Smoke-Activated Closers:

a. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.
b. Dor-O-Matic.
c. Dorma Door Controls International.
d. Norton Door Controls, Div. Yale Security Inc.
e. Rixson-Firemark, Div. Yale Security Inc.
f. Yale Security Inc.

10. Floor Closers:

a. Dor-O-Matic.
b. Dorma Door Controls International.
c. Rixson-Firemark, Div. Yale Security Inc.

11. Door Control Devices:

a. Baldwin Hardware Corp.
b. Brookline Industries, Div. Yale Security Inc.
c. Builders Brass Works Corp.
d. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.
e. Glynn-Johnson Corp.
f. Hager Hinge Co.
g. H. B. Ives, A Harrow Company.
h. Quality Hardware Mfg. Co., Inc.; Div. Newman Tonks, Inc.
i. Triangle Brass Manufacturing Company (Trimco).

12. Door Trim Units:

a. Baldwin Hardware Corp.
b. Brookline Industries, Div. Yale Security Inc.
c. Builders Brass Works Corp.
d. Hager Hinge Co.
e. H. B. Ives, A Harrow Company.
f. Triangle Brass Manufacturing Company (Trimco).

13. Kick, Mop, and Armor Plates:

a. Baldwin Hardware Corp.
b. Brookline Industries, Div. Yale Security Inc.
c. Corbin & Russwin Architectural Hardware, Div.

Black & Decker Corp.

d. Hager Hinge Co.
e. Hiawatha, Inc.
f. H. B. Ives, A Harrow Company.
g. Triangle Brass Manufacturing Company (Trimco).

14. Sliding Door Hardware Sets:

a. Grant Hardware Co.
b. P. C. Henderson Inc.
c. L. E. Johnson Products, Inc.
d. Stanley Hardware, Div. Stanley Works.

15. Sliding Pocket Door Sets:

a. Grant Hardware Co.
b. P. C. Henderson Inc.
c. L. E. Johnson Products, Inc.
d. Stanley Hardware, Div. Stanley Works.

16. Bifold Door Hardware:

a. Grant Hardware Co.
b. P. C. Henderson Inc.
c. L. E. Johnson Products, Inc.
d. Stanley Hardware, Div. Stanley Works.

17. Door Stripping and Seals:

a. Hager Hinge Co.
b. National Guard Products, Inc.
c. Pemko Manufacturing Co., Inc.
d. Reese Enterprises, Inc.
e. Sealeze Corp.
f. Ultra Industries.
g. Zero International, Inc.

18. Thresholds:

a. Hager Hinge Co.
b. National Guard Products, Inc.
c. Pemko Manufacturing Co., Inc.
d. Reese Enterprises, Inc.
e. Sealeze Corp.
f. Zero International, Inc.

19. Automatic Drop Seals:

a. Hager Hinge Co.
b. National Guard Products, Inc.
c. Pemko Manufacturing Co., Inc.
d. Reese Enterprises, Inc.
e. Zero International, Inc.

20. Sound Stripping:

    a. National Guard Products, Inc.
    b. Pemko Manufacturing Co., Inc.
    c. Reese Enterprises, Inc.
    d. Zero International, Inc.

21. Astragals:

    a. Hager Hinge Co.
    b. National Guard Products, Inc.
    c. Pemko Manufacturing Co., Inc.
    d. Reese Enterprises, Inc.
    e. Zero International, Inc.

2.2 SCHEDULED HARDWARE

A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated in the "Hardware Schedule" at the end of this Section. Products are identified by using hardware designation numbers of the following:

1. Manufacturer's Product Designations: The product designation and name of one manufacturer are listed for each hardware type required for the purpose of establishing minimum requirements. Provide either the product designated or, where more than one manufacturer is specified under the Article "Manufacturers" in Part 2 for each hardware type, the comparable product of one of the other manufacturers that complies with requirements.

2. ANSI/BHMA designations used elsewhere in this Section or in schedules to describe hardware items or to define quality or function are derived from the following standards. Provide products complying with these standards and requirements specified elsewhere in this Section.

    a. Butts and Hinges: ANSI/BHMA A156.1.

    b. Bored and Preassembled Locks and Latches: ANSI/BHMA A156.2.

    c. Exit Devices: ANSI/BHMA A156.3.

    d. Door Controls - Closers: ANSI/BHMA A156.4.

    e. Auxiliary Locks and Associated Products: ANSI/BHMA A156.5.

f. Architectural Door Trim: ANSI/BHMA A156.6.

g. Template Hinge Dimensions: ANSI/BHMA A156.7.

h. Door Controls - Overhead Holders: ANSI/BHMA A156.8.

i. Interconnected Locks and Latches: ANSI/BHMA A156.12.

j. Mortise Locks and Latches: ANSI/BHMA A156.13.

k. Sliding and Folding Door Hardware: ANSI/BHMA A156.14.

l. Closer Holder Release Devices: ANSI/BHMA A156.15.

m. Auxiliary Hardware: ANSI/BHMA A156.16.

n. Self-Closing Hinges and Pivots: ANSI/BHMA A156.17.

o. Materials and Finishes: ANSI/BHMA A156.18.

2.3 MATERIALS AND FABRICATION

A. Manufacturer's Name Plate: Do not use 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 acceptable to Architect.

1. Manufacturer's identification will be permitted on rim of lock cylinders only.

B. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

C. Base Metals: Produce hardware units of basic metal and forming method indicated using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units for finish

designations indicated.

D. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.

E. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.

F. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

2.4 HINGES, BUTTS, AND PIVOTS

A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

B. Screws: Provide Phillips flat-head screws complying with the following requirements:

1. For metal doors and frames install machine screws into drilled and tapped holes.

2. For wood doors and frames install wood screws.

3. For fire-rated wood doors install #12 x 1-1/4-inch, threaded-to-the-head steel wood screws.

4. Finish screw heads to match surface of hinges or pivots.

C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

1. Out-Swing Exterior Doors: Nonremovable pins.

2. Out-Swing Corridor Doors with Locks: Nonremovable pins.

3. Interior Doors: Nonrising pins.

4. Tips: Flat button and matching plug, finished to match leaves, except where hospital tip (HT) indicated.

D. Number of Hinges: Provide number of hinges indicated but not less than 3 hinges per door leaf for doors 90 inches or less in height and one additional hinge for each 30 inches of additional height.

1. Fire-Rated Doors: Not less than 3 hinges per door leaf for doors 86 inches or less in height with same rule for additional hinges.

2.5 LOCK CYLINDERS AND KEYING

A. Standard System: Except as otherwise indicated, provide new masterkey system for Project.

B. Multiple-Building System: Except as otherwise indicated, provide new grandmasterkey system for Project.

C. Existing System: Grandmasterkey the locks to the Owner's existing system, with a new masterkey for the Project.

D. Review the keying system with the Owner and provide the type required (master, grandmaster or great-grandmaster), either new or integrated with Owner's existing system.

E. Equip locks with manufacturer's standard 6-pin tumbler cylinders.

F. Equip locks with manufacturer's special 6-pin tumbler cylinder with construction masterkey feature that permits voiding of construction keys without cylinder removal.

G. Equip locks with cylinders for interchangeable-core pin tumbler inserts. Furnish only temporary inserts for the construction period, and remove these when directed.

1. Furnish final cores and keys for installation by Owner.

H. Equip locks with high-security cylinders that comply with performance requirements for Grade 1 cylinders as listed in ANSI/BHMA A156.5 and that have been tested for pick and drill resistance requirements of UL 437 and are UL listed.

I. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.

J. Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.

1. Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."

K. Key Material: Provide keys of nickel silver only.

L. Key Quantity: Furnish 3 change keys for each lock, 5 master keys for each master system, and 5 grandmaster keys for each grandmaster system.

1. Furnish one extra blank for each lock.

2. Deliver keys to key control system manufacturer.

3. Deliver keys to Owner.

2.6 KEY CONTROL SYSTEM

A. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150 percent of the number of locks required for the Project.

1. Provide complete cross index system set up by key control manufacturer, and place keys on markers and hooks in the cabinet as determined by the final key schedule.

2. Provide hinged-panel type cabinet for wall mounting.

3. Provide multiple-drawer type cabinet.

2.7 LOCKS, LATCHES, AND BOLTS

A. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.

1. Provide flat lip strikes for locks with 3-piece, antifriction latchbolts as recommended by

manufacturer.

2. Provide extra long strike lips for locks used on frames with applied wood casing trim.

3. Provide recess type top strikes for bolts locking into head frames, unless otherwise indicated.

4. Provide dust-proof strikes for foot bolts, except where special threshold construction provides nonrecessed strike for bolt.

5. Provide roller type strikes where recommended by manufacturer of the latch and lock units.

6. Provide standard (open) strike plates for interior doors of residential units where wood door frames are used.

B. Lock Throw: Provide 5/8-inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

1. Provide 1/2-inch minimum throw of latch for other bored and preassembled types of locks and 3/4-inch minimum throw of latch for mortise locks. Provide 1-inch minimum throw for all dead bolts.

C. Flush Bolt Heads: Minimum of 1/2-inch-diameter rods of brass, bronze, or stainless steel with minimum 12-inch-long rod for doors up to 7'-0" in height. Provide longer rods as necessary for doors exceeding 7'-0" in height.

D. Exit Device Dogging: Except on fire-rated doors where closers are provided on doors equipped with exit devices, equip the units with keyed dogging device to keep the latch bolt retracted, when engaged.

E. Rabbeted Doors: Where rabbeted door stiles are indicated, provide special rabbeted front on lock and latch units and bolts.

2.8 PUSH/PULL UNITS

A. Exposed Fasteners: Provide manufacturer's standard exposed fasteners for installation, thru-bolted for matched pairs but not for single units.

B. Concealed Fasteners: Provide manufacturer's special concealed fastener system for installation, thru-bolted for matched pairs but not for single units.

2.9 CLOSERS AND DOOR CONTROL DEVICES

A. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use.

1. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.

2. Provide parallel arms for all overhead closers, except as otherwise indicated.

B. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing.

C. Combination Door Closers and Holders: Provide units designed to hold door in open position under normal usage and to release and close door automatically under fire conditions. Incorporate an integral electromagnetic holder mechanism designed for use with UL listed fire detectors, provided with normally closed switching contacts.

1. Provide integral smoke detector device in combination door closers and holders complying with UL 228.

D. Flush Floor Plates: Provide finished metal flush floor plates for floor closers except where thresholds are indicated and cover plate is specified to be an integral part of threshold. Finish floor plate to match hardware sets, unless otherwise indicated.

E. Recessed Floor Plates: Provide recessed floor plates where no thresholds are indicated and floor closers are located in an area of resilient flooring, stone flooring, or terrazzo. Recess plates to receive an insert of the floor finish material of the normal thickness as indicated. Provide extended spindle on closer as may be necessary to accommodate thickness of floor finish.

1. Where terrazzo floor finish includes metal divider or expansion strips, match exposed ring of recessed floor plate on closer with metal of floor strips.

F. Provide grey resilient parts for exposed bumpers.

G. Provide black resilient parts for exposed bumpers.

2.10 DOOR TRIM UNITS

A. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.

B. Fabricate edge trim of stainless steel to fit door thickness in standard lengths or to match height of protection plates.

C. Fabricate protection plates not more than 1-1/2 inches less than door width on hinge side and not more than 1/2 inch less than door width on pull side by height indicated.

1. Metal Plates: Stainless steel, 0.050 inch (U.S. 18 gage).

2. Metal Plates: Brass or bronze, 0.062 inch (U.S. 16 gage).

3. Plastic Plates: Clear acrylic plastic, 1/8 inch thick.

4. Plastic Plates: Plastic laminate or high-impact polyethylene, 1/8 inch thick, in color selected.

2.11 HARDWARE FOR INTERIOR SLIDING DOORS

A. General: Provide manufacturer's standard hardware for interior sliding doors when not furnished as part of complete door package.

B. Operating Hardware for Bipassing Doors: Provide manufacturer's complete set consisting of extruded aluminum overhead track, adjustable hangers (carriages), bumpers, and floor guides designed to accommodate the number, size, thickness, and weight of door leaves indicated. Provide flush pulls for each door leaf.

C. Operating Hardware for Pocket Doors: Provide manufacturer's complete set consisting of extruded aluminum or galvanized steel overhead track, adjustable hangers (carriages), galvanized steel split-jambs and split-studs, wood nailers for head track, jambs and studs, galvanized steel brackets for assembly and attachment to floor and wall framing, bumpers, and nylon floor guides designed to accommodate the number (single and biparting), size, thickness, and weight of door leaves indicated. Provide flush pull and edge pull for each door leaf.

2.12 HARDWARE FOR BIFOLD DOORS

A. General: Provide manufacturer's standard hardware for interior bifold doors when not furnished as part of complete door package.

B. Operating Hardware: Provide manufacturer's complete sets consisting of overhead extruded aluminum track; captive nylon shoe or roller guides; rubber bumpers in track; and adjustable pivots, hinges, and door aligners all designed to accommodate the number, size, thickness, and weight of door leaves indicated.

1. Provide light-duty sets designed for leaves weighing up to 25 lb.

2. Provide medium-duty sets designed for leaves weighing up to 35 lb.

3. Provide heavy-duty sets designed for leaves weighing up to 75 lb.

4. Provide extra-heavy-duty sets designed for leaves weighing up to 125 lb. and 4 feet in width with a minimum thickness of 1 inch.

C. Trim Hardware: Provide the following items as needed for operating bifold doors:

1. Pulls: Manufacturer's standard pull, one per pair of leaves.

2. Pulls: Single knob pull with dummy rose matching design and finish of knobs for swing doors, by manufacturer of locks and latches.

2.13 WEATHERSTRIPPING AND SEALS

A. General: Provide continuous weatherstripping on exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

B. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.

C. Weatherstripping at Jambs and Heads: Provide bumper-type resilient insert and metal retainer strips, surface applied unless shown as mortised or semimortised, and of following metal, finish, and resilient bumper material:

1. Extruded aluminum with natural anodized finish, 0.062-inch minimum thickness of main walls and flanges.

2. Extruded aluminum with color anodized finish as selected from manufacturer's standard color range, 0.062-inch minimum thickness of main walls and flanges.

3. Extruded bronze (brass), finish to match frame, 0.050-inch minimum thickness of main walls and flanges.

4. Sponge neoprene conforming to MIL R 6130, Class II (Closed Cell).

   a. Grade A (30 deg F to 150 deg F, oil-resistant and self-extinguishing).

   b. Grade B (30 deg F to 150 deg F, non-oil-resistant).

   c. Grade C (67 deg F to 170 deg F, low temperature).

5. Expanded neoprene: Cellular rubber conforming to ASTM D 1056 Type 2 (closed-cell); Class B (low-swell, oil-resistant); Grade 2 (compression-deflection of 5 - 9 psi); and self-extinguishing in following size:

   a. 3/16 inch x 5/8 inch.

   b. 1/4 inch x 3/4 inch.

   c. 3/8 inch x 1-1/4 inches.

6. Solid neoprene conforming to MIL R 6855, Class II, Grade 40.

   a. Flexible, hollow bulb or loop insert.

7. Flexible vinyl hollow bulb or loop insert.

8. Brush pile insert of polypropylene or nylon woven pile and aluminum strip backing complying with AAMA 701.2.

D. Weatherstripping at Door Bottoms: Provide threshold consisting of contact-type resilient insert and metal housing of design and size shown and of following metal, finish, and resilient seal strip:

1. Extruded aluminum with natural anodized finish,

0.062-inch minimum thickness of main walls and flanges.

2. Extruded aluminum with color anodized finish as selected from manufacturer's standard color range, 0.062-inch minimum thickness of main walls and flanges.

3. Extruded bronze (brass) finished to match doors, 0.050-inch minimum thickness of main walls and flanges.

4. Solid neoprene wiper or sweep seal complying with MIL R 6855, Class II, Grade 40.

5. Flexible vinyl wiper or sweep seal strip.

6. Brush pile insert of polypropylene or nylon woven pile and aluminum strip backing complying with AAMA 701.2.

2.14 THRESHOLDS

A. General: Except as otherwise indicated, provide standard metal threshold unit of type, size, and profile as shown or scheduled.

B. Exterior Hinged or Pivoted Doors: Provide units not less than 4 inches wide, formed to accommodate change in floor elevation where indicated, fabricated to accommodate door hardware and to fit door frames, and as follows:

1. For in-swinging doors provide units with interlocking lip and interior drain channel; include hook on bottom edge of door and drain pan.

2. For out-swinging doors provide units with interlocking lip and with hook on bottom edge of door to act as weather bar.

3. For out-swinging doors provide rabbeted type units with replaceable weatherstrip insert in stop.

2.15 HARDWARE FINISHES

A. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).

B. Provide finishes that match those established by BHMA or, if none established, match the Architect's sample.

C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer."

E. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

F. The designations used in schedules and elsewhere to indicate hardware finishes are the industry-recognized standard commercial finishes, except as otherwise noted.

1. Rust-Resistant Finish: For iron and steel base metal required for exterior work and in areas shown as "High Humidity" areas (and also when designed with the suffix -RR), provide 0.2-mil-thick copper coating on base metal before applying brass, bronze, nickel, or chromium plated finishes.

PART 3. EXECUTION

3.1 INSTALLATION

A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.

1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.

2. "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames" by the Door and Hardware Institute.

3. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors."

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto

or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers."

F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

B. Clean adjacent surfaces soiled by hardware installation.

C. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.

D. Six-Month Adjustment: Approximately six months after the date of Substantial Completion, the Installer, accompanied by representatives of the manufacturers of latchsets and locksets and of door control devices, and of other major hardware suppliers, shall return to the Project to perform the following work:

1. Examine and re-adjust each item of door hardware as necessary to restore function of doors and hardware to comply with specified requirements.

2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.

3. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.

4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.3 HARDWARE SCHEDULE

A. General: Provide hardware for each door to comply with requirements of Section "Door Hardware," hardware set numbers indicated in door schedule, and in the following schedule of hardware sets.

1. Hardware sets indicate quantity, item, manufacturer and product designation, size, and finish or color, as applicable.

2. Hardware sets indicate quantity, item, ANSI designation, size, and finish or color, as applicable.

3. Lockset Designs: Provide one of the lockset designs designated below [or, if by another manufacturer, one that matches those designated]:

a. Cylindrical Locks: <INSERT NAME(S) OF MANUFACTURER(S) AND PRODUCT NAME(S) DESIGNATING LOCKSET DESIGN(S) THAT OTHER MANUFACTURERS MUST MATCH>.

B. Hardware Set No. [#]: (For each door <INSERT DOOR NUMBERS FROM DOOR SCHEDULE>).

[#] pair Butts <INSERT PRODUCT AND FINISH DESIGNATION>
[#] Lockset <INSERT PRODUCT AND FINISH DESIGNATION>
[#] Closer <INSERT PRODUCT AND FINISH DESIGNATION>
[#] set Weatherstripping <INSERT PRODUCT DESIGNATION>
[#] Sill Sweep <INSERT PRODUCT AND FINISH DESIGNATION>
[#] Threshold <INSERT PRODUCT AND FINISH DESIGNATION>

C. Hardware Set No. [#]: (For each door <INSERT DOOR NUMBERS FROM DOOR SCHEDULE>).

[#] pair Butts <INSERT PRODUCT AND FINISH DESIGNATION>
[#] Lockset <INSERT PRODUCT AND FINISH DESIGNATION>
[#] Closer <INSERT PRODUCT AND FINISH DESIGNATION>
[#] Kickplate [#]" high x [#]" x beveled edges x <INSERT FINISH DESIGNATION>
[#] Wall Stop <INSERT PRODUCT AND FINISH DESIGNATION>
[3][2] Silencers <INSERT PRODUCT DESIGNATION AND COLOR>

D. Hardware Set No. [#]: (For each Door <INSERT DOOR NUMBERS FROM DOOR SCHEDULE>).

E. Same as set No. [#], except change lockset to <INSERT PRODUCT AND FINISH DESIGNATION>.

END OF SECTION 08710