PROJECT MANUAL FOR
BANGOR SAVINGS BANK
ALLEN AVE.

PORTLAND, MAINE

A/E. COMM. NO. 2747.93

JUNE 30, 2010

OWNER:	BANGOR SAVINGS BANK P.O. Box 930 Bangor, Maine 04402-0930
ARCHITECT/ENGINEER:	WBRC ARCHITECTS·ENGINEERS 44 Central Street Bangor, Maine 04401
CONSTRUCTION MANAGER:	

WBRC
ARCHITECTS • ENGINEERS

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PROJECT

Name: Comm No.: 2747.93 / Bangor Savings Bank – Allen Ave.
Location: Portland, Maine

ARCHITECT OF RECORD

WBRC Architects/Engineers
44 Central Street
Bangor, Maine 04401
Name: Gary S. Frankel, AIA

LICENSED ARCHITECT
GARY S. FRANKEL
No. 3549
STATE OF MAINE

Architect of Record 6/30/2010
Date

CIVIL ENGINEER OF RECORD

Gorrill-Palmer Consulting Engineers, Inc.
P.O. Box 1237
15 Shaker Road
Gray, Maine 04039
Name: Alton Palmer, P.E.

STATE OF MAINE
ALTON M. PALMER III
No. 6281
LICENSED
PROFESSIONAL ENGINEER

Civil Engineer of Record 6/30/10
Date

STRUCTURAL ENGINEER OF RECORD

WBRC Architects/Engineers
44 Central Street
Bangor, Maine 04401
Name: John P. Poulin, P.E.

STATE OF MAINE
JOHN P. POULIN
No. 11216
LICENSED
PROFESSIONAL ENGINEER

Structural Engineer of Record 6/30/10
Date

END OF DOCUMENT 00 00 10

DOCUMENT 00 01 20 - INFORMATION FOR CONTRACTOR

1. Security for Performance: Simultaneously with the delivery of the executed Contract, the Contractor will be required to deliver to the Owner a surety bond executed in duplicate in the amount of one hundred per centum (100%) of the accepted bid, as a security for the faithful performance of the contract and for the payment of all persons performing labor or furnishing materials in connection therewith. Said bonds to be prepared in the form of Performance/Labor - Material Bond attached hereto and duly executed by a surety acceptable to the Owner.

2. Power of Attorney: Attorney-in-fact who signs Performance/Labor - Material Bonds must file with each bond a certified copy of their power of attorney to sign said bond.

3. Insurance: Insurance will be provided by the Contractor, to include:

   a. Worker's Compensation insurance;
   b. Fire and extended coverage insurance;
   c. Comprehensive general liability insurance; and
   d. Automobile liability insurance.
   e. And all others as specified.

   Refer to General Conditions and Document 008000.

   NOTE: Builder's Risk Insurance to be covered by Owner's Rider.

4. Responsibility of Subcontractors: Subcontractors receiving partial sets of Drawings and Specifications are responsible for the checking of their work with the complete Drawings and Specifications. Failure to do so will not reduce their obligation for doing all work required to fully complete the work of their trade in this Building. The Architect's office will only issue complete sets of Drawings and Specifications.

5. Instructions to Bidders Regarding Substitutions: To obtain approval to use unspecified products, bidders shall submit written request as per Section 016000 at least ten days before the bid date and hour. Requests received after this time will not be considered. Requests shall clearly describe the product for which approval is asked, including samples and all data necessary to demonstrate acceptability. If the product is acceptable, the Architect will so indicate in an addendum issued to all prime bidders on record.

6. All work under this contract shall comply with 24 CFR Part 35 prohibiting the use of lead-based paint.

END OF DOCUMENT 00 01 20

DOCUMENT 00 03 20 - INFORMATION AVAILABLE TO BIDDERS

The following information is provided for informational purposes only. It is not part of the Contract document.

1. A Geotechnical Report was prepared by S.W. Cole Engineering, for the Owner on this project. A copy is included in the Appendix of this project manual. Boring Logs are including in the drawings sheets.
2. A Property Plan was prepared by Titcomb Associates for use by the Owner of this project. A copy is included with the drawing sheets.
3. A Existing Conditions Plan was prepared by Gorrill Palmer for use by the Owner of this project. A copy is included with the drawing sheets.

END OF DOCUMENT 00 03 20

DOCUMENT 000700

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

THE OWNER:
(Name and address)

THE ARCHITECT:
(Name and address)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

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the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

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§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

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facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume

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the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

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§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be

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required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

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§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate For Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

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§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION
Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

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§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may

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be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

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the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner, separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- **.1** The change in the Work;
- **.2** The amount of the adjustment, if any, in the Contract Sum; and
- **.3** The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon;
- **.3** Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

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.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

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ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2., for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

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§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

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.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a separate contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect,

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stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the

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Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

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§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY
If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS
§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

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§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;
- **.5** Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- **.6** Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- **.7** Claims for bodily injury or property damage arising out of completed operations; and
- **.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction

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of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or

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otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE
The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE
The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION
The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the

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Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

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§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

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§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency that requires all Work to be stopped;

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.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

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§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

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§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

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§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an

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additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

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DOCUMENT 00 08 00 - SUPPLEMENTARY CONDITIONS

GENERAL:

1. The General Conditions of the Contract for Construction AIA Document A201 are hereby specifically made a part of the Contract Documents; the Supplementary General Conditions modify and/or extend the General Conditions only as hereinafter definitely set forth. Should there by any conflict between General Conditions and these Supplementary Conditions, these provisions shall govern. The following is a list of the modifications.

2. Article 1.1, BASIC DEFINITIONS, ADD the following sentence to Par. 1.1.5, THE DRAWINGS:

   It is the intention of the drawings and specifications to include and describe a complete job. The Contractor shall provide all materials, services, and equipment required to execute the work as shown or reasonably inferred to make the job complete.

3. Article 1.1, BASIC DEFINITIONS, ADD the following sentence to Paragraph 1.1.6, THE SPECIFICATIONS:

   Parts of this Specification are written in imperative and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" shall be included by inference where a colon (:) is used within sentences or phrases.

4. Article 1.2, CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS, ADD the following sentence to Par. 1.2.1:

   In the case of disagreement or inconsistency between the specification and drawings or from drawing to drawing the Contractor shall include the more complicated scope of work and cost. At least one scope of work cost shall be included for all areas of disagreement or inconsistently that are not brought to the Architect’s direction during the bid process and addressed by Addendum.

5. Article 3.14, CUTTING AND PATCHING, ADD the following sentence to Paragraph 3.14.1:

   The Contractor shall be responsible and make provisions for cutting and patching for all trades. Whenever materials, finishes and/or equipment that are part of the existing work have to be removed temporarily or permanent in order to facilitate execution of the new work, they shall be put back, replaced and/or refinished in a workmanlike manner to match existing (i.e., concrete slabs for underslab utilities, GWB partitions, GWB ceilings, masonry walls, SAT ceilings, floor finishes).

6. Article 3.18, INDEMNIFICATION, ADD the following Paragraph:

   Par. 3.18.3: The Contractor agrees to indemnify and save harmless the Owner, Architect, their agents, servants, and employees for and against any and all cost, loss and expense, liability, damage, settlements or claims for damages (including attorney's fees and costs for defending any action) suffered, incurred or rising from:

   a. Failure of the Contractor or those acting under him to conform to the statutes, ordinances, rules and regulations of any governmental authority having jurisdiction over the project.

   b. Injury to persons (including deaths) or damages to or destruction of property of the Owner arising or resulting from the work provided for or performed under the contract, or from any or actual alleged act, omission or negligence’s of the Contractor, Subcontractor, or his or their agents or employees.

7. Article 4.2, ARCHITECT'S ADMINISTRATION OF THE CONTRACT, AMEND Paragraph 4.2.7 as follows:

Sufficient time for Architect's review of submittals shall be defined as follows:

The review time begins on the day the Architect actually receives the submittal(s).

The review time for Mechanical, electrical, and structural disciplines will begin on the date they receive their submittals.

In general, the Architect and the disciplines will make every attempt to complete submittal reviews within 15 working days after date of receipt of submittals. The Architect reserves the right to require longer review times for major, complicated, items and for large volumes of submittals.

The working day review time for submittals does not include mailing time from disciplines to Architect and from Architect to Contractor.

8. Article 7.3, CONSTRUCTION CHANGE DIRECTIVES, AMEND Paragraph 7.3.3.3 as follows:

The "mutually accepted fixed or percentage fee" shall be meant that only the Contractor, who performs Change Order work or Construction Change Directive work with his own personnel, shall be entitled to the actual labor and materials cost of the work, plus 15% of the work representing overhead and profit. Materials cost, as described above, shall be for the actual materials cost (with documentation from the Contractor); materials prices shall not be "marked up" according to any appreciated book values.

The following criteria also relate to the above described work:

1. General Contractor is entitled to 10% O & P for such extra work or such work done by his subcontractor which the G.C. has overall responsibility for. Subcontractors are entitled to 15% O & P for their portions of such extra work.

2. The Contractor's and Subcontractor's itemized accounts for all charges or credits for additions to or deductions from the work shown on the Drawings or described in the Specifications, shall at all times be open to inspection by the Architect. No extra work shall be performed without written authorization from the Owner.

3. NOTE: In no case shall the total overhead and profit mark up exceed 26.5%. Overhead to include all operating costs (bonds, insurances, etc.).

9. Article, 9.3, APPLICATIONS FOR PAYMENT, Add the following paragraph:

9.3.4, RETAINAGE: Ten percent retainage shall be in effect during the first half of the project. After that point, retainage may be reduced to zero, if the Owner and Architect find the work quality and progress satisfactory.

10. Article 10 – Protection of Persons and Property, ADD the following to Paragraph 10.2.3:
The Contractor shall provide maintenance of traffic in construction zones (barricades, signage, flaggers, etc.) in accordance with MDOT and MUTCD for all work occurring within the State of Maine right-of-way.

11. Article 11.2, OWNER'S LIABILITY INSURANCE, ADD the following Paragraph:

11.2.2. Note: The Contractor shall maintain and pay for all his insurances required under this Contract. The Contractor shall require all Subcontractors to maintain and pay for their insurances - of the same types and coverages of the Contractor, for their work.

A. Article 11 of the General Conditions is hereby supplemented as follows:

1. Compensation Insurance & Employer's Liability Insurance:

The Contractor shall take out and maintain during the life of this Contract, Workmen's Compensation Insurance and Employer's Liability Insurance in accordance with the General Conditions of the Contract.

2. Bodily Injury Liability and Property Damage Liability Insurance - Owner's Protective Liability Insurance:

The Contractor performing labor at the building shall take out and maintain during the life of this Contract, Bodily Injury Liability and Property Damage Liability Insurance and Owner's Protective Liability Insurance as described in the General Conditions of the Contract.

The Contractor shall not commence Work under this Contract until he has obtained all Insurance required under this paragraph and such Insurance has been approved by the Owner.

A. Compensation Insurance. The Contractor shall take out and maintain during the life of the contract, Workmen's Compensation Insurance for all of his employees employed at the Site of Project, and, in case any Work is sublet, the Contractor shall require the Subcontractor similarly to provide Workmen's Compensation Insurance for all of the latter's employees unless such employees are covered by the protection afforded by the Contractor.

In case any class employees engaged in hazardous Work under this Contract at the site of the Project is not protected under the Workmen's Compensation Statute, the Contractor shall provide and shall cause each Subcontractor to provide for the protection of his employees not otherwise protected.

B. Public Liability and Property Damage Insurance. The Contractor shall take out and maintain during the life of the Contract such public liability and property damage insurance as shall protect them from claims and damages which may arise from operations under this contract, whether such operations shall be by themselves or by anyone directly or indirectly employed by them, and the types and amounts of each insurance shall not be less than:

Description	Coverage
General Liability	(Limits in Thousands)
Gen'l Agg.	$2,000
Products/OPS Agg.	$2,000
Personal & Adver. Injury	$1,000
Ea. Occur.	$1,000
Fire Damage	$ 50
Medical Expense (per year)	$ 5
Automotive Liability	
CSL	$1,000

Excess Liability
(Umbrella Liability)

Ea. Occur	$1,000
Agg.	$1,000
Worker's Comp. & Employees Liability	
Each Accident	$ 100
Disease policy limit	$ 500
Disease each employee	$ 100

1. Special Hazards Insurance. Full coverage for damage or loss resulting from explosion of blasting, collapse and underground damage in the amounts and manner specified in this article, paragraph B, and item 1 and 2 above, ordinarily, excluded from coverage, is to be provided in accordance with the requirements of the Proposal for specified Project.

12. Article 11.3, PROPERTY INSURANCE, ADD the following to Paragraph 11.3.1:

Par. 11.3.1, Builder's Risk.

1. All Work Under this Contract: The Owner shall pay for the cost of and maintain "Builder's Risk Insurance" naming the Contractor as their interest may appear, as insureds for the perils of fire, extended coverage, vandalism and malicious mischief upon the entire structure on which the Work of this contract is to be done. Builder's risk shall also cover one hundred percent of the contract amount upon the standard extended coverage and standard vandalism and malicious mischief forms as promulgated by the Insurance Service Office of Maine.

   It is understood that if any additional insurance coverages are required by the Contractor, Subcontractor, or any material supplier, they should be purchased at his or their expense.

   Certificates Of Insurance. The Contractor shall furnish the Architect with four (4) copies of a Certificate or Certificates of Insurance as provided in Paragraphs A and B above. Said Certificates of Insurance, in addition to the amount of the coverage, shall carry a statement worded as follows: "In the event of cancellation or expiration of any of the foregoing policies, fifteen (15) days' written notice by the insurance company shall be mailed to the Owner and Architect".
   The intent for coverage of insurance for materials for the construction (i.e., Builders Risk Insurance) is generally as follows;

   The Owner's Builders Risk Insurance shall cover materials and work which is already installed and been accepted.

   The Contractor's Insurances (for property, and materials, etc.), shall cover any material stored on or off the job site.

END OF DOCUMENT 00 08 00

DOCUMENT 00 08 50 - INDEX OF DRAWINGS

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GI001	COVER SHEET
GI002	SYMBOLS AND ABBREVIATIONS
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CIVIL

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D1	DEMOLITION PLAN
D2	CONSTRUCTION MOBILIZATION PLAN
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C102	UTILITY PLAN
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EP101 FIRST FLOOR ELECTRICAL POWER PLAN
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SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Type of the Contract.
3. Work under other contracts.
4. Owner-furnished products.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Bangor Savings Bank – Allen Ave, Portland, Maine

B. Owner: Bangor Saving Bank, PO Box 930, Bangor, Maine 04402: Owner's Representative: Jeff Jeter

C. Architect: WBRC Architects / Engineers, 44 Central Street, Bangor, Maine 04401

D. The Work consists of the following:

1. The Work includes the drawings and project manual information for new site work, building, and systems on Allen Ave, Portland, Maine. Work also includes the coordination and scheduling all owners supplied / owner installed items.

1.4 TYPE OF CONTRACT

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

1.5 WORK UNDER OTHER CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

B. Concurrent Work: Owner has awarded or will award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

1. A separate contract has been or will be awarded to a millwork company for all the millwork on the project as defined with in the construction documents.

2. A separate contract has been or will be awarded to a furniture supplier and/or install for owner furnished items.
3. A separate contract has been or will be awarded to Portland Safe for all banking equipment such as, but not limited to the cash safe, night deposit, under counter steel, VAT, and ect..
4. A separate contract has been or will be awarded to a sign company for the building signage.

1.6 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes providing support systems to receive Owner's equipment and making plumbing, mechanical, and electrical connections.

1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
2. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
3. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
5. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
6. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
7. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
8. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.
9. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
10. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.
11. Contractor shall install and otherwise incorporate Owner-furnished items into the Work.

B. Owner-Furnished Products:

1. Casework / Millwork package.
2. VAT, Night Deposit, Cash safe
3. Furniture
4. Kitchen Appliances
5. Building signage

1.7 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Testing and inspecting allowances.

C. Related Sections include the following:

1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
2. Division 01 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.
3. Divisions 02 through 49 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.5 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.6 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.7 TESTING AND INSPECTING ALLOWANCES

A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

C. Costs of services not required by the Contract Documents are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.8 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Include $20,000 “Excess” costs for electrical, water, telephone, natural gas, cable, and other utility work.

B. Allowance No. 2: Include $6,000 “Testing and Inspecting” allowance as specified in Division 01 – General Requirements, Section "014000 – Quality Requirement".

END OF SECTION 01 21 00

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections include the following:

1. Division 01 Section "Allowances" for procedural requirements for handling and processing allowances.
2. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issuesupplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

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

1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within 14 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

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

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.5 ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 21 days after such authorization.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CHANGE ORDER PROCEDURES

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

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Work Change Directive: Architect may issue a Work Change Directive on AIA Document G714. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

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

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections include the following:

1. Division 01 Section "Allowances" for procedural requirements governing handling and processing of allowances.
2. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
3. Division 01 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

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

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

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

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

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

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

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

2. Submit draft of AIA Document G703 Continuation Sheets.
3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section or Division.
b. Description of the Work.
c. Change Orders (numbers) that affect value.
d. Dollar value.

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

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

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

7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

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

1.5 APPLICATIONS FOR PAYMENT

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

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

B. Payment Application Times: Progress payments shall be submitted to Architect by the 15th day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

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

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

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

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

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Certificates of insurance and insurance policies.

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

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

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

1. Evidence of completion of Project closeout requirements.
2. AIA Document G706A, "Contractor's Affidavit of Release of Liens."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Contractor's Construction Schedule.
2. Material location reports.

B. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for submitting the Schedule of Values.
2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
4. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 COORDINATION

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

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, progress reports, payment requests, and other required schedules and reports.

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

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

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

B. Time Frame: Extend schedule from date established for commencement of the Work to date of Final Completion.

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

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

1. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect'sadministrative procedures necessary for certification of Substantial Completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

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

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

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

1. Refer to Division 01 Section "Payment Procedures" for cost reporting and payment procedures.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for commencement of the Work. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 REPORTS

A. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

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

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

END OF SECTION 01 32 00

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
4. Division 01 Section "Quality Requirements" for submitting test and inspection reports.
5. Division 01 Section "Closeout Procedures" for submitting warranties.
6. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
7. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
8. Divisions 02 through 49 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

1.4 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

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

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

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

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

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

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.

E. Identification: Place a permanent label or title block on each submittal for identification.

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

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

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

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

F. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

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

H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.

1. Transmittal Form: Use AIA Document G810.
2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and

deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

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

1. Note date and content of previous submittal.

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

K. Use for Construction: Use only final submittals with mark indicating "action" taken by Architect.

1.5 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:

1. Architect’s release form is signed from each end user and GC.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

1. Submit electronic submittals directly to extranet specifically established for Project.

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

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

a. Manufacturer's written recommendations.
b. Manufacturer's installation instructions.
c. Standard color charts.
d. Standard product operation and maintenance manuals.
e. Application of testing agency labels and seals.

4. Submit Product Data before or concurrent with Samples.
5. Number of Copies: Submit five copies of Product Data, unless otherwise indicated. Architect will return three copies. Mark up and retain one returned copy as a Project Record Document.

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

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

a. Identification of products.
b. Compliance with specified standards.
c. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
3. Number of Copies: Submit five opaque copies of each submittal. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.

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

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

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of appropriate Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

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

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

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

a. Number of Samples: Submit five sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain two returned Sample set as a Project Record Sample.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

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

3.2 ARCHITECT'S/ ACTION

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

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

1. Reviewed, No Exception Taken.
2. Reviewed, Revised As Noted.
3. Revise and Resubmit.
4. Rejected.

C. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

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

END OF SECTION 01 33 00

SECTION 01 33 10 - ADDITIONAL SUBMITTAL REQUIREMENTS

PART 1 - GENERAL

1.1 ELECTRONIC SUBMITTAL REQUIREMENTS for NEWFORMA INFO EXCHANGE

A. Submit one (1) specification section per submittal.

B. Each submittal shall be a single PDF file that includes the following:
   1. GC Transmittal Letter with details of the submittal item, including the spec section #.
   2. GC review stamp on a separate cover sheet.
   3. Data, drawings, etc., that relate to the submittal item.
   4. Black or red marks (arrows, circles, bubbles) to indicate specific product information as applicable.

C. Electronic submittals are acceptable for all documents, including large scale drawings, unless noted otherwise in individual specification sections**.**

D. Electronic Submittal(s) with samples:
   1. Submit electronically entire submittal including color PDF copy of sample(s).
   2. Remit via mail physical sample or color chart with transmittal to Architect's office, unless noted otherwise in individual specification sections**.**

E. Submittals received after 2 PM will be processed and logged as being received on the next business day.

F. A brief tutorial handout will be provided at the preconstruction meeting.

1.2 SUBMITTAL REQUIREMENTS FOR HARD COPY

A. Enter Header information:
   1. Date
   2. GC's name/address/phone-fax
   3. WBRC A/E Project #/Comm. # and the WBRC A/E Project Name/Job Title
   4. Division # (*only one Division per transmittal, NO EXCEPTIONS)*
   5. GC's Transmittal # (see spec section 013300 for numbering details)
   6. Sub-contractor/Supplier name

B. Line item information
   1. One (1) Specification Section per transmittal is preferred
   2. Using one (1) line for each item being submitted, enter the following:
      a. # of copies
      b. Spec Section #
      c. DESCRIPTION of item submitted (brick, siding, etc.)
         1) Information stapled together in one packet is a single item and will receive one review stamp.

C. Specific Transmittal information
   1. Indicate the purpose of the transmittal, relevant comments, instructions, and sign the transmittal letter

D. Submittals received after 2 PM will be processed and logged as being received on the next business day.

E. Instructions for Each Submittal Item
   1. Stamp the front/top page of EACH submittal item, including samples, with the General Contractor's review stamp

a. Front page must have enough clear space for both the GC and WBRC review stamps or use a separate cover sheet attached to the front of each submittal item
b. Complete all appropriate information and sign the GC review stamp.

2. Use black or red marks (arrows, circles, bubbles) to indicate specific product information
   a. Yellow highlighting will not be accepted

F. A brief tutorial handout will be provided at the preconstruction meeting.

1.4 OTHER GENERAL INSTRUCTIONS

A. Comply with all other criteria listed in Section 013300 – Submittal Procedures.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION 01 33 10

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

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

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

C. Related Sections include the following:

1. Division 01 Section "Allowances" for testing and inspecting allowances.
2. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
3. Division 01 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
4. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

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

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

C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.

D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

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

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

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

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

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

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

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

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

1.4 CONFLICTING REQUIREMENTS

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

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

1.5 SUBMITTALS

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

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.

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

1.6 QUALITY ASSURANCE

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

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

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

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

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

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

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

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

1.7 QUALITY CONTROL

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

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

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

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

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

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

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

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

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

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

6. Security and protection for samples and for testing and inspecting equipment at Project site.

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

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

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

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

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

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

3.2 REPAIR AND PROTECTION

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

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."

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

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

END OF SECTION 01 40 00

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

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

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

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

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

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

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

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

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

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

1.3 INDUSTRY STANDARDS

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

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

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

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

1.4 ABBREVIATIONS AND ACRONYMS

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

AA	Aluminum Association, Inc. (The) www.aluminum.org	(703) 358-2960
AAADM	American Association of Automatic Door Manufacturers www.aaadm.com	(216) 241-7333
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists (The) www.aatcc.org	(919) 549-8141
ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	ACI International (American Concrete Institute) www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The)	(703) 548-3118

	www.agc.org	
AHA	American Hardboard Association (Now part of CPA)	
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)	
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(405) 780-7372
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA EWS	APA - The Engineered Wood Association; Engineered Wood Systems (See APA - The Engineered Wood Association)	
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917

ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9585
AWCI	AWCI International (Association of the Wall and Ceiling Industry International) www.awci.org	(703) 534-8300
AWCMA	American Window Covering Manufacturers Association (Now WCSC)	
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWPA	American Wood-Preservers' Association www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772

CCC	Carpet Cushion Council www.carpetcushion.org	(610) 527-3880
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CPA	Composite Panel Association www.pbmdf.com	(301) 670-0604
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRI	Carpet & Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	Canadian Standards Association	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Cast Stone Institute www.caststone.org	(717) 272-3744
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300

CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (770) 968-7945
EJCDC	Engineers Joint Contract Documents Committee www.ejdc.org	(703) 295-5000
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association www.esda.org	(315) 339-6937
FIBA	Federation Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation) www.fivb.ch	41 21 345 35 35
FM Approvals	FM Approvals www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FMRC	Factory Mutual Research (Now FM Global)	
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridaroof.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GA	Gypsum Association www.gypsum.org	(202) 289-5440

GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Now GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAS	International Approval Services (Now CSA International)	
IBF	International Badminton Federation www.internationalbadminton.org	(6-03) 9283-7155
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 255-1561
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510

ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
	Available from ANSI www.ansi.org	(202) 293-8020
ISSFA	International Solid Surface Fabricators Association www.issfa.net	(877) 464-7732 (702) 567-8150
ITS	Intertek Testing Service NA www.intertek.com	(972) 238-5591
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LMA	Laminating Materials Association (Now part of CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(847) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. www.metalframingmfg.org	(312) 644-6610
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(312) 332-0405
NACE	NACE International	(800) 797-6623

	(National Association of Corrosion Engineers International) www.nace.org	(281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAGWS	National Association for Girls and Women in Sport www.aahperd.org/nagws/	(800) 213-7193, ext. 453
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(262) 248-9094
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-3550
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (303) 697-8441
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(866) 342-5642 (703) 442-4890

NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association) www.nofma.com	(901) 526-5016
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736 (540) 751-0930
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)	
NWWDA	National Wood Window and Door Association (Now WDMA)	
OPL	Omega Point Laboratories, Inc. (Now ITS)	
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDCA	Painting & Decorating Contractors of America www.pdca.com	(800) 332-7322 (314) 514-7322
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.ce.uiuc.edu	(217) 333-3929
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America) www.landcarenetwork.org	(800) 395-2522 (703) 736-9666
PTI	Post-Tensioning Institute www.post-tensioning.org	(602) 870-7540
RCSC	Research Council on Structural Connections www.boltcouncil.org	

RFCI	Resilient Floor Covering Institute www.rfci.com	(301) 340-8580
RIS	Redwood Inspection Service www.calredwood.org	(888) 225-7339 (415) 382-0662
SAE	SAE International www.sae.org	(877) 606-7323 (724) 776-4841
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 646-2234
SIA	Security Industry Association www.siaonline.org	(703) 683-2075
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)	
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SSINA	Specialty Steel Industry of North America	(800) 982-0355

	www.ssina.com	(202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWRI	Sealant, Waterproofing, & Restoration Institute www.swrionline.org	(816) 472-7974
TCA	Tile Council of America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tileroofing.org	(312) 670-4177
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(202) 828-7422
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association (Now WCSC)	

WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association) www.windowcoverings.org	(800) 506-4636 (212) 297-2109
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WIC	Woodwork Institute of California (Now WI)	
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

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

BOCA	BOCA International, Inc. (See ICC)	
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICBO	International Conference of Building Officials (See ICC)	
ICBO ES	ICBO Evaluation Service, Inc. (See ICC-ES)	
ICC	International Code Council www.iccsafe.org	(888) 422-7233 (703) 931-4533
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543
SBCCI	Southern Building Code Congress International, Inc. (See ICC)	
UBC	Uniform Building Code (See ICC)	

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names,

telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers www.usace.army.mil	
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce www.commerce.gov	(202) 482-2000
DOD	Department of Defense http://.dodssp.daps.dla.mil	(215) 697-6257
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Building Service (See GSA)	
PHS	Office of Public Health and Science www.osophs.dhhs.gov/ophs	(202) 690-7694
RUS	Rural Utilities Service (See USDA)	(202) 720-9540

SD	State Department www.state.gov	(202) 647-4000
TRB	Transportation Research Board http://gulliver.trb.org	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USPS	Postal Service www.usps.com	(202) 268-2000

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

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
CFR	Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html	(866) 512-1800 (202) 512-1800
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
	Available from Defense Standardization Program www.dps.dla.mil	
	Available from General Services Administration www.gsa.gov	(202) 619-8925
	Available from National Institute of Building Sciences www.wbdg.org/ccb	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
MIL	(See MILSPEC)	

MIL-STD	(See MILSPEC)	
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080

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

CBHF	State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation www.dca.ca.gov/bhfti	(800) 952-5210 (916) 574-2041
CCR	California Code of Regulations www.calregs.com	(916) 323-6815
CPUC	California Public Utilities Commission www.cpuc.ca.gov	(415) 703-2782
TFS	Texas Forest Service Forest Resource Development http://txforestservice.tamu.edu	(979) 458-6650

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Equipment required; phone, fax, computer with email.
3. Drinking water.
4. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

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

3.2 OPERATION, TERMINATION, AND REMOVAL

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

B. Maintenance: Maintain facilities in good operating condition until removal.

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

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

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections include the following:

1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "References" for applicable industry standards for products specified.
3. Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.
4. Divisions 02 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

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

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

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

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

1.4 SUBMITTALS

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

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

   a. Statement indicating why specified material or product cannot be provided.
   b. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   c. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
   d. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

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

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

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

   a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
   b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

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

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

B. Delivery and Handling:

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

C. Storage:

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

1.7 PRODUCT WARRANTIES

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

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

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to Divisions 02 through 49 Sections for specific content requirements and particular requirements for submitting special warranties.

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

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

    a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within 60 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.

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

    1. Substitution request is fully documented and properly submitted.

2.3 COMPARABLE PRODUCTS

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

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

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Coordination of Owner-installed products.
2. Protection of installed construction.
3. Correction of the Work.

B. Related Sections include the following:

1. Division 01 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

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

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

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

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

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

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

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 OWNER-INSTALLED PRODUCTS

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

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.

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

3.4 PROTECTION OF INSTALLED CONSTRUCTION

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

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

3.5 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

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

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

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

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

END OF SECTION 01 73 00

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections include the following:

1. Divisions 02 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

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

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

1.4 QUALITY ASSURANCE

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

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

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Communication systems.
6. Electrical wiring systems.

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

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Equipment supports.

4. Piping, ductwork, vessels, and equipment.

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

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

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

3.3 PERFORMANCE

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

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

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Proceed with patching after construction operations requiring cutting are complete.

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

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
b. Restore damaged pipe covering to its original condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 73 29

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

B. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Division 01 Section "Execution" for progress cleaning of Project site.
3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
4. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
5. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
6. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
3. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
4. Complete startup testing of systems.
5. Submit test/adjust/balance records.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items,

either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

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

1.4 FINAL COMPLETION

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

1. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
2. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.

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

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

k. Remove labels that are not permanent.

l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

n. Replace parts subject to unusual operating conditions.

o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

q. Clean ducts, blowers, and coils if units were operated without filters during construction.

r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

s. Leave Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Emergency manuals.
2. Operation manuals for systems, subsystems, and equipment.
3. Maintenance manuals for the care and maintenance of products, materials, finishes, systems and equipment.

B. Related Sections include the following:

1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
4. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.

1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

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

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
   b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Gas leak.
2. Water leak.
3. Power failure.
4. Water outage.
5. System, subsystem, or equipment failure.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Special operating instructions and procedures.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. Precautions against improper use.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.

2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and

service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard printed maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared Record Drawings in Division 01 Section "Project Record Documents."

F. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Drawings.

B. Related Sections include the following: Divisions 2 through 16 Sections for specific requirements for Project Record Documents of the Work in those Sections:

1.3 SUBMITTALS

A. Record Drawings: Submit one set(s) of marked-up Record Prints:

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an understandable drawing technique.
    c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.

j. Changes made by Change Order or Work Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of each container with identification. If container does not include a complete set, identify Drawings included.
3. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
4. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

B. Related Sections include the following:

1. Division 1 Section "Project Management and Coordination" for requirements for preinstruction conferences.
2. Divisions 2 through 16 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

1. Motorized doors, including and automatic entrance doors.
2. Equipment, including residential appliances.
3. Fire-protection systems, including fire alarm.
4. Intrusion detection systems.

5. Heat generation, including boilers, pumps and water distribution piping.
6. Refrigeration systems, including condensers, pumps and distribution piping.
7. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices.
8. HVAC instrumentation and controls.
9. Electrical service and distribution, including transformers, switchboards and panelboards.
10. Lighting equipment and controls.
11. Communication systems, including intercommunication equipment.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project Record Documents.
    e. Identification systems.
    f. Warranties and bonds.
    g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

    a. Startup procedures.
    b. Equipment or system break-in procedures.
    c. Routine and normal operating instructions.
    d. Regulation and control procedures.
    e. Control sequences.
    f. Safety procedures.
    g. Instructions on stopping.
    h. Normal shutdown instructions.
    i. Operating procedures for emergencies.
    j. Operating procedures for system, subsystem, or equipment failure.

k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner, through Architect, with at least seven days' advance notice.

C. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 01 79 00

SECTION 01 90 00 – SAMPLE FORMS

The following information is provided for informational purposes only. The below samples are available electronically upon request. It is not part of the Contract document.

1. Sample copies of the following are included at the end of this section.

- **GC Request for Information (RFI)**:
  - Contractor to submit request for clarifications, additional information or interpretation through Request for Information form (see attached sample form).
  - Only one topic/subject item per RFI
  - RFI's to be sequentially numbered
  - Specification/drawing reference required
  - Contractor may use his own form as long as basic information is included similar to the sample form.
  - A log of RFI's will be maintained by the Architect.

- **Architect Information Bulletin (IB)**
  - Architect will respond to RFI's through Information Bulleting (see attached sample form). IB may also be used to issue additional information such as drawings, sketches, requests for change proposal, response to Contractor's change proposals and general information.
  - IB's shall be sequentially numbered with subsequently issued IB's relating to the same issue/subject being numbered in outline style ie. IB#1, IB#1.1, IB#1.2, etc.
  - IB's are not direction to proceed with work which modifies the Contract Sum or Contract Time unless specifically indicated in the IB.
  - A log of IB's will be maintained by the Architect.

- **CG Change Order Request (Proposal) (COP)**
  - Contractor to notify Architect of proposed changes in contract amount and/or contract time thorough COP (see attached sample form).
  - Only one item/issue per COP.
  - COP to be numbered sequentially with any subsequently issued COP's relating to the same issue/subject being numbered in outline style ie. COP#1, COP#1.1, COP#1.2, etc.
  - A log of COP's will be maintained by the Architect.
  - Architect will respond in writing to COP's
  - Architect will prepare a Change Order including approved COP's prior to each Contractor's Requisition for Payment.

END OF DOCUMENT 019000

SECTION 02225

DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building demolition excluding removal of hazardous materials and toxic substances.

B. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

A. Section 02230 - Site Clearing: Vegetation and existing debris removal.

B. Section 02315 - Excavation: Backfilling below-grade areas where demolition items are removed

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2004.

C. City of Portland Requirements for Utility Abandonment.

D. Portland Water District Requirements for Utility Abandonment.

1.04 SUBMITTALS

A. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
   2. Identify demolition firm and submit qualifications.
   3. Include a summary of safety procedures.

B. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: As specified in the Geotechnical Report

PART 3 EXECUTION

3.01 SCOPE

A. Remove the entire building designated "Espo's Building" on the Demolition Plan.

B. Remove paving and curbs as required to accomplish new work.

C. Within area of new construction, remove foundation walls and footing in their entirety.

D. Remove concrete slabs on grade within site boundaries.

E. Remove manholes and manhole covers, curb inlets and catch basins, as required to accomplish new work.

F. Remove fences and gates, as required to accomplish new work.

G. Remove other items indicated, for salvage, relocation, and recycling.

H. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside

within one year after completion.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Comply with applicable requirements of NFPA 241.
   3. Use of explosives is not permitted.
   4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   5. Provide, erect, and maintain temporary barriers and security devices.
   6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   8. Do not close or obstruct roadways or sidewalks without permit.
   9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

F. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Dismantle existing construction and separate materials.
   2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

G. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits. All abandonment of existing services shall comply with the respective utility company requirements.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of

utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 02230

SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of surface debris.

B. Clear site of plant life and grass.

C. Removal of trees, shrubs, and other plants.

D. Remove root system of trees, brush and shrubs.

E. Removal of paving, curbs, and existing gravel.

F. Removal of catch basins, manholes and other drainage features.

G. Removal of fences, posts, bollards, poles, signs, gates and other minor structures.

H. Removal and stockpiling of topsoil.

1.02 RELATED REQUIREMENTS

A. Section 02225 - Demolition: Removal of built elements and utilities.

B. Section 02250 - Dewatering

C. Section 02315 - Excavation and Backfill

D. Section 02317 - Trenching

E. Section 2320 - Slope Protection and Erosion Control

1.03 DEFINITIONS

A. Loam
   1. Friable clay loam surface soil found in depth of not less than 4 inches
   2. Satisfactory topsoil is free of subsoil, clay lumps, stones, and other objects over 2 inch in diameter, and without weeds, roots and other objectionable material.

1.04 REGULATORY REQUIREMETNS

A. Obtain required permits from authorities.

B. Notify affected utility companies before starting work and comply with their requirements.

C. Do not close or obstruct roadways without permits.

D. Conform to applicable code for disposal of debris.

E. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.

F. Dispose of all demolition and construction debris off-site in accordance with local requirements.

1.05 PROJECT CONDITIONS

A. Conform to applicable regulations relating to environmental requirements, disposal of debris, and use of herbicides

B. Coordinate clearing work with utility companies.

C. Protect utilities to remain from damage.

D. Protect trees, plants, and other features designated to remain as final landscaping.

E. Provide protection necessary to prevent damage to existing improvements, trees, or vegetation indicated.

F. Provide traffic control as required, in accordance with the U.S. Department of Transportation "Manual of Uniform Traffic Control Devices" and Maine Department of Transportation (Maine DOT) requirements.

G. 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. Thoroughly clean and/or sweep streets and roadways on a daily basis or more frequently as required by the governing authority.

H. Promptly repair damage to adjacent facilities caused by the clearing and grubbing operations, at no cost to the Owner.

I. Protect bench marks, survey control points, and existing structures form damage or displacement.

PART 2 PRODUCTS

2.01 MATERIALS

A. Herbicide: Use an approved chemical registered in the State of Maine for stump or basal bark treatment.

B. Fill Material: As specified in the Geotechnical Report.

PART 3 EXECUTION

3.01 PREPARATION

A. Locate and identify utilities to remain.

B. Verify that existing plants designated to be relocated are tagged or identified.

C. Identify a waste area for placing removed materials.

3.02 PROTECTION

A. Protect utilities to remain from damage.

B. Protect existing trees and other vegetation indicated or directed by the Owner 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 the drip line, excess foot or vehicular traffic, or paring of vehicles within dripline.

C. Pollution Controls: Use water sprinkling to limit to the lowest practical level the amount of dust and dirt rising and scattering in the air. Do not use water when it may create hazardous conditions, ice, flooding or pollution.

D. Clean adjacent structures and improvements for dust, dirt and debris caused by clearing and grubbing or earthwork operations. Return adjacent areas to conditions existing prior to the start of the work.

3.03 CLEARING

A. Clear areas required for access to site and execution of Work.

B. Remove trees, shrubs, and stumps within marked areas and as directed by Owner.

C. Remove roots to a depth of 18 inches

D. Clear undergrowth and deadwood, including blown down or uprooted trees, without disturbing subsoil.

E. Apply herbicide to remaining stumps to inhibit growth.

F. Carefully and cleanly cut roots and branches of trees indicated to be left standing where such roots and branches obstruct new construction.

G. Stumps not required to be removed: Cut flush with ground elevation.

H. Retain root systems intact in areas where erosion is likely.

I. Tree wound paint.
   1. Apply to all cut surfaces of trees to remain and to all surgically repaired areas damaged by construction.
   2. Apply material recommended by the tree wound paint manufacturer for trees which are not readily affected by the standard applications.

3.04 REMOVAL

A. Remove paving, curbs, poles, posts, signs, fences, gates, culvert and minor structures to facilitate construction. Where required by these Drawings, or directed by Owner, preserve those curbs, light poles, posts, signs, feces, gate, culverts, minor structures, and other features called for to be reset. Reset removed objects immediately upon completion of backfilling, unless otherwise directed by Owner.

B. Remove portions of existing pavement; as indicated. Neatly saw cut edges at right angle to surface with a paving saw or compressed air cutter satisfactory to Owner.

C. Remove debris from site.

3.05 GRUBBING

A. Limits of grubbing: Coincide with limits of clearing.

B. Use only hand methods for grubbing inside drip line of trees indicated to be left standing.

C. Remove all stumps, roots over 2 inches in diameter, and matted roots within limit of grubbing to depths of organics or maximum depths shown below:
   1. Walks - 18 inches
   2. Roads - 24 inches
   3. Parking Areas - 24 inches
   4. Lawn Areas - 12 inches

3.06 TOPSOIL REMOVAL

A. Remove vegetation from areas before stripping.

B. Strip topsoil to whatever depths encountered, avoiding its inter mingling with the underlying subsoil or other objectionable material.

C. Prevent topsoil from mixing with underlying subsoil or other objectionable material.

D. Stockpiling:
   1. Stockpile in areas on site as directed by Owner.
   2. Locate out of natural drainageways.
   3. Construct to freely drain surface water to a height not to exceed 8 feet with side slopes of 1:5:1 to 2:1.
   4. Erect silt fence surrounding stockpile immediately following formation.
   5. Cover if required to prevent wind-blown dust.
   6. Apply temporary seeding if piles remain for a period of greater than ten days.

3.07 DISPOSAL

A. Burning of Materials: Burning will not be permitted.

B. Removal: Remove material, debris, rock and extracted plant life from site daily as it accumulates

and legally dispose of.

C. Dumping: Dispose of material in an approved off site legally operated disposal area.

D. Chipping: Reduce to dimensions of less than 2 inches by use of an approved chipping machine and dispose of at an approved off site, legally operated disposal area.

E. Trucks removing demolition debris from the site shall be covered or shall be of a closed body design to prevent the accidental throwing upon any way of tracks, nails, wire, scrap metal, glass, crockery, or other substances injurious to the feet of persons or animals or to tires or wheels of vehicles.

3.08 RESTORATION

A. Restore any improvements damaged by or removed by this work to original condition, as acceptable to Owners or other parties or authorities having jurisdiction including but not limited to fences, curbs, signs, trees, shrubs, vegetation, poles, and posts.

B. Repair or replace trees and vegetation damaged by construction operations, in a manner acceptable to Owner.

C. Retain qualified tree surgeon to repair specimen tree damage.

D. Replace trees damaged beyond repair.

3.09 EXISTING UTILITIES AND BUILT ELEMENTS

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits. All abandonment of existing services shall comply with the respective utility company requirements.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Protect existing structures and other elements that are not to be removed.

3.10 DEBRIS

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 02230

SECTION 02250

DEWATERING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish, operate and maintain dewatering equipment for control, collection, and disposal of ground and surface water entering trenches and excavations.

1.02 RELATED SECTIONS

A. Section 02315 - Excavation and Backfill.

B. Section 02317 - Trenching for Site Utilities.

C. Section 02230 - Site Clearing.

D. Section 02320 - Slope Protection and Erosion Control.

E. Section 02510 - Water Distribution

F. Section 02535 - Sanitary Sewer Piping

G. Section 02635 - Storm Drainage Piping.

H. Section 02640 - Manholes and Covers.

1.03 DESIGN REQUIREMENTS

A. Design dewatering facilities including drains, piping and pumping.

1.04 SUBMITTALS

A. Prior to start of excavation and trenching, submit dewatering design and methods to Owner for review.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Provide pumps, drains, piping and other facilities necessary to keep excavations and trenches free of water including spare units available for immediate use in the event of equipment failure.

PART 3 EXECUTION

3.01 PROTECTION

A. Protect watercourses, sewer systems and adjacent properties from siltation by use of sediment ponds or other measures acceptable to Owner.

B. Keep excavations clear of groundwater, tidal water, surface water, seepage, sewage and stormwater.

C. Coordinate with appropriate authorities regarding discharge/disposal of water and sediment. Comply with applicable requirements and specifications.

3.02 INSTALLATION

A. Install, construct and maintain equipment and facilities required for work of this section.

B. Dispose of water removed from Work in a suitable manner which will not interfere with other work, cause erosion, damage pavements, other surfaces or property and is acceptable to Owner.

C. Remove dewatering equipment and facilities when no longer required.

D. Backfill excavations in accordance with 02315.

E. Repair damage resulting from dewatering operations.

END OF SECTION 02250

SECTION 02315

EXCAVATION AND BACKFILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures, and utilities within the building.

B. Common Excavation, stockpile subsoil for later reuse. Remove excess from site.

C. Grade and rough contour site.

D. Prepare subsoil and borrow to receive subbase and base gravels and topsoil materials.

E. Fill materials

F. Aggregate base and subbase gravels for pavement areas

G. Preparation of foundation bearing surfaces.

H. Place, grade and compact subbase and base gravels to receive pavement.

I. Compaction requirements.

J. Dust Control.

K. The following soils report, boring logs, supplemental reports, letters, etc. are included and hereby made a part of these specifications. Construct project in accordance with the recommendations contained in these reports. All references in the construction documents to "Geotechnical Report" or "Soils Report" are to the following:

1. “Explorations and Geotechnical Engineering Services Proposed Bank Branch Building 314 Allen Avenue Portland, Maine” prepared by S.W. Cole Engineering, Inc. and dated June 22, 2010.

1.02 RELATED REQUIREMENTS

A. Geotechnical report; bore hole locations and findings of subsurface materials.

B. Section 02250 - Dewatering.

C. Section 02317 - Trenching for Site Utilities.

D. Section 02320 - Slope Protection and Erosion Control.

E. Section 02510 - Water Distribution

F. Section 02535 - Sanitary Sewer Piping

G. Section 02635 - Storm Drainage Piping

H. Section 02741 - Bituminous Concrete Paving.

1.03 REFERENCES

A. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 1996a.

B. ASTM D 698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 1991.

C. ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 1991.

D. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System); 1998.

E. .ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 1996.

F. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 1996.

G. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 1998.

H. State of Maine Department of Transportation, Standard Specifications, latest edition (Maine DOT Specifications).

1.04 DEFINITIONS

A. Common Excavation: Excavated material meeting the description of Maine DOT Specifications Section 203.01, except common excavation shall include the removal and disposal of boulders, solid mortared stone masonry, and concrete masonry when each is less than 2 cubic yards in volume.

B. Earth excavation includes excavation of pavements and obstructions visible on ground surface; underground structures, utilities and other items indicated to be demolished and removed; together with earth and other materials encountered.

1.05 SUBMITTALS

A. Samples: 75 pound sample of each type of fill and aggregate material; submit in air-tight containers to testing laboratory.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory gradation tests on proposed and actual materials used.

D. Moisture Density Test Reports: Results of ASTM D 1557 laboratory tests. Verify soil/fill-bearing capacity conforms to design requirements. Perform on test at each column pad and per each 50 linear feet of foundation.

E. Field density tests: Perform at least one test per each 2,500 sq. ft. per lift or fill

F. Trench Backfill: Perform at least one test per each 100 lineal feet of trench. Recompact and retest density and compaction of any trench installed after building pad testing has been performed.

G. Foundation wall backfill inside and outside shall have compaction tests made every 50 linear feet. Tests shall be performed on each 12 inch lift.

H. Perform one test per each type soil and each 1,000 cubic yards of material.

1.06 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Protect plants, lawns, and other features to remain.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

D. Protect above or below grade utilities which are to remain.

E. Underpin adjacent structures which may be damaged by excavation work, including service utilities and pipe chases.

F. Notify Owner of unexpected subsurface conditions and discontinue work in affected area until notification to resume work.

G. Protect excavations and soil adjacent to and beneath foundations from frost.

H. Grade excavation top perimeter to prevent surface water runoff into excavations.

I. Protect excavations by shoring, bracing, sheet piling, underpinning or other methods required to prevent cave-in or loose soil from falling into excavation.

J. Maintenance of existing flows:
   1. Keep existing sewers and drains in operation.
   2. If existing sewers and drains are disturbed, provide for maintenance of such flows until work is completed.
   3. Do not allow raw sewage to flow on ground surface or stand in excavation.

K. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary. store materials on site in advance of need.

L. When fill materials need to be stored on site, locate stockpiles where indicated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.
   4. Limit stockpile heights so as to preclude ground failure.

M. The Contractor will be responsible for obtaining any necessary street opening permits from the City of Portland, and complying with the terms and conditions of said permit.

PART 2 PRODUCTS

2.01 MATERIALS

A. Subsoil: Reused, meeting the requirements of Granular Borrow or as Common Borrow, provided they comply with the specifications below.

B. Common Borrow: Maine DOT Section 703.18; Shall consist of inorganic mineral soil free of ice, loam, organic or other unsuitable material, with sufficient moisture content to provide the required compaction, moisture content shall not exceed 4 percent above optimum. Determine optimum moisture content in accordance with ASTM D 698 (Cohesive Soils) or D 1557 (Granular Soils).

C. Granular Borrow: Maine DOT 703.19; Mixture of sand, gravel and silt or reclaimed asphalt, concrete, brick, crushed rock that is crushed and blended with sand, free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation of that portion passing a 2 inch sieve shall meet the following requirements:
   1. No. 40 sieve: 0 to 70 percent passing by weight.
   2. No. 200 sieve: 0 to 20 percent passing by weight.
   3. Granular borrow shall contain no particles or fragments with a maximum dimension in excess of one-half of the compacted thickness of the layer being placed. Granular borrow shall not contain particles of rock which will not pass the 6 inch square mesh sieve.

D. Aggregate Base: Maine DOT Section 703.06 Type 'A' Crushed Gravel, of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation of that part that passes a 3 inch sieve shall meet the following requirements:
   1. 1/2 inch sieve: 45 to 70 percent passing by weight
   2. 1/4 inch sieve: 30 to 55 percent passing by weight
   3. No. 40 sieve: 0 to 20 percent passing by weight
   4. No. 200 sieve: 0 to 5 percent passing by weight
   5. Type A aggregate shall not contain particles of rock which will not pass the 2 inch square mesh sieve.

E. Aggregate Subbase: Maine DOT Section 703.06, Type 'D' Gravel, of hard durable particles free form vegetable matter, lumps or balls of clay and other deleterious substances. The gradation of that part that passes a 3 inch sieve shall meet the following requirements:
   1. 1/4 inch sieve: 25 to 70 percent passing by weight
   2. No. 40 sieve: 0 to 30 percent passing by weight
   3. No. 200 sieve: 0 to 7 percent passing by weight.
   4. Type D aggregate shall not contain particles of rock which will not pass the 6 inch square mesh sieve.

F. Structural Fill: Clean, non-frost susceptible, sand, screened or crushed gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation shall meet the following requirements:
   1. 4 inch sieve: 100 percent passing by weight.
   2. 3 inch sieve: 90 to 100 percent passing by weight.
   3. 1/4 inch sieve: 25 to 90 percent passing by weight.
   4. No. 40 sieve: 0 to 30 percent passing by weight.
   5. No. 200 sieve: 0 to 5 percent passing by weight.

G. Crushed Stone: Maine DOT Section 703.22 Underdrain backfill Type 'C' meeting the following requirements:
   1. 1 inch sieve: 100 percent passing by weight.
   2. 3/4 inch sieve: 90 to 100 percent passing by weight.
   3. 3/8 inch sieve: 0 to 75 percent passing by weight.
   4. No. 4 sieve: 0 to 25 percent passing by weight.
   5. No. 10 sieve: 0 to 5 percent passing by weight.

2.02 ACCESSORIES

A. Water for sprinkling: Fresh and free from oil, acid, and injurious alkali or vegetable matter.

B. Woven Geotextile Fabric: Non-Biodegradable, Mirafi 500x or approved equivalent.

C. Non-woven Geotextile Fabric: Non-Biodegradable, Mirafi 160N or approved equivalent.

D. Calcium chloride: ASTM D 98 commercial grade except as waived by Owner.

2.03 SOURCE QUALITY CONTROL

A. Where fill materials are specified by reference to a specific standard, test and analyses samples for compliance before delivery to site.

B. If tests indicate materials do not meet specified requirements, change material and retest. Materials failing to meet specified requirements, if used prior to acceptance, shall be removed and replaced at no cost to Owner.

C. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. Examine the areas and conditions under which excavating and filling is to be performed and notify Owner in writing of conditions detrimental to proper and timely completion of work.

C. Correct unsatisfactory conditions in a manner acceptable to owner prior to proceeding with work.

D. Maintain in operation condition existing utilities, active utilities and drainage systems encountered in utility installation. Repair any surface or subsurface improvements as shown on Drawings.

E. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

F. Verify structural ability of unsupported walls to support imposed loads by the fill.

G. Notify utility company to remove and relocate utilities.

3.02 INSPECTION

A. Verify stockpiled fill to be reused is approved.

B. Verify areas to be backfilled are free of organics, debris, snow, ice or water, and surfaces are not frozen.

3.03 PREPARATION

A. When necessary, compact subgrade surfaces to density requirements for aggregate base and aggregate subbase materials.

B. Identify known underground utilities. Stake and flag locations.

C. Identify and flag surface and aerial utilities.

D. Notify utility companies of work to be done.

E. Locate, identify, and protect utilities that remain and protect from damage.

F. Proofroll subgrade surface to identify soft spots.

3.04 FOUNDATION PREPARATION

A. Construct building pad in such a manner as to provide positive drainage of surface water off the pad and to protect the pad surface and subgrade. Temporary ditches shall be constructed to carry any surface runoff away from the pad area, as directed by the Owner. At the start of building construction, the pad shall be prepared for foundations and temporary ditches properly backfilled.

B. Topsoil and pavement shall be removed from proposed building area.

C. Excavation to subgrade shall be made with a smooth-edge bucket to lessen disturbance of subgrade soils.

D. All building and drive-through canopy footings as well as exterior foundations for signs be cast on at least 12 inches of compacted ¾-inch crushed stone fully wrapped with a non-woven geotextile fabric such as Mirafi 160N or equivalent.

E. At least 12 inches of Structural Fill shall be placed beneath the slab-on-grade. The Structural Fill shall be compacted to at least 95 percent of its maximum dry density per ASTM D-1557 (Modified Proctor).

F. All fill placed beneath the building shall consist of Structural Fill. Structural Fill shall be used for interior and exterior foundation backfill and backfill of exterior foundations such as bollards and light pole bases.

G. Fills shall be placed in horizontal lifts and be compacted. Lift thicknesses shall be such that desire density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment

H. All soil fill that is placed below the building, sidewalk and paved areas shall be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557.

I. Exterior perimeter underdrains shall be provided within the fabric wrapped crushed stone layer beneath perimeter footings.

J. Underdrains shall have perforations of ¼ to 5/8 inch. 6 inches of ¾ inch crushed stone bedding shall be provided around the underdrains. The stone shall be wrapped with a geotextile filter fabric such as Mirafi 160N or equivalent. The underdrains shall have positive gravity outlets.

K. Exterior foundation backfill shall be sealed with a surficial layer of clayey or loamy soil in areas that are not paved or occupied by entrance slabs.

3.05 EXCAVATING

A. Underpin adjacent structures which may be damaged by excavating work.

B. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

C. Excavate materials encountered when establishing required subgrade elevations in accordance with Maine DOT Specification Sections 203.04 and 203.05.

D. Remove lumped subsoil, boulders, solid mortared stone masonry, concrete masonry and rock up to 2 cubic yards, measured by volume.

E. Conform to elevations, contours, dimensions, line and grade shown on the drawings.

F. When excavating through roots is necessary, perform work by hand and cut roots with a sharp axe.

G. Slope banks of excavations deeper then 4 feet to angle of repose or flatter until shored. All excavations shall be consistent with OSHA regulations.

H. Do not excavate wet subsoil

I. Remove all existing fill soils from beneath foundations.

J. Do not interfere with 45 degree bearing splay of foundations

K. Correct areas that are over-excavated and load-bearing surfaces that are disturbed at no cost to Owner

L. Grade top perimeter of excavation to prevent surface water from draining into excavation.

M. Remove excavated material that is unsuitable for re-use form site.

N. Surplus Material:
   1. Make arrangements to provide suitable disposal areas off-site
   2. Deposit and grade material to the satisfaction of the owner of the property on which the material is deposited.
   3. Obtain any necessary permits for disposal.
   4. Provide suitable watertight vehicles to haul soft or wet materials over streets or pavements to prevent deposits on same.
   5. Keep crosswalks, streets, and pavements clean and free of debris.
   6. Clean up materials dropped from vehicles as often as directed by Owner.

O. Excavation beneath entrances and sidewalks abutting the building shall continue to at least 4.5 feet below finished grade.

P. The area beneath all concrete pavement shall be excavated to at least 4.5-feet below finished grade.

3.06 FILLING AND SUBGRADE PREPARATION

A. Topsoil and pavement shall be removed from proposed fill and pavement areas.

B. Should the subgrade become yielding or difficult to work, disturbed areas shall be excavated and backfilled with compacted Structural Fill (dry subgrades) or ¾ crushed stone overlying a non-woven geotextile filter fabric such as Mirafi 160N, or equivalent (wet subgrades).

C. Crushed stone, if used, shall be compacted to at least 100 percent of its dry rodded unit weight as determined by ASTM C-29.

D. The entire length and width of entrance slabs and adjacent sidewalk areas shall be underlain with

compacted Structural Fill to a depth of at least 4.5 feet below finished grade. A gradual transition (3H:1V) of the Structural Fill thickness shall be provided from the 4.5 foot depth to the bottom of the pavement subbase material at adjacent paved areas. Structural Fill shall be placed in lifts and compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557.

E. The area beneath all concrete pavement shall be excavated at least 4.5 feet below finish grade and be backfilled with MDOT Type D Subbase, compacted to 95 percent of its maximum dry density per ASTM D-1557 up to the bottom of the Type A aggregate base material. A gradual transition (3H:1V) of the sub-base shall be provided up to the adjacent bituminous pavement sub-base materials to reduce the potential for abrupt differential movement due to frost action.

F. Pavement subgrade in fill areas shall consist of Type D subbase or Structural Fill compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557.

G. Landscape subgrade shall consist of Common Borrow compacted to at least 90 percent of its maximum dry density as determined by ASTM D-1557

H. Place and compact fill materials in continuous layers not exceeding 12 inches loose depth upon compacted material.

I. Fill to contours and elevations indicated on plans using unfrozen materials.

J. Fill up to subgrade elevations unless otherwise indicated.

K. Employ a placement method that does not disturb or damage other work.

L. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

M. Maintain optimum moisture content of fill materials to attain required compaction density.

N. Compaction Density Unless Otherwise specified or Indicated:
   1. Under building, paving, sidewalk, slabs-on-grade, and similar construction: 95 percent of maximum dry density.
   2. At other locations: 90 percent of maximum dry density.

O. Leave stockpile areas completely free of excess fill materials

P. Reshape and re-compact fills subjected to vehicular traffic.

Q. Frost:
   1. Do not excavate to full indicated depth when freezing temperatures may be expected unless fill material or structures can be constructed immediately after the excavation has been completed. Protect the excavation from frost if placing of fill or structure is delayed.
   2. Fill shall not be placed over frozen soil. Soil that is frozen shall be removed prior to placement of compacted fill. Remove all frozen uncompacted soil prior to placing additional fill for compaction.

3.07 CONSTRUCTION OF AGGREGATE BASE AND SUBBASE COURSE

A. Place and compact aggregate base and subbase course materials in continuous layers not exceeding 12 inches loose depth upon compacted material, unless noted otherwise.

B. Employ a placement method so not to disturb or damage structures and utilities.

C. Spread well-mixed materials having no pockets or either fine or coarse materials.

D. Do not segregate large or fine particles.

E. The base and subbase materials shall be compacted to at least 95 percent of their maximum dry densitities as determined by ASTM D-1557.

F. Maintain surface, compaction and stability until placement course has been placed.

G. Conform to elevations, contours, dimensions, line and grade shown on the Drawings.

3.08 DUST CONTROL

A. Upon request of Owner, implement the following dust control measures:
   1. Apply water and calcium chloride as directed by Owner.
   2. Spread calcium chloride uniformly over designated area.
   3. Apply water with equipment having a tank with pressure pump and nozzle equipped spray bar acceptable to Owner.

3.09 TOLERANCES

A. Top surface of base and subbase course: Plus or minus 3/8 inch.

3.10 FIELD QUALITY CONTROL

A. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

B. Compaction density testing will be performed by the Owner of compacted fill in accordance with ASTM D 2922.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor") or ASTM D 1557 ("modified Proctor") as appropriate for soil type.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.

E. Frequency of Tests:
   1. Building subgrade areas, including 10'-0" outside exterior building lines: In fill areas, not less than one compaction test on each lift for every 2,500 square feet. Proofroll cut areas.
   2. Areas of construction exclusive of building subgrade: In fill areas, not less than one compaction test on each lift for every 10,000 square feet. Proof roll cut areas.

3.11 PROTECTION

A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Protect newly graded areas form traffic and erosion and keep free of trash and debris.

D. Repair and re-establish grades in settled, eroded and rutted areas within specified tolerances.

E. Slope fill surfaces to shed water.

3.12 ATTACHMENTS

A. “Explorations and Geotechnical Engineering Services Proposed Bank Branch Building 314 Allen Avenue Portland, Maine” prepared by S.W. Cole Engineering, Inc. and dated June 22, 2010.

END OF SECTION 02315

SECTION 02317

TRENCHING FOR SITE UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating trenches and backfill for utilities, including underslab utilities

B. Excavating for manholes, catch basins and other structures.

C. Compacted bedding and compacted backfilling over utilities to subgrade elevations.

D. Compacted base and compacted backfilling for manholes, catch basins and other structures to subgrade elevations.

E. Compaction requirements.

F. Dust Control

1.02 RELATED REQUIREMENTS

A. Section 02250 - Dewatering.

B. Section 02315 - Excavation

C. Section 02510 - Water Distribution

D. Section 02535 - Sanitary Sewer Piping

E. Section 02635 - Storm Drainage Piping

1.03 REFERENCES

A. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2006.

B. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2000a.

C. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2002.

D. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2000.

E. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

F. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

G. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2005.

1.04 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: As indicated on drawings or the bottom of aggregate subbase gravel in paved areas, the bottom of aggregate base gravel in sidewalk areas, the bottom of loam in seeded areas, or to 1 foot below finished floor elevation.

1.05 SUBMITTALS

A. Samples: 75 pound sample of each type of fill; submit in airtight containers to testing laboratory.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

D. Compaction Density Test Reports.

1.06 PROJECT CONDITIONS

A. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where designated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

C. Verify that survey bench marks and intended elevations for the Work are as indicated.

D. Protect plants, lawns, and other features to remain.

E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

F. Protect excavations by shoring, bracing, sheet piling, underpinning or other methods required to prevent cave-in or loose soil from falling into excavation

G. Protect above or below grade utilities which are to remain. Repair any damage caused by construction of this project at no cost to Owner

H. Underpin adjacent structures which may be damaged by excavation work, including service utilities and pipe chases.

I. Protect excavations and soil adjacent to and beneath foundations from frost.

J. Grade excavation top perimeter to prevent surface water runoff into excavations.

K. Maintenance of existing flows:
   1. Keep existing sewers and drains in operation.
   2. If existing sewers and drains are disturbed, provide for maintenance of such flows until work is completed.
   3. Do not allow raw sewage to flow on ground surface or stand in excavation.

L. The Contractor will be responsible for obtaining the necessary street opening permits from the City of Portland, and complying with the terms and conditions of said permit. The Contractor is required to pay for applicable frees. Applicable fees to be included in bid.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. Type B Underdrain Sand: Granular material meeting the requirements of Maine DOT Section 703.22, Type B Underdrain Backfill, with the following limits:
   1. 1 inch (25 mm) sieve: 95 to 100 percent passing by weight.
   2. 1/4 inch sieve: 75 to 100 percent passing by weight.
   3. No. 4 sieve: 50 to 100 percent passing by weight.
   4. No. 20 sieve: 15 to 80 percent passing by weight
   5. No. 50 sieve: 0 to 15 percent passing by weight.
   6. No. 200 sieve: 0 to 5 percent passing by weight.

7. Type B backfill shall not contain particles of rock which will not pass the 1-1/2 inch square mesh sieve.

B. Type C Underdrain stone: Crushed material meeting the requirements of Maine DOT Section 703.22, Type C Crushed Stone, with the following limits:
   1. 1 inch sieve: 100 percent passing by weight
   2. 3/4 inch sieve: 90 to 100 percent passing by weight
   3. 3/8 inch sieve: 0 to 75 percent passing by weight
   4. No. 4 sieve: 0 to 25 percent passing by weight
   5. No. 10 sieve: 0 to 5 percent passing by weight

C. Sand Bedding & Backfill; free of silt, clay, loam, friable or soluble materials, and organic matter.
   1. Graded in accordance with the following limits
      a. 3/8 inch sieve: 100 percent passing by weight
      b. No. 4 sieve: 95 to 100 percent passing by weight
      c. No. 200 sieve: 0 to 5 percent passing by weight

2.02 ACCESSORIES

A. Woven Geotextile Fabric: Non-biodegradable, Mirafi 500x or approved equivalent.

B. Non-Woven Geotextile Fabric: Non-biodegradable, Mirafi 160N or approved equivalent.

C. Water for sprinkling: Fresh and free from oil, acid and injurious alkali or vegetable matter.

D. Calcium Chloride: ASTM D98 commercial grade except as waived by the Owner.

2.03 SOURCE QUALITY CONTROL

A. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

B. If tests indicate materials do not meet specified requirements, change material and retest. Materials not meeting specified requirements, if used prior to acceptance, shall be removed and replaced at no cost to Owner.

C. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify stockpiled fill to be reused is approved.

B. Verify areas to be backfilled are free of organics, debris, now ice or water, and surfaces are not frozen.

3.02 PREPARATION

A. When necessary, compact subgrade surfaces to density requirements of aggregate base and aggregate subbase materials.

B. Identify known underground utilities. Stake and flag locations.

C. Identify and flag surface and aerial utilities.

D. Notify utility companies of work to be done.

E. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Type B Underdrain Sand Backfill if above the groundwater table, and Type C Underdrain Stone if below the groundwater table and compact to density equal to requirements for subsequent backfill material.

F. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.03 GENERAL REQUIREMENTS

A. Refer to Section 02315 Excavation and Backfill.

B. Provide trenching and backfilling for water service, sewerage pipes, conduits and structures. Water and sewerage lines separation shall be minimum 10 feet horizontally and 18 inches vertically. Lay all piping in open trench. Maintain access to fire hydrants by fire-fighting equipment.

C. Sheet and brace trenches and remove water as necessary to fully protect workmen and adjacent facilities, in keeping with local regulations or in the absence there of, with the provisions of the 'Manual of Accident Prevention in Construction,' of the Associated General Contractors of America, Inc. Under no circumstances lay pipe or install appurtenances in water. Keep the trench free from water until pipe joint material has hardened. Sheeting left in place shall be cut off not less than 2 feet below finished grade. Sheeting shall not be removed until the trench is substantially backfilled.

D. Excavation under this contract shall be unclassified

E. Should soil conditions necessitate special supports for piping and/or appurtenances, including the removal of unsuitable material and refilling with sand bedding, such work shall be performed as necessary.

F. Backfill trenches only after piping has been inspected, tested and the location of pipe and appurtenances have been recorded. Backfill by hand around pipe and for a depth of 1 foot above the pipe. Use earth without rock fragments or large stones and tamp as specified in layers not exceeding 6 inches in thickness, taking care not to disturb the pipe or damage the pipe coating. Compact the remainder of the backfill as specified with a rammer of suitable weight, or with an approved mechanical tamper, provided that under pavements, walks and other surfacing, the backfill shall be tamped as specified. Exclude all cinders, rubbish and scrap metal from trenches in which metal pipes are laid. Special care shall be used to properly tamp backfill under lower half of sewer pipe.

3.04 ELECTRICAL / TELEPHONE

A. Refer to the Handbook of Standard Requirements for Electric Service and Meter Installation for installation requirements for primary electric service, secondary eclectic service, telephone service and cable services. Pull ropes shall be installed in all conduits.

3.05 TRENCHING

A. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove large stones and other hard matter which could damage piping or impede consistent backfilling or compaction.

G. Remove excavated material that is unsuitable for re-use from site.

H. Stockpile excavated material to be re-used in area designated on site.

I. Correct unauthorized excavation with Sand Bedding, Type B Underdrain Sand or Type C Underdrain Stone as directed by Owner at no cost to Owner.

J. Fill over-excavated areas under pipe bearing surfaces with sand Bedding, Type B Underdrain

Sand or Type C Underdrain Stone or as directed by Owner.

K. Do not store excavated material adjacent to excavations where they could surcharge side slopes.

L. Remove excess excavated material from site.

M. Surplus material:
   1. Make arrangements to provide suitable disposal areas off-site
   2. Deposit and grade material to the satisfaction of the owner of the property on which the material is deposited.
   3. Obtain any necessary permits for disposal.
   4. Provide suitable watertight vehicles to haul soft or wet materials over streets or pavements to prevent deposits on same.
   5. Keep crosswalks, streets, and pavements clean and free of debris.
   6. Clean up materials dropped from vehicles as often as directed by Owner.

3.06 REPAIRS TO EXISTING PIPES, CONDUIT AND WATER LINES

A. Remove damaged or broken portions of pipe or conduit and replace with a pipe or conduit of the same size and material, unless otherwise directed by Owner, designed to serve same function as existing pipe or conduit.

B. Make connections for repair with flexible couplings to satisfaction of Owner

C. Maintain inventory of suitable repair materials on site.

D. Make repairs immediately following discovery of damaged.

E. Do not backfill until repairs have been completed to satisfaction of Owner

F. Repairs to water mains and services will be by the water utility. Coordination and payment of repairs shall be the responsibility of the Contractor.

3.07 BACKFILLING

A. Place and compact bedding material to grade of underside of pipe in trench bottom as soon as excavation reaches grade.

B. Compact bedding material to provide firm laying base.

C. After pipe is laid to grade, place bedding materials uniformly on each side of pipe up to spring line while carefully compacting bedding material under haunches of pipe.

D. Support pipe and conduit during placement and compaction of bedding fill.

E. Place and compact base material to grade of underside of appurtenant structures in bottom of excavation as soon as excavation reaches grade.

F. Compact base material for appurtenant structures to provide a firm laying base.

G. Utility Pipes shall be bedded and surrounded using materials consistent with the Trench Section detail. Above the utility bedding, backfill in trenches shall be similar to that in the trench sidewalls to reduce the potential for differential frost action between the trench and the adjacent materials.

H. Backfill materials shall be placed in horizontal lifts not exceeding 12-inches in thickness and shall be compacted to a desnity similar to that of the material in the adjacent trench sidewalls.

I. Backfill to contours and elevations indicated using unfrozen materials.

J. Install geotextile fabric in accordance with manufacturer's recommendations and where shown on Drawings.

K. Employ a placement method that does not disturb or damage other work or existing pipe.

L. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

M. Maintain optimum moisture content of fill materials to attain required compaction density.

N. Leave stockpile areas completely free of excess fill materials.

O. Upon completion of backfilling in paved areas, sweep undisturbed pavement.

P. Upon request of Owner implement the following dust control measures during the interim period between backfilling and capping of the trench:
   1. Apply water and calcium chloride as directed by Owner.
   2. Spread calcium chloride uniformly over designated areas.
   3. Apply water with equipment having a tank with pressure pump and nozzle equipped spray bar acceptable to Owner.

Q. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under building, paving, sidewalks, slabs-on-grade, and similar construction: 95 percent of maximum dry density.
   2. At other locations: 90 percent of maximum dry density.

3.08 TOLERANCES

A. Top Surface of General Backfilling: Plus or minus 1 inch form required elevations.

3.09 FIELD QUALITY CONTROL

A. Compaction density testing will be performed by Owner of compacted fill in accordance with ASTM D 2922.

B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor") or ASTM D 1557 ("modified Proctor") as appropriate for soil type.

C. If test indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.

D. Frequency of Tests: 1 test for each 200'-0" of trench for the first and every other lift of compacted trench backfill not including pipe bedding.

3.10 CLEAN-UP

A. Leave unused materials in a neat, compact stockpile.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

SECTION 02320

SLOPE PROTECTION AND EROSION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary silt fence.

B. Stone check dams.

C. Plain riprap - machine placed stones on filter fabric.

D. Stabilized Construction Entrance

1.02 RELATED SECTIONS

A. Section 02230 - Site Clearing

B. Section 02315 - Excavation

1.03 ENVIRONMENTAL REQUIREMENTS

A. Conform to Maine Department of Environmental Protection publication "Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices" latest edition.

B. Maintain erosion control installations in a functional condition at all times. Inspect after each rainfall and at least daily during prolonged rainfall. Immediately correct deficiencies.

PART 2 PRODUCTS

2.01 MATERIALS

A. Silt Fence: Maine DOT Section 656.03

B. Store check dams: Crushed stone

C. Woven Geotextile Fabric: Mirafi 500x or Approved Equal.

D. Non-Woven Geotextile Fabric: Mirafi 140N or Approved Equal.

E. Stone for Stabilized Construction Entrance: Crushed Stone Meeting the following requirements
   1. 3 inch sieve: 100 percent passing by weight.
   2. 2 inch sieve: 0 to 20 percent passing by weight.
   3. 3/4 inch: 0-5 percent passing by weight.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Beginning of installation means installer accepts existing surface conditions.

3.02 INSTALLATION

A. Install silt fences before beginning grubbing.

B. Install silt fences in accordance with Maine DOT Section 656.08

C. Install plain riprap in accordance with Maine DOT 610 with the exception that plain riprap shall be installed on filter fabric installed per manufacturer's recommendations.

3.03 MAINTENANCE

A. Maintain erosion control installations in a functional condition at all times. Inspect measures at least weekly, after each rainfall and at least daily during prolonged rainfall. Immediately correct

deficiencies.

B. Make a daily review of the location of erosion control measures in areas where construction activity causes drainage runoff to ensure that erosion control measures are properly located for effectiveness.

C. Where deficiencies exist, install additional erosion control measures as approved or directed by the Owner. No additional payment shall be made for additional erosion control measures which may be required.

3.04 TEMPORARY EROSION CONTROL REMOVAL

A. Remove temporary silt fence and hay bales when site is stabilized and grass catch is at least 80 percent and dispose of in a proper manner.

B. Remove stone check dams when drainage channel is stabilized and grass catch is at least 80 percent and dispose of in a proper manner. Stone shall be raked out to a maximum depth of one layer to allow future vegetation to grow through the stone.

END OF SECTION 02320

SECTION 02510

WATER DISTRIBUTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe and fittings for site water lines including domestic water lines.

B. Valves.

1.02 RELATED REQUIREMENTS

A. Section 02250 - Dewatering

B. Section 02317 - Trenching for Site Utilities.

C. Section 02315 - Excavation: Excavating of trenches.

D. Section 02317 - Trenching for Site Utilities: Excavating, bedding, and backfilling.

1.03 REFERENCES

A. ASTM B 88 – Standard Specification for Seamless Copper Water Tube; 2003.

1.04 SUBMITTALS

A. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with Portland Water District specifications. The contractor shall comply with the requirements contained within these section and those contained within the Districts specifications. In the event of conflicting requirements, the more stringent standard shall apply.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Unload materials so as to avoid shock or damage. Handle and store all pipe in such a manner as to avoid deterioration or other injury thereto. Place no pipe within pipe of larger size. Store pipe and fittings on sills above storm drainage level and delivery for laying after trenches are excavated. Valves and Hydrants shall be dried and stored to protect then from damage.

PART 2 PRODUCTS

2.01 MATERIALS

A. Refer to the Portland Water District specifications attached to this section.

2.02 THRUST BLOCKS

A. Blocks shall be concrete of a mix not leaner than 1:2-1/2:5 cement:sand:stone, and shall have a compressive strength of not less than 3,000 psi at 28 days. Concrete for thrust blocks shall be placed against undisturbed earth.

B. Bedding: As specified in Section 02317.

C. Cover: as specified in Section 02317.

PART 3 EXECUTION

3.01 TRENCHING

A. See Sections 02315 and 02317 for additional requirements

B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION - PIPE

A. Service line from existing curb stop shall be furnished and installed to serve the project. The project contract work shall begin at indicated public water supply line and shall include all water lines, valves, and appurtenances as shown on the drawings, except as indicated otherwise.

B. Pipe-Laying - General:

1. The interior of all pipe shall be clean and joint surfaces wiped clean and dry before the pipe is lowered into trench. Lower each pipe, fitting and valve into the trench carefully and lay true to line and without objectionable breaks in grade. The depth of cover below finished grade shall be not less than 5'-6" and the standard cover shall be 6'-0".
2. Provide uniform bearing for all pipe in trenches. Do not allow trench water or dirt to enter the pipe after laying. Insert a watertight plug in the open end of the piping while laying of pipe is not in progress.
3. Do not lay pipe closer than 10 feet to a sewer. At cross-overs with sewer, no joint in the water line shall be closer than 6 feet from the cross-over point. A minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer shall be maintained when the water main is either above or below the sewer. Provide valves, plugs or caps, as required, where pipe ends are left for future connections.

C. All pipe shall be laid with standard provisions for expansion and contraction and in accordance with manufacturer's recommendations. All pipe with slip type joints shall be restrained at elbows and tees by thrust blocks or rods and clamps.

D. Install suitable fittings at all changes in direction, dead ends and branch connections, provided that double strap saddles, in lieu of tees, may be used for service taps.

E. Before setting each valve, make sure that the interior is clean, and test opening and closing. Set valves and stops with stems plumb and at the exact location shown. Provide brick laid flat, or other similar foot-pieces, under each curb box. Valve and service boxes shall be plumb, with tops at finished grade.

F. Route pipe in straight line.

G. Install pipe to allow for expansion and contraction without stressing pipe or joints.

H. Slope water pipe and position drains at low points.

I. Connect to building water outlet

3.03 INSTALLATION - VALVES

A. Set valves on solid bearing.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

3.04 DISINFECTION OF WATER DISTRIBUTION SYSTEM

A. Disinfection procedures shall comply with Portland Water District specifications and requirements.

3.05 FIELD QUALITY CONTROL

A. Pressure test water mains in accordance with the requirements of the Portland Water District.

B. Disinfect water mains in accordance with the requirements of the Portland Water District.

C. If test indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.06 ATTACHMENTS

A. Portland Water District Specification - Section II: Work Associated with Water Main Construction.

B. Portland Water District Specification - Section III: Water Main Materials Specification.

END OF SECTION 02510

SECTION II: Work Associated with Water Main Construction

A. GENERAL

1. MAIN EXTENSION AGREEMENT:

After final plans depicting the approved water main configuration and right of way and or easements have been received, the District and the developer/contractor shall enter into a main extension agreement. At this time, the developer will deposit the following estimated fees:

a) Public Fire Protection Fee:
A fee applies in the amount of $4.00/ft for all towns except Raymond and Scarborough, $8.00/ft for these two towns. This fee applies when a main can be extended in the future beyond the end of a main extension in a local or state road. The amount is based on the average, per-foot cost of installing a public hydrant in each municipalilty. The footage is the distance from the last hydrant installed to the end of the main. This allows the prorated share of the cost of a future hydrant to be escrowed and applied to the installation cost when installed.

b) Planning & Engineering Fee:
This fee of $600/day represents non-inspection time spent by PWD's Asset Management and Planning Department to develop inspection plans, update record information, and complete As-Built record drawings. This estimate is based on the size and complexity of the project.

c) Inspection Fee:
$300/day (estimated at the beginning of the project and reconciled at the end of the project based on actual time that PWD spent inspecting the project)

d) Service Application Fee:
$45/service line

e) Meter Installation Fee:
$206.76 (typical residential meter) and up. Costs for larger size meters available on PWD website – www.pwd.org)

f) Main Extension Application Fee:
$154/project

g) Valve Box Adjustment Deposit:
$25/valve box (collected on main extensions). Deposit is refunded to Applicant when valve boxes are raised to final grade by Applicant's Contractor upon application of final paving surface. Should final paving not be completed after expiration of the one-year main warranty period, responsibility for raising valve boxes and deposit transfer to the Portland Water District.

h) M.D.O.T. Street Opening Permit Fees (if applicable).
State opening permit must be obtained by P.W.D.

After the project is completed, the District will reconcile all costs associated with the project and will either provide a refund if total costs are less than the deposited amount or request payment for costs in excess of the deposited amount.

2. LEGAL LOCATION PERMITS:

The Developer or agent shall submit a legal location permit (state or municipal) to the District. The District will sign the permit and submit to the State or Municipality.

3. INSPECTION:

An inspector from the District or a consultant working for the District will be assigned to each project to ensure that all work is completed and materials are installed in compliance with these specifications. All work must be inspected prior to backfilling. During the course of the work the inspector will report to the Engineering Supervisor on the progress of the work. Any deviation from the approved plans or specifications must be approved by the District before incorporation into the work.

The Contractor shall schedule with the District for inspection services a minimum of 5 working days prior to construction.

B. DESIGN CRITERIA

1. PIPE SIZE/TYPE:

All distribution mains 4" and larger shall be ductile iron per material specifications except under special site conditions where the District will specify a different pipe type. Beginning in 2007, all ductile iron pipe and services shall be wrapped in polyethylene encasement per AWWA Standards, PWD material specifications, and DIPRA's Polyethylene Encasement Installation recommendations. All distribution mains smaller than 4" shall be PVC per PWD material specifications.

All requests for a modification of the standard pipe material shall be made during the plan review phase of a project, not during the pre-construction phase, and shall be approved by the Business Development Engineer. The District will review leak history, available soil mapping, wetland delineations, plans showing cathodically protected utility crossings, and may require soil sampling prior to approving the change. Should it be shown that highly corrosive soils exist, PWD will specify the type of pipe to be used.

All main distribution pipe lines shall be of a size to adequately serve the needs of the proposed development and any potential extensions thereof, but in any event shall not be less than eight (8) inches in diameter except as may otherwise be permitted herein:

The minimum size of the pipe where public fire protection is to be provided or required shall be eight (8) inches in diameter. Dead-ends shall be minimized by looping all mains where practical. Where dead-ends are necessary they shall be terminated with a fire hydrant, or blow-off assembly. The nominal pipe diameter of water mains without public fire protection shall not be less than four (4) inches.

The District may request that the size of the main be increased beyond the required size for the project. This is sometimes necessary to facilitate the future expansion of the system beyond the scope of the developer's project. In this case the District will pay to the developer the difference in cost of the material between the two sizes.

2. DEPTH OF COVER:

Water pipe shall be laid with a cover of five and one-half (5 ½') feet measured from established finished grade to the top of the pipe in all towns except Standish, Windham and Raymond. In those towns water pipe shall be laid with a cover of six (6') feet measured from finished grade to the top of pipe. The contractor shall establish adequate elevation control to ensure that upon final grading appropriate cover over water lines has been maintained. It shall be the Contractor's responsibility and expense to verify the cover at any location questioned by the District. Any potential changes in alignment or grade of roadways shall be considered in the original utility design. Any deviation from the required cover shall be approved by the Engineering Supervisor.

3. GATE VALVE LOCATIONS:

Gate valves shall be installed at all pipe junctions and street intersections in such a manner as to control and cut off flows in all segments of the system. A minimum of two (2) valves are required at tees. A valve may be required beyond the last service if the main can be extended in the future. In all other areas gate valves will be required every 1000 feet, except as otherwise may be approved by the District. All new mains and services connecting to a main over 50 years old will require a valve at the main and an additional gate valve located at the property line. Additional gate valves may be required under certain situations, such as looped systems, where it is necessary to isolate certain sections of the system.

4. PRESSURE/FLOW REQUIREMENTS:

All distribution systems shall be capable of providing a minimum working pressure of 40 p.s.i. at each service connection under maximum day demand conditions, plus the required fire flow as determined by the Insurance Services Office (ISO) or the local fire department. The consultant will provide the estimated peak demand for the project and the District will determine whether the project meets the pressure/flow requirements.

In the event that the 40 p.s.i. minimum pressure cannot be met, the developer/owner can request limited service for each service connection in question. The District will determine whether adequate conditions exist to grant limited service.

C. WATER LINE CONSTRUCTION

1. DUTIES OF THE CONTRACTOR:

Install the water mains so as to supply the District, upon completion, with a satisfactory, watertight pipeline, laid to proper line and grade, and in accordance with these specifications and approved plans to the satisfaction of the District, and will leave the site in condition which is suitable, not only to the District, but to those abutting the right-of-way, right-of-way grantors, and any municipal or state authorities having jurisdiction over the areas involved.

Obtain all street opening permits from cities or towns covering any pipelines to be laid in the public way and shall be responsible for fees levied by any regulatory agencies which are applicable to the work covered by this specification.

Establish line and grade for the pipeline and right-of-way boundaries where the pipeline is to be laid in right-of-way outside of a public way.

Familiarize himself with all obstructions which he can foresee, such as existing pipes, services, conduits, ducts, sewers or any other such obstructions which might interfere with the construction, and he agrees to make arrangements with the owners of such facilities so as to save the District harmless from any damages thereto caused by his operations and to make whatever arrangements might be necessary to move or remove and replace these facilities so as to permit the construction of this pipeline, all at his own expense.

Purchase all pipe, fittings, valves, gaskets and piping accessories, including but not limited to services, air valves and hydrants, in accordance with District specifications.

Make any changes which may be required, such as the removing or restoring of the property of others in the land through which this line will cross in right-of-way or otherwise. The Contractor will place all pipe, fittings, valves and all the attendant facilities in place in the proper trench, to proper

line and to proper grade, as called for in the plans and specifications and to the satisfaction of the District's representative.

Make all connections to the District system in accordance with standard District practice and under District inspection. The Contractor must disinfect all tools or equipment coming in contact with the water in a 5% hypochlorite solution.

Provide trench and excavation for the purpose of testing, chlorinating, and connecting the new main into existing pipe and promptly backfill such trench and patch and restore the surface as necessary. Provide and maintain trench barricades, warning signs, warning lights, traffic control, as required by applicable safety regulations and organizations with jurisdiction over traffic control.

Shall perform leakage tests and disinfect the completed main.

Upon completion of the work to the District's satisfaction, transfer to the District, free and clear of liens, damage claims or law suits all right, title and interest to all piping and appurtenances.

The following specifications for the performance of the work are part applicable, but do not necessarily constitute the full and complete specifications for the work. Such reasonable additional requirements as the Engineer may specify must be followed.

No valve, hydrant or other facility of the Portland Water District shall be operated by the Contractor or his agents. The District will, upon reasonable request of the Contractor, furnish men and equipment for such activity.

Provide a minimum of 4 days notice to the District prior to any required shutdown.

2. INSTALLATION OF TEMPORARY WATER SYSTEMS:

In order to maintain uninterrupted water service to District customers, the Contractor shall provide temporary above ground water systems. The temporary water systems consist of mains, services and fire department outlets. The above ground systems shall be installed only for the duration of deep water main replacement and removed promptly after main replacement is complete. Connections to an existing water source shall be installed and provided by the District. All material for the temporary water systems, except as otherwise indicated, shall be supplied by the contractor. Currently the District has approved 2 manufacturers for the temporary mains and 100-psi poly tube for individual services. Only authorized District personnel shall operate control valves attached to these systems.

Temporary Water Systems Approved Pipe

Certainteed Certa-Lok Yellowmine	Restrained Joint PVC pressure pipe and fittings
AquaMine (Victaulic Co)	Restrained Joint PVC pressure pipe and fittings

Temporary above ground water mains shall be installed in a manner to both protect the public water supply and to minimize customer service interruption. To allow the District to notify its affected customers, the Contractor shall provide the District a minimum of 5 working days notice prior to installing any temporary lines.

The size and approximate location of the temporary systems are shown on the drawings. The Contractor must obtain the approval of the District for any changes prior to installation of the system.

Temporary mains shall typically be installed behind sidewalks or along the edge, and within the public right of way. The mains shall follow a uniform straight course and shall not bow to accommodate long sections of pipe. Temporary mains shall not be installed on private property. The route of services lines installed from the mains to houses shall be acceptable to the property owner.

The Contractor shall follow the pipe manufactures installation guidelines when installing temporary systems. Additionally, an approved joint lubrication for the installation of potable water pipe shall be used on all joints prior to connecting pipe.

Source: The District will provide necessary connections at fire hydrants including an approved backflow device and meter. A chlorine tap will also be provided.

Disinfections: All 2" diameter and larger temporary mains shall be chlorinated, sampled, and tested for bacteria prior to activating any portion of the temporary mains. (See disinfection specification for deep mains).

Leakage test: All systems shall be watertight. A static pressure test shall be performed on all systems prior to disinfecting any portion of the system.

Test Procedure

1. Install a pressure gauge at furthest end of the system.
2. Open main feed valve to fully charge the system with water and bleed all air.
3. Record the static pressure reading.
4. Close main feed valve.
5. The system must hold static pressure for a minimum of 30 minutes.

Driveway crossings: A gravel or cold patch raised berm shall be placed over temporary mains to prevent vehicles from dragging along the ridge.

Sidewalk crossings: A gravel or cold patch raised berm shall be placed over temporary mains to eliminate tripping hazards. In areas where the berm would prevent rainwater drainage plywood ramps shall be installed the full width of the sidewalk and over the temporary mains

Roadway crossings: Temporary mains shall be buried just below the surface of the roadway. The pipe shall be protected with clean sand or material free from rocks, as the rocks tend to punch through the pipe when exposed to heavy traffic. The use of cold patch or QPR as fill material is acceptable.

Curbing or esplanade rise: To accommodate curb rise, pre-fabricated certa-lock bends and/or elbows shall be used. Sweeping or bending the actual pipe is not an acceptable method unless the sweep lies flat on the ground and is not obstructing walkways. A traffic barrel shall be placed near the curb at offset connections to protect the offsets from being damaged by vehicles.

Cutting pipe: Follow manufacturer's installation instructions. All joints, including those on cut lengths of pipe, shall be grooved to provide a restrained joint. Pre-fabricated bends, elbows, and tees shall be used when changing direction.

Blow off: A 1" blow off shall be installed at the ends of all temporary mains. The blow off shall be constructed using a 1" brass female curb stop.

Isolation valves: Shall be 2" brass female curb stops for 2" mains and 4" resilient wedge valves for 4" mains (grip rings shall be used for 4" valves). Valves shall be located as shown on the plan. The valves are attached to the mains using pre-fabricated adapters.

Service line connections: All temporary individual service lines shall be ¾" poly tube rated at a minimum working pressure of 100 psi. The service lines shall be connected to a 2"x 3/4" factory tapped restrained joint coupling, then a ¾" close brass nipple, a ¾" female curb stop and a brass poly tube adapter ¾" insert x male. The tube shall be extended to a sill cock (outside faucet) and connected using the same poly tube adapter. Prior to connecting the service, a garden hose connection, including a brass boiler drain or sill cock valve shall be installed in the line. All service lines shall be flushed prior to activating mains. *See Detail sheets (1,2,3)*

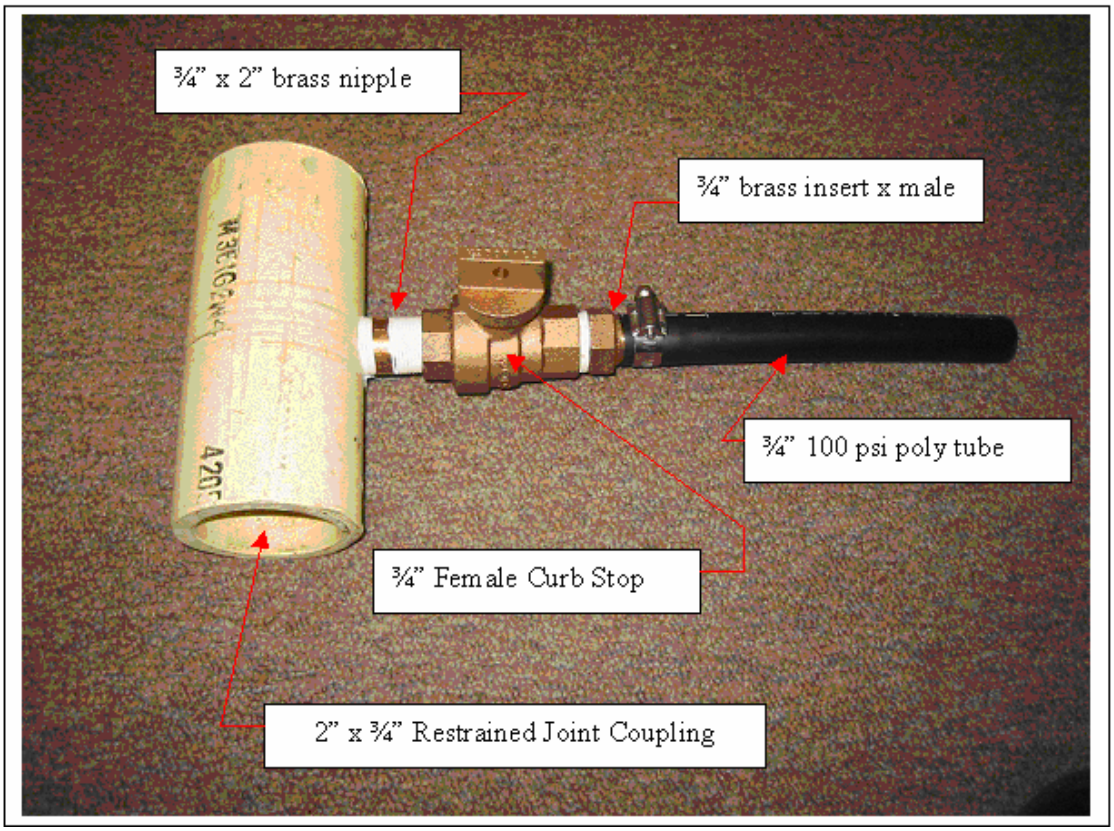
Anti-siphon sill cocks: Only District authorized personnel shall disassemble anti-siphon sill cocks. Excavating and connecting into existing deep service lines may be required where properties have malfunctioning sill cocks or no exterior plumbing.

Shutting off meters: After activating the temporary lines, all meters shall be shut off. Only District authorized personnel may de-activate meters.

Maintenance of temporary water systems: The contractor shall be responsible for maintaining the temporary systems during the regular workday including making repairs to the systems. The District's Inspector must be on site prior to any work, or repairs being performed on the temporary water systems. District crews will respond to all after hour's emergencies. All affected customers shall be notified as soon as possible prior to any service interruption.
It is expected that contractors will keep an inventory of readily available repair parts on hand enabling them to quickly respond to any type of problem. Restrained joints shall be maintained. The use of non-restrained joint couplings is prohibited. Joint leaks shall be cut out. The use of stainless steel wrap around repair clamps over pinholes is acceptable.

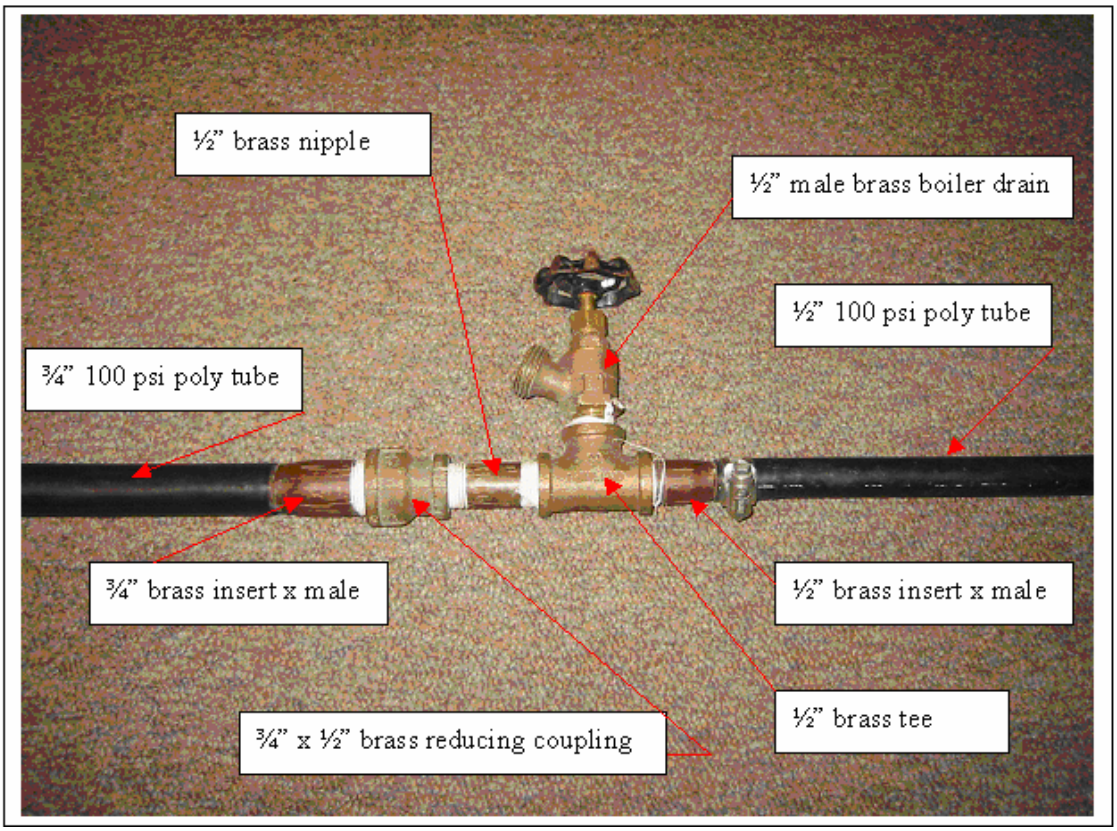
2" x ¾" Factory Tapped Restrained Joint Coupling
and associated fittings.

(Section 1)



Temporary service line boiler drain assembly used for customer garden hose connection.

(Section 2)

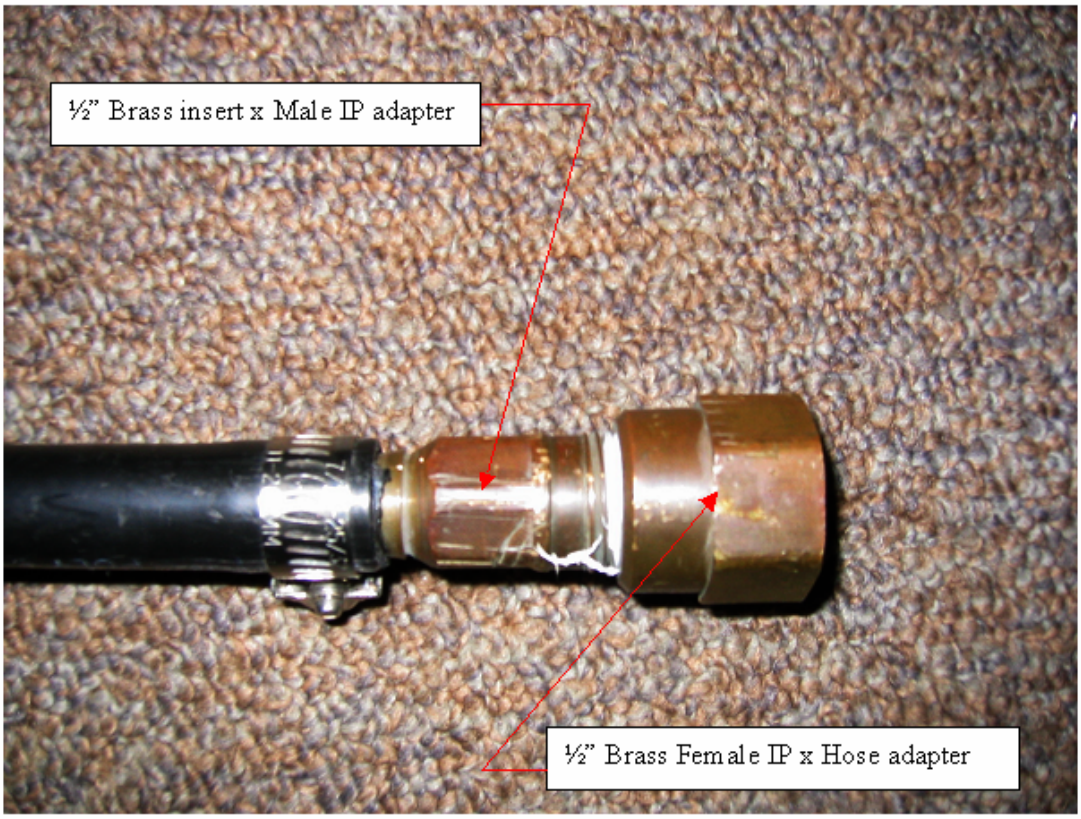


Temporary water Service – Final Connection to customer sill cock

The final house connection shall be a non-swivel, rigid connection as shown.

(Section 3)

revised 7-10-03



3. EXCAVATION:

The Contractor will make application for all necessary street or highway opening permits necessary for the pursuit of the work. No street or highway opening shall be made by the Contractor until the appropriate permit has been received and is in hand, and when such opening shall be made, it shall be done in strict accordance with the terms of the permit.

When any pavement, regardless of type, must be cut, it shall be done in a neat and symmetrical manner by use of a saw, chisel, or other suitable method. In no case shall pavement be torn up with a backhoe bucket except between and inside of cuts previously made as above. Should any further pavement be broken, outside of the cuts, as by blasting, such damaged pavement shall be cut out in a neat and orderly fashion.

The trench shall be dug so that the pipe can be laid to the alignment and depth required and shall be excavated in advance only to the extent necessary for the proper pursuit of the work; the amount excavated ahead may be controlled by the District representative. The trench shall be kept dewatered, such that no drainage water shall enter the pipe, and the end of the pipe shall be temporarily plugged off at night or over weekends, or whenever the work is suspended, or in cases where unstable material could cause a cave-in to enter into the exposed end of the pipe. The trench width shall be the minimum necessary to properly lay and joint the pipe, permitting whatever bracing or sheathing may be necessary in unstable material. The bottom of the trench shall be smooth and even and should be as nearly undisturbed as possible so that the barrel of the pipe may be laid in a flat bottom trench on good solid material. Shallow holes should be dug at the joints so that the barrel of the pipe shall be in contact as much as possible with the solid floor of the trench. In ledge installation or in boulders or other large stones, there shall be at least 6” clearance between the barrel of the pipe and any ledge. These clearances are the minimum to be permitted between any part of the pipe or appurtenance being laid and any part or projection or point of a rock, boulder or stone. The bottom of the trench may for a short distance, near the center of the pipe length, be left slightly low to permit the withdrawal of the slings with which the pipe is placed in the trench. This material shall be replaced and compacted mechanically when the pipe is in place. Likewise, if for any reason the bottom of the trench should be excavated below the desired grade, suitable material may be replaced to bring the bottom of the trench up to the proper grade before pipe is put in place. This material is to be mechanically compacted so as to give it a smooth, solid base for the pipe, subject to the approval of the District representative. When the bottom of the trench at subgrade is found to be unstable or to include cinders or other types of refuse, or vegetable or other organic material, or large pieces or fragments of inorganic material or stone or rock, any such undesirable material shall be removed and replaced with suitable material before the pipe is placed. Such material as is used to replace unsuitable material in a trench bottom shall be compacted in layers of no more than 8” by mechanical means before the pipe is placed on it. In the case of unstable material, the District inspector may, at his discretion, order crushed stone or gravel to be used to stabilize the pipe bed before pipe is placed in the trench.

All structural excavations and trenches shall be sheeted or braced as required for the safe pursuit of the work, the protection of structures, the protection of other utilities, and as required by any Federal, state or municipal laws, ordinances or regulations.

The Contractor shall be responsible for the design, adequacy and maintenance of all sheeting, sheet piling, bracing or other temporary structures or supports required.

When the sheeting or shoring cannot be removed without endangering the new work, other structures or the security of the banks, it shall be left in place.

4. PIPE LAYING:

<u>4.1 Handling of Materials into Trench</u>
Proper implements, tools and facilities shall be provided and used by the Contractor for the safe and convenient handling of all materials. Pipe fittings and accessories shall be carefully lowered into the

trench, piece by piece, by means of derrick, crane, slings and other suitable tools and equipment, in a manner such as to prevent damage to the material or to its protective coating and linings. No chain or slings shall be passed through the inside bore of any pipe or valve or fitting. Under no circumstances shall piping materials be dropped or dumped into the trench.

4.2 Cleaning of Materials

All lumps, blisters, excess coating material or other foreign matter shall be removed or cleaned from the pipe, with particular attention being given to the spigot end, which enters into the bell of the next adjacent pipe. Also, the inside of the bell shall be cleaned and wiped dry and clean before any joint material is applied to it. All foreign matter shall be removed from the inside of pipe, fittings, valves, and the interior cleaned and kept clean. Particular attention shall be given to the cleaning of surfaces to which gaskets are to be applied, and especially to the inside grooving of the push-on pipe bells.

4.3 Laying Pipe

Every possible precaution shall be taken to prevent foreign material from entering into the pipe as it is being placed in the trench. Likewise, no foreign matter shall be allowed to enter into the joint area between pipes. If there is any question as to foreign material having gotten into the joint, the joint shall be taken apart and checked and made up again in the proper manner. The inside of every pipe, as it is lowered into the trench, shall be checked for any dirt or stone or other debris, or any material whatsoever which may be inside the pipe, and such extraneous material shall be cleared out and the pipe made completely clean before it is jointed into the next pipe in the trench. Precautions shall be taken such that no backfill material shall enter the open end of the pipe already laid in the trench, and every effort shall be made to prevent trench water from entering the pipe. Whenever pipe laying is not in progress, a watertight plug or other effective means shall be used for keeping any extraneous material from entering into the pipe. Any water in the trench shall be kept down by pumps, such that it will be below the invert of the pipe already laid. Sump holes may be dug in the bottom of the trench, off center of the pipe, for the purpose of keeping the pump suction below the gradient of the bottom of the pipe. No pipe shall be laid in water or when, in the opinion of the PWD representative, conditions are not suitable for laying.

4.4 Cutting Pipe

Any pipe which must necessarily be cut on the job in order to put fittings, valves or other accessories in the proper place shall be done in a workmanlike manner satisfactory to the District. In case of “push-on” joint pipe, proper chamfering must be done on the ends of any cut pipe before an attempt is made to enter it into a bell. In the case of mechanical joints, a smooth, square, neat cut must be made. On Ductile iron pipe a saw or abrasive wheel type of equipment shall be used. On cast iron pipe smaller than 12”, wheel cutters or other approved method may be used, but in no case shall any cement lining of iron pipe be harmed in the cutting. No so-called “cold cutters” will be allowed on the job. All cuts shall be square and even, with no ragged, rough ends. Any unevenness shall be ground smooth. Pipe shall be cut no closer than 2’ from the bell.

4.5 Bell Ends to Face Direction of Laying

The pipe shall be laid with the bell ends facing the direction of the laying, unless otherwise permitted by the District.

4.6 Blocking

Permanent blocking necessary to support the pipe in the trench shall be done only with specific authorization and approval of the District. Temporary blocking under valves and fittings for support prior to the building of permanent supports or anchors is allowed.

4.7 Jointing Of Pipe

All joint areas on the pipe shall be cleaned and free from irregularities before an attempt is made to make up any joints. Joints, when made, shall be done in the manner prescribed by the manufacturer of the pipe.

In the case of rubber gasket joints, these joints shall be made up in accordance with the American Standard specifications for the jointing of cast iron pressure pipe and fittings including torque. ASA #A21.11 (AWWA #C111).

Consult the Portland Water District for guidance in the proper selection of pipe gaskets in areas of contaminated soils. The Portland Water District reserves the right to specify the use of specialty gaskets, including nitrile and viton gaskets.

In the case of flanged joints, flange faces shall be thoroughly cleaned before making up such joints, so that no paint globs or any other projections or rust or other foreign matter remain on the faces of the flanges and that they are smooth, clean iron. Bolts and nuts shall be tightened evenly, being tightened in pairs on opposite sides of the pipe, until all are equally torqued. When completely tightened, the bolts should be long enough so that all nuts are “full”.

Solid long body sleeves per specifications shall be used when connecting new pipe of all sizes. When joining a new section of pipe to an existing section of unknown O.D., a “duo” sleeve shall be used for sizes up to and including 16”. The “duo” sleeve will accommodate the increased O.D. of older cast iron pipe. For connecting to a section of pipe with an unknown O.D. above 16”, an approved steel coupling may be used. The existing pipe O.D. shall be measured prior to ordering the coupling.

4.8 Permissible Deflection of Joints

Whenever it may be necessary to deflect pipe from a straight line, either vertically, horizontally, or other direction to change the direction of laying, in all sizes 12” and smaller, the allowable deflection shall be 3 degrees per joint, or 16 inches per 20’ length; in larger sizes, 1 1/2 degrees, or 6 inches per 20’ length. Every possible precaution shall be taken to be sure that each joint is properly made up and that the pipe is “home”.

4.9 Setting Valves & Fittings

All valves, fittings, plugs and/or caps shall be set and jointed into the pipe, and blocked and anchored as shown on the plans. The location of these features along the line shall be in accordance with the general plans for the pipeline. Any unconnected outlets shall be valved and securely plugged with adequate and appropriate pipe plugs or blind flanges, as called for on the plans (See Sec 4.14). 'Mechanical Joint' bends, plugs, sleeves and caps shall be restrained with a PWD approved restrainer.

4.10 Valve Boxes (See Standard Detail and Materials Section)

All valves 12” and smaller shall be fitted with a standard valve box set so as to not come in contact with the valve body and concentric with the operating nut, straight, square and plumb. The top shall be set to the proper surface grade and, after backfilling and settlement have taken place, these valve box top sections shall be straightened, reset or adjusted as necessary. All valves shall be supplied with proper boxes and/or chambers, as called for in the plans and these specifications. At least two permanent location measurements to the valve must be obtained. Backfill around valve boxes shall be mechanically tamped within a five-foot radius of the valve box. Backfill at valve chambers shall be mechanically tamped for a distance of 30 feet along the trench, both upstream and downstream from the ends of the chamber.

4.11 Hydrants

Hydrants shall be installed in accordance with the District’s standard details. The hydrant tee and the hydrant base shall be appropriately braced. Trenching for hydrant and branch shall be done in accordance with Section 3 herein. All appurtenant piping and jointing shall be done in accordance with Section 4 herein.

4.12 Services

Services shall be tapped on the side of the main in accordance with the District’s standard details. Service piping shall be copper with a minimum size of 1” and conform to the Maine State Plumbing Code for buried cold water service lines. Enough slack shall be placed in the material to prevent stretching or pulling from main. A service shut off (curb stop) with rod shall be placed in a service box

6” from the right of way line in the public way. Any service box located in a paved area except sidewalks shall be installed inside a full sized gate box top section. At least two permanent location measurements to the service shut off must be obtained. Services shall have 5-1/2 feet of cover along the entire length of the service. For new main extensions, the service shall be installed at the center of the lot to be served. The only exception will be when a foundation is already on the lot. In that case, the service can be installed anywhere along the foundation frontage to the road. For new services installed on existing mains, the service shall be installed a minimum of 10 feet from the property line. Trenching and backfilling shall be done in accordance with Sections 3 and 5 herein.

Standard small service sizes include 1”, 1-1/2” and 2” diameters. 1-1/2” and 2” services shall consist of a corporation threaded into an approved tapping saddle. One inch and three quarter inch corporations (where allowed) shall be threaded into the main.

Domestic and fire services to the same building shall consist of completely separate lines beginning at the main. Combined services (fire services greater than 2" that have a domestic service tapped at the street line) shall require approval during the plan review process of a project. If approved, combined services shall have individual shut-off valves for both the fire and domestic service at the street line. Additional gate valves may be necessary under certain situations.

All domestic services 2" and larger and all combined services shall require chlorination/dechlorination. Any service with a joint between the main and the end of service for live taps shall require a restrained joint gasket at each joint; methods for pressure relief on private property are recommended in these instances.

4.13 Protective Wrapping
As required, special plastic sleeves or envelopes shall be slipped over the pipe and sealed together with plastic adhesive tape. Care shall be exercised such that these sleeves shall be intact and sealed together when backfill is placed, and during the backfill operation, likewise, care shall be taken not to puncture the material.

4.14 Pipe Endings
ALL dead-end sections of pipe shall end with a hydrant where possible; otherwise a blow off valve. This shall include all main stubs into subdivisions in addition to the main runs. Fire services 4” and larger that require pressure testing shall also end with a blowoff valve, however a 2” ball valve may be substituted for the 2” gate valve for service stubs.

4.15 Abandoning Pipe & Services
All abandoned water mains shall be terminated with a mechanical joint cap or push-on plug. No brick and mortar will be allowed. Abandon service pipe by shutting corporation and cutting pipe close to the corporation. The associated curb stop, box and rod shall be removed. For water service lines larger than 2”, and all hydrants, mains and valves, the connection at the main shall be excavated and removed and a solid piece of pipe sleeved into its place.

5. BACKFILLING:

5.1 Material
All backfill material shall be free from cinders, ashes, refuse, organic matter, boulders, rocks, stones or other material which, in the opinion of the District, is unsuitable for the purpose. However, from one foot above the top of the pipe to the top of the trench, material containing stones up to 8” in their greatest dimension may be used unless otherwise directed by the District. When the type of backfill material is not otherwise specified on the drawings, the material excavated from the trench may be used as backfill upon its approval by the District, provided that unsuitable stone, etc., as above, are sorted out. Where any specific type of backfill material is indicated on the plans, such notation shall be followed and native material will be hauled away and disposed of to make way for the specified material. Pipe in ledge trench is to be backfilled with select material.

5.2 Backfill In Right-Of-Way (Untraveled)
From a point one foot above the pipe to the surface, backfill material may be placed by machine, but shall be worked over in such a manner as to minimize future settlement of this material. The backfill material shall be mounded up to an excess depth of 3" to 6" over the trench to allow for future settlement, and before the Contractor finishes and the job is accepted, this situation shall be reviewed and any necessary fill added so that there is no depression left due to settlement of the trench at any point. The above is the minimum requirement, and when highway or street requirements are more stringent, such requirements shall be met.

5.3 Backfill within Public Streets, Highways and Traveled Areas
Backfilling in public right-of-way, along the streets or highways in or along shoulder, berm or backslope shall be done in accordance with the specifications and requirements of the state or municipality, whichever is responsible for the street or highway involved. Responsibility for the fulfillment of permit conditions or any other applicable requirements of the street or highway authority shall be the obligation of the Contractor. Surface restoration shall be carried out to the satisfaction of the street or highway authority or as shown on the plans. The trench shall be topped out with gravel a depth meeting municipal or state specifications.

Where the trench crosses or follows highways, streets or other areas such as driveways, parking areas, etc., or wherever there will be vehicular traffic with or without a pavement over the trench the backfill from a point one foot above the pipe shall be placed in 8" layers if compacted by manual plate equipment or 24" lifts with approved roller type equipment. Compaction of granular material shall be by means of a mechanical vibratory compactor. Other material shall be compacted by pneumatic or other mechanical compaction methods. In all cases a gravel or stone base shall be placed to a depth at least equal to the existing road base, but in no case less than one foot of depth.

5.4 Backfill in Ledge Trenches
Backfill around the pipe in ledge trench shall be either sand or fine gravel (6" below and 12" above the pipe), but in cases where corrosive conditions may prevail due to the type of ledge or other material which has been excavated, clay may be specified on the plans or by the Engineer. In cases where granular material is used, a complete clay dam shall be put in the backfill at least every 100' along the trench where the surface gradient is other than horizontal.

5.5 Backfilling – Structures
The excavation for thrust blocks and other structures shall be refilled with such of the excavated materials and in such order as may from time to time be directed by the District. Whenever the excavated materials are unsuitable, the Contractor shall furnish suitable backfill materials. This material shall be a uniformly graded bankrun gravel having no stones larger than 6 inches.

The backfill around structures must be carefully placed in layers not to exceed 8" and tamped and brought up evenly around all sides of the structure. The material shall be thoroughly tamped with mechanical or vibratory compactors and water added, if necessary, to obtain 90 percent laboratory density as determined by the Standard Method of Test for Compaction and Density of Soils AASHO Designation T-99.

Backfilling around pipes outside the structures shall be in accordance with the pipe laying specifications.

5.6 Operation in Freezing Weather
In freezing weather, no backfill material which is frozen shall be placed in the trench, but if backfilling must be done, new unfrozen material must be brought to the site and the frozen material disposed of elsewhere.

Should the excavation take place in sustained periods of freezing weather, the sides and bottom of the trench shall be protected to prevent freezing of the material to the satisfaction of the District.

5.7 Open Trench
Backfilling shall follow pipe laying as closely as reasonable, so that a minimum of trench shall be open at any time. The regulations of the highway authorities shall be observed as regards the amount of trench to be open at any one time. Over night, and especially over weekends and holidays, the amount of open trench shall be kept at an absolute minimum. Any caved-in trench, especially after heavy rain and flooding, shall be cleaned out and the bottom consolidated before any additional pipe shall be laid.

6. FILLING AND TESTING:

6.1 Upon completion of backfilling, the Contractor shall fill the pipeline with water from the Portland Water District's system and conduct a pressure and leakage test in accordance with Section 4 of AWWA Standard C600-82 and the following procedures.

6.2 The Contractor shall not operate any existing District valves for filling, flushing or testing the new main. The District will provide the necessary personnel upon request.

6.3 Under the inspection of the District, the Contractor shall slowly fill the new main and ensure that all air has been expelled from the main, hydrants, air valves and service leads. Once all air is expelled, the Contractor shall flush the new main at a minimum velocity of 2.5 feet per second turning the over the volume of water in the main a minimum of 3 times. The "scour" flow rate shall be calculated by the District and verified in the field. The Contractor shall be responsible for all dechlorination and disposal of all flushing water and providing any necessary hoses or equipment for flushing and prevent unnecessary erosion.

6.4 The Contractor shall excavate and provide a tap for pressure and leak testing and chlorination. The chlorine tap shall be installed within ten feet of the source if practical. Otherwise, install the tap immediately outside of existing pavement. The Contractor is responsible for all work associated with the excavation, including proper trench protection, barricades, traffic control and proper backfilling and compaction upon successful completion of the test. Upon completion of the test all fittings and pipe shall be removed and all corporations shut.

6.5 The Contractor shall conduct the pressure and leak test and provide the required testing equipment after the new main has been properly filled and flushed, unless otherwise arranged with the District. The Portland Water District reserves the right to determine the geographic limits of pressure testing water mains.

The pressure and leak test shall be conducted as follows:

a) Purge all air from the line.

b) Decrease pressure in the main to be tested approximately 20 p.s.i. Observe test gauge to ensure the pressure doesn't rise due an existing valve or tapping valve leaking by. This is done to ensure that no undisinfected water from the installed main enters the existing main while performing the actual test.

a) A pressure test pump will be connected to the new main at the testing point. The pressure will be slowly increased to 150 psi and allowed to stabilize (+/- 2.5 psi) for a minimum of 15 minutes.

b) A reservoir of potable water shall be connected to the test pump and the initial level of water recorded.

c) The pump pressure shall be maintained at 150 psi for one hour with all makeup water withdrawn from the reservoir.

d) After one hour, the water level in the reservoir will be measured and the volume of water drawn from the reservoir calculated and compared with the following allowable leakage:

$$\text{Allowable leakage (gal/hr)} = \frac{\text{Pipe length (feet)} \times \text{Nominal diameter (inches)}}{10{,}900}$$

e) If any test discloses leakage greater than that specified above, the Contractor shall, at his own expense, locate and make repairs as necessary until the leakage is within the specified allowance. No repair clamps of any kind will be allowed. Repair shall consist of removing leaking section and replacing with couplings and pipe.

7. DISINFECTION:

Products:

Acceptable Disinfectants:

Sodium hypochlorite (NaOCl):

- Shall conform to the provisions of AWWA B300 'Standard for Hypochlorites' and
- Shall be certified to meet NSF/ANSI Standard 60 - *latest revision*, Drinking Water Treatment Chemicals – Health Effects.

Acceptable Dechlorination (neutralizing) Agents:

As defined in AWWA C651 'Standard for Disinfecting Water Mains', Appendix C

7.1 Scope

This specification becomes a standard part of the contract documents and covers the disinfecting and flushing of water mains within the Portland Water District distribution system. Unless specified otherwise, all procedures apply to new mains, cleaned mains, cleaned and relined mains, repaired mains, and mains which have been out of service for a long period of time.

In certain circumstances, the Director of Water Services or designee may waive or alter the requirements in this specification where it is determined that no reasonable threat of contamination constituting a health hazard or aesthetic deterioration exists in the water main in question.

7.2 Keeping the Pipe Clean and Dry

Precautions shall be taken by the Contractor to protect the interiors of pipes, fittings, and valves against contamination:

- Pipe delivered for construction shall be strung and protected so as to prevent entrance of any foreign material.
- Pipe shall not be laid in water, or when trench conditions or weather conditions are unsuitable for such work.
- All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons.
- Joints of all pipe in the trench shall be completed before work is stopped.
- The surface of the joint rings shall be thoroughly cleaned with an approved soap solution and all foreign matter removed from the pipe and fittings before the pipe is lowered in the trench.
- If dirt enters the pipe, it shall be removed and the interior of all affected pipe and fittings shall be swabbed with a 5% Hypochlorite solution or other commercially available household bleach immediately before they are installed.
- Pipes and services in the ground shall be closed off when not under construction.

7.3 Pre-Flushing

The District shall flush the source water, as near the shut off as possible prior to tying-in to ensure that contaminants or debris are not introduced into the new pipe.

7.4 Flushing

The main shall be flushed through a hydrant at the end of the main at a velocity not less than 2.5 ft./sec. If no hydrant is installed at the end of the main, the Contractor shall provide a tap large enough to develop a velocity in the main of at least 2.5 ft./sec. The gallons per minute to achieve 2.5 ft./sec velocities for different diameter pipes are provided in Table 1.

Table 1 Gallons per minute required to obtain 2.5 feet per second flushing velocity

Main Size (in.)	Gallons per minute
6	200
8	400
12	900
16	16000

District water at no cost to the Contractor will be available to the work site for use in disinfecting and flushing mains. The Contractor shall furnish all necessary pipe and hose connections. The Contractor shall exercise care in the use of the water to prevent contamination of the existing water supply. Measures shall be taken prior to flushing to provide adequate drainage during flushing. Drainage shall be away from the main, and flooding of the trench shall be prevented. The volume of water flushed shall be measured or calculated and reported to the District Inspector.

Wherever the conditions allow, the new water main shall be kept isolated from the active distribution system using a physical separation until satisfactory bacteriological testing has been completed and the disinfectant water flushed out. Water required to fill the new main for hydrostatic pressure testing, disinfection, and flushing shall be supplied through a temporary connection between the distribution system and the new main. The temporary connection shall include a double check valve assembly backflow preventer and shall be disconnected (physically separated) from the new main during the hydrostatic pressure test. It will be necessary to reestablish the temporary connection after completion of the hydrostatic pressure test to flush out the disinfectant water prior to final connection of the new main to the distribution system.

7.5 Methods of Disinfection

The Contractor shall disinfect all portions of the water main that was worked on as well as any portion(s) of the network that was taken out-of-service to allow completion of the contract. The chlorine solution to be used must be Sodium Hypochlorite.

NOTE – The use of Calcium Hypochlorite granules left in the main to be dissolved on filling of the main is not an approved method.

7.5.1 Continuous Feed Method

The continuous feed method consists of completely filling the main to remove all air pockets, flushing the completed main to remove particulates, and filling the main with chlorinated potable water so that after a 24±4-hour holding period in the main there will be a free chlorine residual of not less than 10 mg/L at all locations of the main.

Prior to being chlorinated, the main shall be filled to eliminate air pockets and shall be flushed to remove particulates. The flushing velocity in the main shall be not less than 2.5 ft/sec unless the Director of Water Services or designee determines that conditions do not permit the required flow to be discharged to waste.

NOTE – Flushing is no substitute for preventive measures during construction.

At a point not more than 10 ft. downstream from the beginning of a new main, water entering the new main shall receive a dose of chlorine pumped at a constant rate such that the water at any location will have not less than 25 mg/L of chlorine. To assure that this concentration is provided, the District representative shall measure the chlorine concentration at regular intervals at available blow-offs or hydrants in accordance with procedures described in the

current editions of "Standard Methods for the Examination of Water and Wastewater" or using an appropriate chlorine test kit.

Table 2 gives the amount of chlorine required for each 100 ft. of pipe of various diameters. Solutions of 1% chlorine shall be prepared with Sodium Hypochlorite. During the application of chlorine, valves shall be closed so that the strong chlorine solution in the main being treated will not flow into water mains in active service. Chlorine application shall not cease until the entire main is filled with heavily chlorinated water. The chlorinated water shall be retained in the main for at least 24±4 hours, during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances. At the end of this 24±4-hour period, the treated water in all the portions of the main shall have a residual of not less than 10 mg/L of free chlorine.

Table 2 Chlorine Required to Produce 25 mg/L Concentration in 100 feet of Pipe by diameter

Pipe size (in.)	Volume (gals in 100 feet of Pipe)	15% Chlorine solution gals per 100 feet of Pipe	1% Chlorine solution gals per 100 feet of Pipe
4	65	2 oz.	0.2 (1 ½ pts)
6	150	3 oz.	0.4(1 ½ qts)
8	260	5 oz.	0.6 (2 ½ qts)
10	410	1 cup	1.0 Gal
12	590	1 Pint	1.4
16	920	1Quart	2.3
24	2350	1 ½ Quarts	5.8
30	3680	2 ½ Quarts	9.1
36	5290	0.9	13.0
42	7200	1.2	18.0
48	9400	1.5	23.0
54	11900	2.0	30.0
60	14690	2.5	36.0

NOTE: To make 1% chlorine solution. Using Sodium Hypochlorite, dilute the hypochlorite according to the percent available chlorine on the container. For example, if you have 5% household bleach, place 1 gallon in 4 gallons of water. You then have 5 gallons of 1% solution.

7.5.2 Slug Method (Emergency Use Only)

At a point not more than 10 ft. downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 100 mg/L of free chlorine. To assure that this concentration is provided, the District representative shall measure the chlorine concentration at regular intervals along the main where taps and/or hydrants have been provided. The chlorine shall be applied continuously and for sufficient period to develop a solid column or 'slug' of chlorinated water that will, as it moves through the main, expose all interior surfaces to a concentration of approximately 100 mg/L for at least 3 hours.

The free chlorine residual shall be measured in the slug as it moves through the main. If at any time it drops below 50 mg/L, the Contractor shall stop the flow, chlorination equipment shall be relocated at the head of the slug, and as flow is resumed, chlorine shall be applied to restore the free chlorine in the slug to not less than 100 mg/L.

As the chlorinated water flows past fittings and valves, related valves and hydrants shall be operated so as to disinfect appurtenances and pipe branches.

7.6 Flushing After Disinfection
After the applicable retention period, the heavily chlorinated water shall be flushed from the main into the sewer until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the system. Where domestic sewers are not available, the heavily chlorinate shall be dechlorinated. The replacement water shall be allowed to remain in the pipeline for 24 hrs.(+/- 4 hrs.) prior to sampling for physical, bacteriological, and chemical testing.

7.7 Analytical Tests
After the appropriate retention time (24±4 hours or 3 hours for the slug method), after flushing and before the water main is placed into service, a sample or samples shall be collected for sanitary analysis by a District representative. Suitable sample piping shall be furnished by the Contractor to allow sample collection. The sampling point or points shall provide samples, which are representative of the water in all sections of the main for which sanitary approval is requested. All samples shall be collected in a manner as to avoid contamination from the environment surrounding the main. Rubber or synthetic hose shall not be connected to the main to collect a representative sample. The area around the sampling point of the main shall not be filled with water. At least one sample shall be taken from each main, and in the case where a main is greater than 1000 feet, one sample from each 500 feet of line. The samples shall be submitted to the District Laboratory for bacteriological, chemical, and physical analysis. The following analyses shall be completed and reported on the appropriate form. Total chlorine residual, Total Coliform (Membrane Filtration method), pH, and turbidity.

7.8 Final Flushing
Disinfected water mains shall be flushed within 4 hours of being placed into service. Flushing shall be designed to restore water quality to that of the source water, immediately prior to being placed into service. The length of time of flushing shall depend on the size and length of the water main, however at least three volumes of water should flow through the entire length of the main. Pipe volumes can be calculated by using Table 2 and adjusting for the full length of the main.

7.9 Redisinfection
If the initial disinfection and flushing fail to produce satisfactory analytical results, the main may be reflushed and shall be resampled. If check samples show the presence of coliform organisms, then the main shall be rechlorinated by the Contractor, using the continuous feed method of chlorination, until satisfactory results are obtained.

7.10 Miscellaneous
The District Laboratory, at no expense to the Contractor, will analyze two sets of samples. However, should the initial disinfection fail to produce satisfactory samples, a charge of $100 will be made to the Contractor for each set of additional samples required.

7.11 Final Connection
Water mains and appurtenances must be completely installed, flushed, tested for leakage, disinfected, and satisfactory bacteriological sample results received prior to permanent connections being made to the active distribution system where the new main was isolated from the existing system. Sanitary construction practices must be followed during installation of the final connection to insure that there is no contamination of the new or existing water main with foreign material or groundwater.

The new pipe, fittings, and valve(s) required for the connection will be spray-disinfected or swabbed with a minimum 1 – 5% solution of chlorine just prior to being installed.

7.12 Dechlorination
Contact the local sewer authority before discharging the highly chlorinated water to the sewer. The discharge of water to the environment with chlorine concentrations greater than the ambient distribution system chlorine residual is prohibited. The highly chlorinated water must be dechlorinated before being discharged to the environment.

SECTION III: Water Main Materials Specifications

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NOTE:

- All installations shall follow manufacturer's recommended procedures unless otherwise noted or directed by PWD personnel.
- All materials, products and coating that contact drinking water shall be certified to meet NSF/ANSI Standard 61 – *latest revision*, Drinking Water System Components – Health Effects.

BOLTS AND NUTS

GENERAL SPECIFICATIONS

General Description of Properties Required:

1.0 Stainless Steel: Type 304 – contains the addition of Molybdenum to the nickel-chromium steels.

2.0 High Strength/Low Alloy Steel: Trade name for cold formed T-head bolts containing alloying elements such as copper, nickel, and chrome (Cor-Ten).

CAST IRON OR DUCTILE IRON SPLIT REPAIR SLEEVE

GENERAL SPECIFICATIONS

1.0 Split repair sleeve shall be mechanical joint.

2.0 The side rubber gaskets shall be rectangular to cross-section and shall fit into grooved channels in the casting. These gaskets shall extend the entire length of the sleeve.

3.0 Split repair sleeve shall be AB-CD pattern to permit use of plain rubber and duck-tipped gaskets for various O.D. piping sizes.

4.0 Mechanical joint with accessories furnished; glands, gaskets and Cor-Ten T-bolts and nuts or equal.

5.0 All side bolts shall be Stainless Steel (Type 304) or silicone bronze.

6.0 Interior and exterior to be bituminous coated with a minimum of 4 mils D.F.T.

7.0 The sleeve shall be provided with a 2” F.I.P.T. test port with brass plug.

APPROVED MANUFACTURERS

A. All Manufacturers

CORPORATION STOPS

GENERAL SPECIFICATIONS

1.0 Conforming to AWWA C-800.

2.0 ¾" to 2" curb stops shall be ball valve design with brass ball that is teflon coated or brass ball with teflon seats.

3.0 The ball shall be supported by seats which are water tight in either direction.

4.0 The valve shall have a full port opening.

5.0 The body of the corporation stop shall be of heavy duty design.

6.0 The valve working pressure shall be 300 p.s.i.

APPROVED MANUFACTURERS

A. A.Y. McDonald
B. Cambridge Brass
C. Ford Meter Box Co.
D. Mueller Co.

CURB STOPS

GENERAL SPECIFICATIONS

1.0 Conforming to AWWA C-800

2.0 ¾" to 2" curb stops shall be ball valve design with brass ball that is teflon coated or brass ball with teflon seats.

3.0 The ball shall be supported by seats which are water tight in either direction.

4.0 The valve shall have a full-port opening.

5.0 The valve shall open with ¼ turn (90°) with a check or stop.

6.0 The valve shall not have a drain.

7.0 The valve stem shall have 2 "O" rings and a bronze ring lock which holds the stem solidly in the valve body.

8.0 The valve body shall be of heavy duty design.

9.0 The valve working pressure shall be 300 p.s.i.

APPROVED MANUFACTURERS

A. A.Y. McDonald
B. Cambridge Brass
C. Ford Meter Box Co.
D. Mueller Co.

CUT-IN SLEEVE

GENERAL SPECIFICATIONS

1.0 The sleeve shall be mechanical joint to plain-end type.

2.0 The sleeve shall fit over either AB or CD pattern pipe.

3.0 Coatings:
a) Interior – Seal-coated – AWWA C104-74, min. 4 mils D.F.T.
b) Exterior – Bituminous coated, min. 4 mils D.F.T.

4.0 Mechanical joint accessories shall be furnished:
a) Glands: Duck-tipped for AB pipe, Plain Gaskets for CD pipe
b) Cor-Ten tee bolts and nuts

5.0 Cut-in sleeves shall have at least one stop-screw in sizes up through 10” and at least 2 stop-screws in 12” size.

6.0 The stop-screw “O” ring shall be recessed into the body of the sleeve between stop-screw and body.

APPROVED MANUFACTURERS

A. Mueller Co.

DUCTILE IRON FITTINGS

INCLUDING BENDS, REDUCERS, OFF-SETS, TEES AND SLEEVES

GENERAL SPECIFICATIONS

7.0 Material shall be ASTM A536 latest, grade 70-50-05, in accordance with AWWA C110 (latest revision) for fittings larger than 24" and C153 (latest revision) for fittings 3" thru 24".

8.0 Fittings shall be cement lined AWWA C104 (latest revision) or fusion bonded epoxy coated with a 5 mil nominal thickness per AWWA C550 and C116.

9.0 Interior seal coated AWWA C104 with minimum of 4 mils dry film thickness.

10.0 Exterior bituminous coated, 4 mils minimum dry film thickness or fusion bonded epoxy coated with a 5 mil nominal thickness per AWWA C550 and C116.

11.0 Sleeves shall not be cement lined, but shall be bituminous coated inside to 4 mils dry film thickness. All sleeves shall be long body type.

12.0 Mechanical joint with accessories furnished: D.I. glands, gaskets, Cor-Ten T-bolts and nuts.

13.0 Pressure Ratings:
a) Class 350 pressure rating in accordance with AWWA C153 - 3"-24" sizes.
b) Class 250 pressure rating in accordance with AWWA C110 - 30"-48" sizes.

14.0 The "compact design" fittings must provide adequate space for the MJ joint and accessories to be installed without special tools (i.e. Lowell wrench can be used).

APPROVED MANUFACTURERS

A. All Manufacturers

DUCTILE IRON PIPE

GENERAL SPECIFICATIONS

1.0 Ductile iron pipe shall meet requirements of AWWA Standard C-151 (latest revision) and be cement lined and seal coated to meet AWWA Standard C-104 (latest revision).

2.0 Joints shall meet requirements of AWWA C-111 (latest revision).

3.0 Interior seal coated, bituminous paint oil cut, emulsion not acceptable, thickness minimum of 2 mils dry film thickness.

4.0 Exterior bituminous coated with minimum of 2 mils dry film thickness.

5.0 Class 52 wall thickness, 4-inch diameter through 12-inch diameter inclusive.

6.0 Ductile Iron Pipe with diameters 16-inches and larger shall be approved by PWD.

7.0 State nominal laying length and mark shorter lengths near bell.

8.0 Mechanical joint pipe to be furnished with gland, gaskets and Cor-Ten bolts and nuts.

APPROVED MANUFACTURERS

A. American Cast Iron Pipe
B. Griffin Pipe
C. U.S. Pipe
D. Clow Pipe
E. McWain Pipe
F. Atlantic States Pipe

FIRE HYDRANT

GENERAL SPECIFICATIONS

1.0 The hydrant shall open right.

2.0 The operating nut shall:
a) be D.I. or bronze
b) be pentagon in shape with dimensions: Top 1-13/16" tapering to 1-7/8" on bottom.

3.0 Nozzles shall be:
a) 2 each – 2-1/2" National Standard Thread
b) 1 each – 4-1/2" National Standard Threadbottom.

4.0 Port covers shall be supplied without chains and shall have the same size pentagon operator as specified in 3.0(b) above.

5.0 Traffic model hydrant with breakaway feature

6.0 Barrel length(s) shall be:
a) 6 ft. cover, 6-1/2 ft. bury; or
b) 5-1/2 ft. cover, 6 ft. bury, or
c) 5 ft. cover, 5'-6" bury

7.0 Hydrant shoe or base shall have the following:
a) 6" MJ inlet;
b) 5-1/4" valve opening with non-draining bronze seat that is permanently plugged;
c) valve seat and sub-seat arrangement shall be bronze to bronze;
d) Horizontal and vertical blocking planes manufactured into hydrant base

8.0 Bolts:
a) all buried mechanical joint bolts and nuts (T-head, etc.) shall be Cor-Ten or equal;
b) all buried flange joint bolts shall be stainless steel (Type 304) or silicone bronze.

9.0 Protective Coatings shall consist of the following:
a) all paintings and coatings shall be a minimum of 3 mils total dry film thickness, unless noted
b) the internal area of the hydrant base, which is normally exposed to water and which includes the internal body of hydrant shoes, including lower valve plate, shall be epoxy coated
c) all internal and external cast iron or ductile iron components shall be coated with an approved bituminous coating, 3 mils minimum
d) Coatings for upper barrel - exterior:
   1. Surface preparation blast clean SSPC-SP-6
   2. Primer Sherwin Williams Red Oxide E61RC21, 1.5 mils, dry
   3. Finish coat Sherwin Williams – Regal Yellow, F78Y30, 1.5 mils, dry or sufficient paint to hide the second coat
   4. Total dry film thickness - 3 mils minimum.
e) Coatings for bonnet, operating nut, port cap:
   1. Surface preparation: Blast clean, SSPC-SP-6
   2. Exterior primer
   3. Exterior aluminum
   4. Total dry film thickness: 3 mils minimum.

10.0 Flow Indicator Collars: PWD personnel shall install flow indicator collars on all new hydrants.

FIELD TEST OF INSTALLED HYDRANT

1.0 Hydrant flow shall completely stop with no more than 200 ft. lb. of torque applied to the operating nut.

2.0 Failure to shut completely at no more than 200 ft. lb. of torque will be cause for rejection of that hydrant.

APPROVED HYDRANTS

A. Clow Eddy – with lower stern machined from bar stock
B. American Darling Models: B62B-1, B62B-5

PIPE JOINT RESTRAINER

GENERAL SPECIFICATIONS

1.0 Pipe Restraints:

1.1 Use in conjunction with mechanical joint fittings.

1.2 The joint restraint ring and its wedging components shall be made of ductile iron conforming to ASTM A536-80.

1.3 Dimensions of the restrainer must allow use with standard M.J. bell conforming to AWWA C111 and AWWA C153.

1.4 Restrainer must restrain up to 350 psi of working pressure in 3” to 16“ sizes and 250 psi of working pressure in 18” to 48” sizes with a 2:1 safety factor.

1.5 Torque limiting twist off nuts shall be used to ensure proper actuation of the restraining wedges (used on a,b,c below).

APPROVED MANUFACTURERS

A. Sigma Super Lug
B. Ford Uni-Flange Series 1400
C. Ebba Mega Lug
D. Romac Grip Ring
E. Star Grip Series 300
F. Romac Romagrip
G. MJ FIELD LOK Gasket

POLYETHYLENE ENCASEMENT

GENERAL SPECIFICATIONS

1.0 Tube type polyethylene encasement shall be installed on all ductile iron pipe and fittings in accordance with AWWA Standard C105 - latest revision, Method A.

2.0 Polyethylene encasement shall be either linear low-density polyethylene (LLDPE) film with a minimum thickness of 8-mil or high-density, cross-laminated polyethylene (HDCLPE) film with a minimum thickness of 4-mil.

3.0 Circumferential wraps of tape or plastic tie straps shall be placed at 2-ft. intervals along the barrel of the pipe.

4.0 The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material but is not intended to be a completely airtight or watertight enclosure. All lumps of clay, mud, cinders, and so forth, on the pipe surface shall be removed prior to installation of the polyethylene encasement. During installation, care shall be exercised to prevent soil or embankment material from becoming trapped between the pipe and the polyethylene.

5.0 The polyethylene film shall be fitted to the contour of the pipe to effect a snug, but not tight, encasement with minimum space between the polyethylene and the pipe. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to the polyethylene due to backfilling operations. Overlaps and ends shall be secured with adhesive tape, string, plastic tie straps, or any other material capable of holding the polyethylene encasement in place until backfilling operations are complete.

6.0 Three layers of polyethylene adhesive tape shall be wrapped around any polywrapped pipe where a tapping machine will be placed. All copper services connected to a pipe wrapped in polyethylene encasement shall be wrapped within three feet of the pipe.

PVC WATER PIPE

GENERAL SPECIFICATIONS

1.0 For all water main installations that are less than 4" I.D. (4" and larger use ductile iron), the District will require use of 2" I.D. PVC plastic water pipe meeting the following: Under special site conditions the District does require the use of C-900 PVC in sizes larger than 4".

2.0 Pipe Specifications (2"):

2.1 Diameter:
A. The I.D. shall be a minimum of 2"
B. The O.D. shall be a maximum of 2.38"
C. The minimum wall thickness shall be 0.113"

5.2 Pressure Rating
A. The minimum working pressure rating shall be 200 PSI (SDR-21).
B. The pipe shall conform to standard ASTM 2241.

1.3 Pipe Length
A. The pipe shall be provided in 20' lengths.
* Shorter lengths may be allowed and/or field cut following manufacturer's recommended procedures.

5.2 Gaskets
A. The gasket or O-Ring material shall be rubber meeting ASTM F 477 and of the "permanent use" type.

3.0 Fittings:

3.1 Standard AWWA C900 fittings are not available in the 2" I.D. and therefore "steel pipe" class fittings, or Certa-Lok Yelomine couplings and fittings meeting ASTM D 3139 shall be used.

5.2 The normal nomenclature for "steel fittings" is Schedule 40 or Schedule 80, with the respective pressure ratings of 280 PSI and 400 PSI. Both of these fitting classes are acceptable for use.

4.0 Service Connections:

4.1 All service connections shall be made with tapping saddles* per Portland Water District specifications or by use of tees meeting the above noted fitting specifications.

5.0 Installation:

5.1 Follow manufacturer's instructions.

5.2 An eight gauge bare copper wire shall be fastened to the buried PVC pipe to facilitate electronic pipe locating. The wire shall be fastened at two locations per length and not at any joint.

6.0 The District requires 200 PSI (SDR-14) PVC pipe for other sizes such as 4”, 6”, 8”, and 12”. Pipe shall conform to AWWA C-900.

APPROVED MANUFACTURER / TYPE

A. J-M Manufacturing - Blue Brute
B. Certainteed - Yelomine
C. Victaulic - Aquamine
D. IPEX – Blue Brute

RESILIENT SEATED GATE VALVE

GENERAL SPECIFICATIONS

1.0 Valve shall meet the latest revision of the AWWA C-509 Standard.

2.0 Valve shall have a smooth unobstructed water way which shall be a minimum diameter of the valve.

3.0 Valve ends to be specified and shall be furnished with Cor-ten (or equal) bolts and nuts.

4.0 Valve shall be rated for zero leak rate at 200 psi differential working pressure and have a 400 psi hydrostatic test for structural integrity.

5.0 Sealing - Valve shall have a minimum of 2 “O” rings situated such that the “O” rings above the thrust collar can be replaced with the valve under pressure and in the open position.

6.0 Stem - Valve stem shall:
- a) open right with a stem nut made of grade D,E manganese bronze;
- b) be non-rising;
- c) be designed with a thrust collar integrally cast to the stem;
- d) be designed with two (2) thrust washers, placed one above and one below the stem thrust collar;
- e) be constructed of grade D,E manganese bronze;
- f) be such that the thrust washers are made of a synthetic polymer with physical properties required.

7.0 Valve Body - The body, including the stuffing box and the bonnet, shall be constructed of cast iron or ductile iron, meeting the latest revision of AWWA C-153.

8.0 Valve Wedge:
- a) shall be constructed of ductile iron (less guiding mechanism);
- b) shall be fully encapsulated and permanently bonded with a resilient elastomer;
- c) shall be constructed such to allow the flushing of any interior exposed surface during operations.

9.0 Coatings:
- a) the internal and external valve body, including the stuffing box, bonnet, and interior of the wedge shall be fusion bonded epoxy coated with 8 mils D.F.T.
- b) interior shall meet latest version of AWWA C-550.
- c) shall be holiday free, interior and exterior, per testing method described in AWWA C-550, Sec. 5.1.

10.0 Operating Nut:
- a) shall be two (2) inch square ductile iron:
  - 2. with a countersunk hold down nut (made of 316 stainless steel or silicone bronze). This applies to stems that are tapered; or
  - 3. with a stainless steel pin inserted thru the stem. This applies to stems of full diameter.

11.0 Bolts – The seal plate and bonnet bolts shall be stainless steel (Type 316 or Type 304).

12.0 Valves 12” nominal diameter and smaller shall be directly operated by the nut on the valve stem and mounted vertically. Number of turns to open or close shall closely match the formula: (3 x D) + 2. For example, a 12” valve should open or close with approximately (3 x 12) + 2 = 38 turns of the operating nut.

13.0 Valves larger than 12” nominal diameter shall be designed to be installed horizontally and shall have bevel gear operators driven by the operating nut. Valves 14” – 24” nominal diameter shall have 4:1 bevel gear operators. Valves with 30” – 36” nominal diameters shall have 6:1 bevel gear operators and valves with 42” – 48” nominal diameters shall have 8:1 bevel gear operators. Number of turns to open or close shall closely match the formula: ((3 x D) + 2) times the bevel gear ratio. For example, a 24” valve should open or close with approximately ((3 x 24) + 2) x 4 = 296 turns of the operating nut.

GENERAL PROVISIONS

1.0 Vendor shall identify any and all exceptions to the specifications.

2.0 Vendor shall provide standard brochures for item quoted.

3.0 Vendor may be required to supply a valve for inspection and determination of coating process.

APPROVED RESILIENT SEATED GATE VALVES

A. U.S.P.
B. AFC Series 2500
C. Mueller A-2360/61
D. Clow Series F6100

RESTRAINED JOINT GASKETS

GENERAL SPECIFICATIONS

1.0 All accepted restrained joint gaskets in the Portland Water District distribution system shall be rated in accordance with the performance requirements of ANSI/AWWA C111/A21.11.

2.0 Required Applications

2.1 Any hydrant branch or service with a distance greater than 18' shall have an approved restrained joint gasket in the bell ends.

2.2 Where a casing is required, all joints within the casing shall have an approved restrained joint gasket unless restrained joint pipe is used.

2.3 At any time as required by a PWD Engineer.

2.4 Any live service tap where there is a joint between the connection and the end of the service.

APPROVED MANUFACTURERS

A. American Fast-Grip Gasket – American Pipe
B. Field Lok 350 Gasket – US Pipe

SERVICE BOX AND ROD

GENERAL SPECIFICATIONS

Reference Standard Details

1.0 Service Box - Approved Manufacturers: Laroche, Clow Canada, Bibby

1.1 Shall be 1.0" Schedule 40 steel pipe with top having 1.0" N.P.T. pipe threads for screw-on cover or coupling.

1.2 Shall be Erie style with 6' slide-type riser.

1.3 Any extension of a service box requires a threaded merchant coupling with no set screw.

2.0 Service Box Cover – Approved Manufacturers: Bibby, Laroche, Clow Canada, QWP

2.1 Shall be Quincy type (heavy duty) cover that screws on Service Box (1.1 above).

2.2 Shall be tapped with a 1" rope thread with a solid brass plug with pentagon operating head.

3.0 Service Box Foot Piece – Approved Manufacturer: Laroche

3.1 The standard foot piece shall be heavy duty (Ford style or equal) cast iron design.

3.2 The large, heavy-duty foot piece shall have an arch that will fit over 2" ball-valve curb stops.

4.0 Service Rod – Approved Manufacturer: North American Manufacture

4.1 Shall have a self aligning design.
a) 36" length for all services.
b) 24" length for air valves.

4.2 Shall be round and constructed of stainless steel (304) with an epoxy coating (minimum 4 mil D.F.T.).

4.3 Shall have a yoke design that is an integral part of the rod.

4.4 The curb-stop attachment pin shall be a brass cotter pin.

4.5 The rod "wrench-flat" shall have a minimum thickness of ¼" tapered to 1/16" and width of 5/8" or ½".

4.6 Diameter
a) ½", ¾" and 1" services use ½" diameter.
b) 1 ½" and 2" services use 5/8" diameter.

SERVICE SADDLES

GENERAL SPECIFICATIONS FOR DUCTILE IRON PIPE

1.0 The service saddle shall have the “larger sized” body, the same as associated with the “service repair” saddle, which shall have a minimum diameter of 6 in. and multiple “O” ring type sealing.

2.0 The saddle body shall be constructed of epoxy coated ductile iron.

3.0 The sealing gasket(s) shall be either Buna-N rubber or SBR rubber (ASTM D2000).

4.0 Service saddles shall be installed with all 1 1/2” and 2” corporation stops (cc only).

Approved Manufacturers

Size	Tap	Saddle
2” – 2-1/4”	¾”, 1” cc	Smith-Blair 315, Ford FC 202
4” - 12” D.I.	¾”- 11/2” cc	Smith Blair 331
4” - 12” D.I.	2” cc	Smith-Blair 313
16”	¾”-2” cc	Smith-Blair 313
20” – 36”	¾”-2”cc	Smith-Blair 366

GENERAL SPECIFICATIONS FOR PVC PIPE

1.0 Stainless steel straps will be used on saddles on C-900 PVC Pipe

Approved Manufacturers

Size	Tap	Saddle
2” – 2-1/4”	¾”, 1” cc	Smith-Blair 315, Ford FC 202
4”-12”		Smith-Blair 265

GENERAL SPECIFICATIONS FOR HDPE PIPE

1.0 Spring washers are required for service saddles on HDPE Pipe.

Approved Manufacturer

Size	Tap	Saddle
4”-12”		Smith-Blair 265

STAINLESS STEEL REPAIR CLAMPS

GENERAL SPECIFICATIONS

1.0 The sleeve shall be of full circle design, either one piece or two piece, for pipe sizes 2” thru 12”.

2.0 Body: Shall be 18-8 stainless steel shell.

3.0 Gasket:
- a) Shall be full length and diameter of the body size;
- b) This gasket shall form a multiple O-ring, or grid, sealing barrier for the entire length and circumference;
- c) Shall be virgin SBR rubber (ASTM D2000 AA 415).

4.0 Lugs, sidebar, and lifting bar shall be heavy gauge 18-8 stainless steel with TIG/MIG welding and chemical passivation of all welds.

5.0 Bolts and Nuts shall be Teflon coated 18-8 heavy gauge stainless steel.

6.0 Armor: The armor, or bridging plate between the side bars shall be heavy gauge 18-8 stainless steel bonded to the gasket to bridge the lug area.

APPROVED MANUFACTURERS

A. All Manufacturers

TAPPING SLEEVES

GENERAL SPECIFICATIONS

1.0 For sizes 12” and smaller tapping sleeve shall be ductile iron or approved fabricated steel:

1.1 Tapping sleeve shall be mechanical joint with recessed outlet flange for tapping valve.

1.2 Tapping sleeve shall conform to AWWA C-207, Class D, with rated maximum working pressure of 200 psi.

1.3 The side rubber gaskets shall be rectangular in cross-section and fit into grooved channels in the casting. These gaskets shall extend the entire length of the sleeve and shall not require cutting or trimming to match MJ end gaskets.

1.4 Tapping sleeve shall be AB-CD pattern to permit use of plain rubber and duck-tipped gaskets for various O.D. piping sizes.

1.5 Mechanical joint with accessories furnished; glands, gaskets, and Cor-Ten T-bolts and nuts or equal.

1.6 All flange outlet bolts shall be stainless steel (Type 304).

1.7 Interior and exterior to be bituminous coated with a minimum of 4 mils dry film thickness or fusion bonded epoxy coated.

1.8 The sleeve shall be provided with a ¾” F.I.P.T. test port and brass lug.

2.0 For sizes 16” and larger tapping sleeve shall be fabricated steel:

2.1 Body and Flange - A-36

2.2 Coating - Fusion-bonded epoxy coating with minimum D.F.T. of 5 mils, inside and out.

2.3 Bolts, Nuts - Stainless Steel (Type 304).

2.4 Gaskets - SBR.

2.5 Flange - AWWA Class D plate flange with ANSI 150# drilling, proper recessing for tapping valves.

2.6 Sleeves shall be provided with 3/4" F.I.P.T. test port and plug.

APPROVED MANUFACTURERS (4”-12”)

A. AFC
B. Mueller Co.
C. U.S. Pipe
D. Tyler / Union
E. Powerseal Model 3490 and 3490MJ (Fabricated Steel)

APPROVED MANUFACTURERS (16" and larger)

A. Romac FTS 420
B. Ford FTSC
C. Smith Blair 622
D. JCM 412
E. Powerseal Model 3490 and 3490 MJ (up to 24")
F. JCM 415 or approved equal (for RCCP pipe only)

VALVE BOXES

GENERAL SPECIFICATIONS

Reference Standard Details

1.0 The valve box bottom section shall be slide-type with bell-type base with bottom lip.
Manufacturer: North American Manufacture

2.0 The valve box top section shall be slide-type, 36 inches long (minimum). No top flange and no "bead" or bottom flange.
Manufacturer: North American Manufacture

3.0 The valve box cover shall be a 2" drop-type cover to fit the 7-1/4" opening of the top section.
Manufacturer: Bibby St-Croix (no substitute)

4.0 The valve box intermediate (mid) section shall be slide-type with a minimum 3" belled bottom. Base section No. 645 may be used as an alternate.
Manufacturer: North American Manufacture

5.0 Material shall be cast iron or ductile iron free from defects.

6.0 Interior and exterior of all components shall be bituminous coated with a minimum of 4 mils dry film thickness.

SECTION 02535

SANITARY SEWER PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary sewerage drainage piping, fittings, and accessories.

1.02 RELATED REQUIREMENTS

A. Section 02250 - Dewatering

B. Section 02315 - Excavation

C. Section 02317 - Trenching for Site Utilities

D. Section 02640 - Manholes and Covers.

1.03 REFERENCE STANDARDS

A. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2005.

B. ASTM D 2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2003.

C. ASTM D 3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2004a.

1.04 SUBMITTALS

A. Product Data: Provide data indicating pipe, pipe accessories.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Project Record Documents:
   1. Record location of pipe runs, connections, catch basins, cleanouts, and invert elevations.
   2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.05 REGULATORY REQUIREMENTS

A. Perform work in accordance with the requirements of the City of Portland Public Works.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

A. Plastic Pipe - gravity service: ASTM D 3034, Type PSM, Poly(Vinyl Chloride) (PVC) material rated SDR 35; inside nominal diameter of 8 inches, bell and spigot style solvent sealed joint end.

B. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM classification.

C. Pipe joints shall be integrally molded bell ends in accordance with ASTM D-3034 Table 2, with factory supplied elastomeric gaskets and lubricant.

D. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.02 PIPE ACCESSORIES

A. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Sewer Service" in large letters.

PART 3 EXECUTION

3.01 TRENCHING

A. See Section 02317 for additional requirements.

B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION - PIPE

A. Make all required connections to existing sewers. Carry out such work in accordance with local standards. Observe care to prevent debris from entering sewers. Check the invert elevations of existing sewers to which connections are to be made, and if appreciable difference from elevations noted on the drawings, or if they involve any difficulty in obtaining necessary drainage, notify the engineer immediately so that appropriate corrective action may be taken.

B. Commence at the lowest point in the system and lay the pipe with the bell-end upgrade. Test pipe for soundness and clean interior and joint surfaces before lowering the pipe into the trench. Lay pipe in straight lines and on uniform grades between points where changes in alignment or grade are shown. Bed the pipe barrel uniformly.

C. Comply fully with manufacturer's instructions for sewer pipe jointing, using sealing or lubrication compound as supplied by the manufacturer, and apply proper pressure to seal the spigot in the bell.

D. As soon as the joint material has set, pack fine earth carefully around the joints, and around and over the pipe. Carry this backfill operation to a depth of at least 12 inches above the top of the pipe. Care shall be used in tamping backfill under lower parts of the pipe to give proper support, especially in shallow trenches.

E. Flush all sanitary sewers, including building connections, with water in sufficient volume to obtain free flow through each line. Remove any obstructions and correct any defects discovered.

F. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

G. Install pipe, fittings, and accessories in accordance with ASTM D 2321 and manufacturer's instructions. Seal joints watertight.

H. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet

I. Connect to building sanitary outlet.

J. Install trace wire 6 inches (150 mm) above top of pipe; coordinate with Section 02317.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with the requirements of the servicing utility.

B. Provide copies of test report to owner and servicing utility, documenting results and compliance with requirements in advance of requesting a certificate of occupancy

C. It tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.04 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 02535

SECTION 02635

STORM DRAINAGE PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Storm drainage piping, fittings, and accessories.

B. Foundation drainage piping and accessories

C. Connection of drainage system to municipal storm drain system.

1.02 RELATED REQUIREMENTS

A. Section 02250 - Dewatering.

B. Section 02315 - Excavation:

C. Section 02317 - Trenching for Site Utilities:

D. Section 02640 - Manholes and Covers.

1.03 REFERENCE STANDARDS

A. ASTM A 74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2005.

B. ASTM A 746 - Standard Specification for Ductile Iron Gravity Sewer Pipe, latest edition.

C. ASTM C 76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe; 2005b.

D. ASTM C 443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets; 2005a.

E. ASTM C 443M - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (Metric); 2005a.

F. ASTM D 1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2005.

G. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2005.

H. ASTM D 2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2003.

I. ASTM D 3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2004a.

J. AASHTO M252 - Standard Specification for Corrugated Polyethylene Drainage Pipe.

K. AASHTO M294 - Standard Specification for Corrugated Polyethylene Drainage Pipe 12 inch to 60 inches in diameter.

1.04 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.05 SUBMITTALS

A. Product Data: Provide data indicating pipe, pipe accessories.

B. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents:
   1. Record location of pipe runs, connections, catch basins, cleanouts, and invert elevations.
   2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 PRODUCTS

2.01 STORM DRAIN PIPE MATERIALS

A. Concrete Pipe Joint Devices: ASTM C 443 (ASTM C 443M) rubber compression gasket joint.

B. Concrete Pipe: Reinforced, ASTM C 76 (ASTM C 76M), Class II with Wall type A; mesh reinforcement; inside nominal diameter shown on plans, bell and spigot end joints.

C. Reinforced Concrete Pipe Joint Device: ASTM C 443 (ASTM C 443M) rubber compression gasket joint.

D. Plastic Pipe: ASTM D 3034, Type PSM, Poly(Vinyl Chloride) (PVC) material; inside nominal diameter shown on plans, bell and spigot style solvent sealed joint end.

E. Corrugated Polyethylene Pipe (smooth interior): AASHTO M 252, M 294: pipe sizes as indicated on plans; bell and spigot style joint ends. Joints shall be silt tight. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F 477.

F. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM classification.

G. Pipe joints shall be integrally molded bell ends in accordance with ASTM D-3034 Table 2, with factory supplied elastomeric gaskets and lubricant.

H. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

I. Corrugated Polyethylene Pipe (PE): Pipe complying with AASHTO M294 and MP7, and ASTM D3550. Interior of pipes shall be smooth, and shall have an "n" value of not less than 0.010. Pipes shall be joined with gasketed bell and spigot joints complying with ASSHTO M252 and M294. Gaskets shall comply with ASTM F477 and ASTM D1149. Provide minimum coverage per manufacturer's specifications.
   1. Acceptable Manufacturer's of Corrugated Polyethylene Pipe: Hancor "Sure Lok", ADS N-12 Prolink, or Equal.

J. Plastic Pipe: ASTM D 3034, Type PSM, Poly(Vinyl Chloride) (PVC) material; inside nominal diameter of specified inches, bell and spigot style solvent sealed joint end.

2.02 ACCESSORIES

A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

PART 3 EXECUTION

3.01 TRENCHING

A. See Section 02317 for additional requirements.

B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION - PIPE

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.

C. Install pipe, fittings, and accessories in accordance with ASTM D 2321 and manufacturer's instructions. Seal joints watertight

D. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 feet (3 m).

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance requirements of local authorities having jurisdiction.

3.04 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 02635

SECTION 02640

MANHOLES AND COVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Modular precast concrete manhole section with tongue-and-groove joints with masonry transition to lid frame, covers, anchorage, and accessories.

B. Modular precast catch basins with frames and grates

C. Modular precast concrete manhole sections with tongue-and-groove joints with masonry transition to lid frame, covers, anchorage, and accessories.

1.02 RELATED REQUIREMENTS

A. Section 02250 - Dewatering.

B. Section 02315 - Excavation.

C. Section 02317 - Trenching.

D. Section 02535 - Sanitary Sewer Piping.

E. Section 02635 - Storm Drainage Piping.

1.03 REFERENCE STANDARDS

A. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International; 2005.

B. ASTM A 48/A 48M - Standard Specification for Gray Iron Castings; 2003.

C. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.

D. ASTM C 55 - Standard Specification for Concrete Brick; 2003.

E. ASTM C 62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale); 2005.

F. ASTM C 478 - Standard Specification for Precast Reinforced Concrete Manhole Sections; 2006a.

G. ASTM C 923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals; 2002.

H. IMIAWC (CW) - Recommended Practices & Guide Specifications for Cold Weather Masonry Construction; International Masonry Industry All-Weather Council; 1993.

1.04 SUBMITTALS

A. Shop Drawings: Indicate manhole locations, elevations, piping sizes and elevations of penetrations.

B. Product Data: Provide manhole covers, component construction, features, configuration, and dimensions.

1.05 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

A. Manhole Sections: Reinforced precast concrete in accordance with ASTM C 478 (ASTM C 478M), with resilient connectors complying with ASTM C 923 (ASTM C 923M).
   1. Use concrete that will attain a 28-day compressive strength of not less than 4,000 psi.
   2. Reinforcing: H-20 loading
   3. Horizontal Joints:
      a. Tongue and Groove formed of concrete to receive a flexible plastic gasket.
      b. Joints to be watertight
      c. Cast to allow installation to be vertical and in true alignment
   4. Provide two tapered lifting holes 180 degrees apart in each section for handling and placing.
   5. Base Section: Cast holes for pipes to provide invert elevations as required by Drawings.
   6. Pipe to Structure Joints:
      a. Flexible sleeves, rubber quality, ASTM C-443 and C361 cast into base
      b. If premanufactured adaptor cannot be installed, use rubber concrete adaptor designed to provide a watertight seal between pipe and structure.

B. Grout: ASTM C270, using the proportion specification
   1. Masonry below grade and in contact with earth: Type S

C. Concrete Masonry Units: ANSI/ASTM C139.

D. Manhole Brick: ANSI/ASTM C32, Grade MS

E. Sewer Brick: ANSI/ASTM C32, Grade SS

F. Masonry Mortar: ANSI/ASTM C270, Type M.

G. Frames and Covers: Grey cast iron, ANSI/ASTM A 48, Class 30 B.
   1. Furnish covers with cast-in legend on roadway face as indicated. Also refer to plans.
   2. Minimum clear opening of frame shall be 24 inches.

H. Manhole Steps: Polypropylene steps meeting the requirements of ASTM C-478 and AASHTO M-199. Polypropylene conforms to ASTM D-4101. Grade 60, 1/2 inch diameter reinforcing bar meeting the requirements of ASTM A-615.

I. Catch Basin Frames and Gratings: Grey cast iron, ANSI/ASTM A 48, Class 30 B. Also refer to plans.

J. Other Precast Structures:
   1. Use concrete that will attain a 28-day compressive strength of not less than 4,000 psi.
   2. Manufactured in accordance with ASTM C-478
   3. Reinforcing: H-20 loading
   4. Horizontal Joints:
      a. Tongue and groove formed of concrete to receive a flexible plastic gasket.
      b. Joints to be watertight.
      c. Cast to allow installation to be vertical and in true alignment.
   5. Pipe to structure joints;
      a. Flexible sleeves, rubber quality, ASTM C-433 and C-361 cast into place.
      b. If pre-manufactured adaptor cannot be installed, use rubber-concrete adaptor designed to provide a watertight seal between pipe and structure.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify items provided by other sections of Work are properly sized and located.

B. Verify that built-in items are in proper location, and ready for roughing into Work.

C. Verify excavation for manholes, catch basins and other structures is correct.

3.02 PRECAST CONCRETE STRUCTURES

A. Precast Concrete structures: Place precast concrete sections as shown on drawings, Where structures occur in pavement, set tops of frames and covers flush with finish surface. Elsewhere, set tops 3 inches above finish surface, unless otherwise indicated.

1. Use epoxy bonding compound where manhole steps are mortared into structure walls.
2. Provide rubber joint gasket complying with ASTM C443
3. Place base section level on 12 inch layer of crushed stone.
4. Fix inlet and outlet stubs into sleeves with stainless steel pipe clamp.
5. Place barrel sections, cones or tops of the appropriate combination of heights to meet grades required by Drawings or existing conditions.
6. Seal horizontal joints as recommended by manufacturer.
7. Apply lubricant to inside tongue and rubber gaskets immediately prior to joining sections.
8. Fill lifting holes with non-shrink mortar.
9. Place frame and grate on top or otherwise prevent accidental entry by unauthorized persons until ready for adjustment to grade.
10. Repair damaged coating of frames and covers with coat-tar-pitch varnish.

3.03 MASONRY WORK

A. Laying Brick:

1. Use clean bricks
2. Lay brick by methods consistent with the trade acceptable to Owner
3. Lay in full bed of mortar and joint without subsequent grouting, flushing, or filling, for thorough bond.
4. Bring casting rim to grade with brick and coat outside with mortar; minimum thickness 3/8 inch with troweled waterproof surface.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with the requirements of the servicing utility.

B. Provide copies of test report to Owner and servicing utility, documenting results and compliance with requirements in advance of requesting a certificate of occupancy.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

END OF SECTION 02640

SECTION 02741

BITUMINOUS CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hot Bituminous Concrete Paving.

B. Portland Cement Concrete Sidewalk.

1.02 RELATED REQUIREMENTS

A. Section 02315 - Excavation and Backfill.

B. Section 02317 - Trenching.

C. Section 02772 - Curbing.

1.03 REFERENCE STANDARDS

A. State of Maine Department of Transportation Standard Specifications Highways and Bridges, latest revision (for Hot Mix Asphalt (HMA) pavement designations), hereafter designated as Maine DOT specifications.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with Maine DOT Section 403

B. Mixing Plant: Conform to Maine DOT Section 401.

C. Pavement Proof Rolling Inspection.

D. Pavement Surface Smoothness Testing

E. Obtain materials from same source throughout.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for paving work on public property.

1.06 FIELD CONDITIONS

A. Weather and seasonal limitations as required by Maine DOT Section 401.07 shall apply to this Section.

1.07 TESTS

A. Submit proposed mix design of each class of mix for review prior to commencement of work.
   1. Mix design must be for current year.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Cement: Maine DOT Section 702

B. Hot Bituminous Pavement: Maine DOT Section 401.02 Through 401.06

C. Mineral Filler: Maine DOT Section 703.

D. Emulsified Bituminous Sealing Compound: Maine DOT Section 702.12

E. Joint Mortar: Maine DOT Section 705.02

F. Tack Coat: Emulsified asphalt for tack coat shall conform to Maine DOT Section 702.

G. Portland Cement Concrete Sidewalks: Maine DOT Section 608.

PART 3 EXECUTION

3.01 EXAMINATION

A. BITUMINOUS CONCRETE PAVING
   1. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
   2. Verify gradients and elevations of base are correct.
   3. Beginning of installation means acceptance of substrate.

3.02 PREPARATION AND PLACEMENT

A. Tack coat shall be applied to any existing pavement at a rate of approximately 0.025 gal/sq yd, and on milled pavement approximately 0.05 gal/sq yd, prior to placing new course. All joints between existing and new pavement will be tacked.

B. Prepare and place plant mix hot bituminous pavement in accordance with Maine DOT Sections 301 and 401.

C. Compact to the following:
   a. Base and subbase materials shall be compacted to at least 95 percent of their maximum dry densities as determined by ASTM D-1557.
   b. Subgrade fill below the subbase material shall be compacted to at least 95 percent of their maximum dry densities as determined by ASTM D-1557.
   c. Bituminous pavement shall be compacted to 92 to 97 percent of its theoretical maximum dry density as determined by ASTM D-2041.

3.03 SIDEWALK

A. Portland Cement Concrete Sidewalks: Conform to requirements of Maine DOT Section 608.03 with the exception that finish shall be a broom finish with 2" troweled edge.

3.04 TOLERANCES

A. Flatness: Maximum variation of 3/16 inch measured with 10 foot straight edge.

B. Compacted Thickness: Conform to requirements of Maine DOT Section 401.17

C. Variation from True Elevation: Maximum variation from true design elevation 1/4 inch.

D. Areas which pond water for longer than 24 hours will be cut out and replace with hot mixed asphalt at no cost to the owner.

E. FIELD QUALITY CONTROL
   1. Owner shall provide field inspection and testing. Owner shall take samples and perform tests in accordance with Maine DOT Specifications for mix aggregate gradation and asphalt content and 2 cores for compacted density.
   2. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to the Owner.

F. PROTECTION
   1. Immediately after placement, protect pavement from mechanical injury for 5 days.

END OF SECTION 02741

SECTION 02765

PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Parking lot markings, including parking bays, crosswalks, arrows, handicapped symbols, and curb markings.

B. Roadway lane markings and crosswalk markings.

1.02 RELATED REQUIREMENTS

A. Section 02741 - Bituminous Concrete Paving.

1.03 REFERENCE STANDARDS

A. FS TT-B-1325 - Beads (Glass Spheres); Retro-Reflective; Rev. C, 1993.

B. FS TT-P-1952 - Paint, Traffic Black, and Airfield Marking, Waterborne; Rev. D, 1994.

C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.

D. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration; current edition at http://mutcd.fhwa.dot.gov.

1.04 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Certificates: Submit for each batch of paint and glass beads stating compliance with specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint in containers of at least 5 gallons (18 L) accompanied by batch certificate.

B. Deliver glass beads in containers suitable for handling and strong enough to prevent loss during shipment accompanied by batch certificate.

C. Store products in manufacturer's unopened packaging until ready for installation.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 PROJECT CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MATERIALS

A. Line and Zone Marking Paint: MPI No. 97 Latex Traffic Marking Paint; color(s) as indicated.
   1. Parking Lots: Yellow.
   2. Handicapped Symbols: Blue.

C. Reflective Glass Beads: FS TT-B-1325, Type I (low index of refraction), Gradation A (coarse, drop-on); with silicone or other suitable waterproofing coating to ensure free flow.

D. Temporary Marking Tape: Preformed, reflective, pressure sensitive adhesive tape in color(s) required; Contractor is responsible for selection of material of sufficient durability as to perform satisfactorily during period for which its use is required.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Clean surfaces thoroughly prior to installation.
   1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.

D. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.

E. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.

F. Temporary Pavement Markings: When required or directed by Architect, apply temporary markings of the color(s), width(s) and length(s) as indicated or directed.
   1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.
   2. At Contractor's option, temporary marking tape may used in lieu of temporary painted marking; remove unsatisfactory tape and replace with painted markings at no additional cost to Owner.

3.03 INSTALLATION

A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.

B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F (10 degrees C) or more than 95 degrees F (35 degrees C).

C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.

D. Comply with FHWA MUTCD manual (http://mutcd.fhwa.dot.gov) for details not shown.

E. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.

F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on the drawings true, sharp edges and ends.
   1. Apply paint in one coat only.
   2. Wet Film Thickness: 0.015 inch (0.4 mm), minimum.
   3. Length Tolerance: Plus or minus 3 ((75 mm).
   4. Width Tolerance: Plus or minus 1/8 inch (3 mm).

G. Roadway Traffic Lanes: Use suitable mobile mechanical equipment that provides constant agitation of paint and travels at controlled speeds.
   1. Conduct operations in such a manner that necessary traffic can move without hindrance.
   2. Place warning signs at the beginning of the wet line, and at points well in advance of the marking equipment for alerting approaching traffic from both directions. Place small flags or other similarly effective small objects near freshly applied markings at frequent intervals to reduce crossing by traffic.
   3. If paint does not dry within expected time, discontinue paint operations until cause of slow drying is determined and corrected.
   4. Skip Markings: Synchronize one or more paint "guns" to automatically begin and cut off paint flow; make length of intervals as indicated.
   5. Use hand application by pneumatic spray for application of paint in areas where a mobile paint applicator cannot be used.
   6. Distribute glass beads uniformly on the paint lines within ten seconds without any waste, applied at rate of 6 pounds per gallon (720 g per L) of paint; if the marking equipment does not have a glass bead dispenser, use a separate piece of equipment adjusted and synchronized with the paint applicator; remove and replace markings having faulty distribution of beads.

H. Parking Lots: Apply parking space lines, entrance and exit arrows, painted curbs, and other markings indicated on drawings.
   1. Mark the International Handicapped Symbol at indicated parking spaces.
   2. Hand application by pneumatic spray is acceptable.

I. Symbols: Use a suitable template that will provide a pavement marking with true, sharp edges and ends, of the design and size indicated.

3.04 DRYING, PROTECTION, AND REPLACEMENT

A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.

B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.

C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.

E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

F. Replace removed markings at no additional cost to Owner.

END OF SECTION 02765

SECTION 02772

CURBING

PART 1 GENERAL

1.01 RELATED SECTIONS

A. Section 02315 - Excavation and Backfill

B. Section 02741 - Bituminous Concrete Paving

PART 2 PRODUCTS

2.01 MATERIALS

A. Vertical Granite Curb:

1. Granite curb shall conform to MDOT Specifications for Type I. Curb shall be acceptable granite from approved quarries.

2. Tip-Down and Transition Granite Curb: Miscellaneous Granite Curb Sections shall conform to MDOT Specifications 712.04 (b).

3. All granite curb shall conform to the following standards:

a. All granite curb shall be basically light gray in color, free from seams and other structural imperfection or flaws which would impair its structural integrity, and of a smooth splitting appearance. Natural color variation characteristic of the deposit from which the curbing is obtained will be permitted.

b. The exposed face shall be smooth quarry split to an approximately true plane having no projections or depressions which will cause over one (1) inch to show between a two (2) foot straight-edge and the face when the straight-edge is placed as closely as possible on any part of the face.

c. If projections on the face are more than that specified they shall be dressed off. The top and bottom lines of the face shall be pitched off to a straight line and shall not show over one (1) inch between stone and straight-edge when straight-edge is placed along the entire length of the top and bottom lines and when viewed from a direction at right angles to the plane of the face, and for the top line only not over (1) inch when viewed from a direction in the plane of the face. The ends shall be square to the length at the face and so cut that when placed end to end as closly as possible, no space shall show in the joint at the face of over 3/8 inch except that where the edging is to be used on a curve having a radius of ten (10) feet or less, the ends of the stones shall be so cut as to provide a finished joint at the face section of not more than 1/2 inch. The arras formed by the intersection of the plane of the face with the plane of the end joint shall not vary from the plane of the face more than 1/4 inch. Drill holes not more tha 3-1/2 inches in length and 1/2 inch in depth will be permitted. The sides shall not be broken under the square more than four (4) inches and the side adjacent to the grass shall not project over one (1) inch.

d. Dimension Tolerance:

1) Minimum Length: 2 feet

2) Maximum Length: 8 feet

3) Thickness: 4 inches

4) Width of face: 12 inches

e. Acceptable Manufacturer: Swenson Granite Co. or approved equal.

B. Precast Concrete Curb:

1. The precast concrete curb producer shall supply cut sheets showing conformance to project drawings and requirements.
2. All concrete shall be air entrained to 5%, made with sand and gravel aggregate and conform to a twenty-eight (28) day strength of 4,000 psi (min.). Approximate weight of 130 lbs/LF. All concrete curb shall be properly reinforced with two (2) -3# rebar.
3. Precast concrete curb sections shall be handled and transported in a manner to minimize damage. Lifting devices or holes shall be consistent with industry standards. Lifting shall be accomplished with methods and devices intended for this purpose.
4. Precast concrete curb sections shall be stored in a manner that will minimize potential damage.
5. Precast concrete curb sections shall be delivered to the site to avoid excessive build-up of units in storage at the site. Upon delivery to the jobsite, precast concrere curb sections shall be inspected by the Owner or Owner's agent for quality and final acceptance.

PART 3 EXECUTION

3.01 GRANITE CURB

A. Contractor shall install, backfill and protect all granite curb in accordance with MDOT Subsection 609.03 and as detailed on the Drawings. Provide approved granite tip-down curbs at all curb end sections. Provide approved granite transition curb where curb type and/or material changes occur.

3.02 PRECAST CONCRETE CURB

A. The Contractor shall be responsible for providing adequate access to the site to faciliatate hauling, storage and proper handling of the precast concrete curb sections.

B. The precast concrete curb sections shall be installed to the lines and grades as shown in the project Drawings.

C. The precast concrete curb sections shall be lifted by suitable lifting devices.

D. The precast concrete curb sections shall be installed as indicated in the project Drawings.

E. Replace broken and damaged curbing before final acceptance by Owner.

3.03 PROTECTION

A. The Contractor shall be responsible to protect and repair as necessary all curbing disturbed during construction at no expense to Owner. Provide temporary barriers at all radius locations where truck entry would impact curbing.

END OF SECTION 02772

SECTION 02924
TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Preparing sub-grade for turf areas
2. Soil Preparation
3. Seeding
4. Hydro-seeding
5. Sodding

B. Related Sections include the following:
1. Division 02 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
2. Division 02 Section "Erosion & Sedimentation Control" for erosion and sedimentation control measures.
3. Division 02 Section "Site Clearing" for clearing and grubbing and stockpiling stripped materials
4. Drawing C-300 "Erosion & Sedimentation Control" notes and details of erosion and sedimentation control measures.

C. References Included in this Section:
1. USDA – United States Department of Agriculture
2. TPI – Turfgrass Producers International
3. ASTM- American Society for Testing & Materials.
4. AOSA – Association of Official Seed Analysis

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Topsoil (Loam): The uppermost layer of soil characterized by high concentrations of organic matter. When found in its natural state it has a minimum depth of 4 inches. For the purpose of these specifications it can be natural or cultivated surface-soil layer containing organic matter and friable sand, silt, and clay particles; free of subsoil, clay lumps, gravel, and other objects more than 1 inch (50 mm) in diameter; weeds, roots, toxic materials, and other nonsoil materials.

E. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

F. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill that will meet the specified compaction requirements.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is completed or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.
2. Submit product information with mix ratios and amounts for hydro mulching to be used during hydro seeding for Owner's Representative's approval.
3. Submit fertilizer, herbicide and fungicide products for application as required for Owner's Representative's approval.

B. Product Certificates: For soil, soil amendments and fertilizers, from manufacturer.

C. For topsoil submit topsoil analysis done by a plant and soil testing agency such as the Maine Soil Testing and Analytical Lab (207-581-2934) for review by the Owner's Representative. State recommended quantities for amendments necessary to produce satisfactory topsoil as stated in the specifications herein.

1.5 QUALITY ASSURANCE

A. Soil-Testing Laboratory Qualifications: An independent laboratory with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

B. Topoil Analysis: For each unamended soil type, Contractor to furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Owner's Representative. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for turf growth.

   a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
   b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying. Store in a cool, dry, shaded area.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

D. Use all means necessary to protect seed from moisture and other contaminants which may adversely effect proper germination.

E. Use all means necessary to protect fertilizers, amendments and other materials from moisture and other contaminants which may adversely affect their efficiency.

1.7 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.

1. Spring Planting: April 15 to June 1.
2. Fall Planting: September 1 to October 15.
3. The Contractor may seed at times other than those specified, only upon authorization by the Owner's Representative.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 60 days from date of planting completion.

   a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

2. Sod Turf: 30 days from date of installation.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil (Loam):
1. Natural, fertile loam typical of cultivated topsoil of the locality, containing not less than 3.5 percent or more than 8 percent by weight, of decayed organic matter (humus) as determined by ASTM F1647.
2. Obtain from a well drained arable site, free of subsoil, earth clods, large stones, sticks, stumps, clay lumps, roots, or other objectionable, extraneous matter or debris. Screen topsoil to a maximum stone size of 3/4 inch.
3. Topsoil shall be free of Quack-grass rhizones, *Agropyron Repens*, and the nut-like tubers of Nutgrass, *Cyperus Esculentus*, and all other primary noxious weeds.
4. Topsoil shall have a pH of not less than 6.0 or greater than 6.8.
5. Topsoil shall have a loam texture classification and do not deliver or use while in a frozen or muddy condition.
6. Topsoil shall conform to the following particle size distribution, as determined by pipette method in compliance with ASTM F1632.

   a. Sand: 40-60 percent.
   b. Silt: 30-40 percent.
   c. Clay: 5-20 percent.

B. Existing topsoil stockpiled from on-site stripping may be utilized if in compliance with the requirements for topsoil. Clean existing soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth. If determined by a soil test the existing topsoil that was stripped does not meet said requirements, the topsoil may be amended to provide and acceptable topsoil for use.
1. Supplement existing topsoil with suitable off site topsoil when quantities are insufficient.
2. If determined by a soil test the existing topsoil does not meet these specifications, the topsoil may be amended to provide acceptable topsoil. Once amendments are made the soil shall be retested for compliance with topsoil specifications.

2.2 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Lawn Mixture: Proportioned by weight as follows:

   a. 55 percent Creeping Red Fescue (3 varieties).

b. 30 percent Kentucky Bluegrass (3 varieties).
c. 15 percent Perennial Ryegrass (2 varieties).

C. Sod Turfgrass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Proportioned by weight as follows:

a. 80 percent Kentucky Bluegrass (2 varieties minimum).
b. 20 percent Perennial Ryegrass (2 varieties minimum).

2.3 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: O, with a minimum of 98 percent passing through No. 20 sieve and a minimum of 55 percent passing through No. 60 sieve.
2. Provide lime in form of ground dolomitic limestone.

2.4 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 6.1 to 7.8; moisture content 40 to 60 percent by weight; 100 percent passing through 1/2-inch (12.5-mm) sieve; soluble salt content of less than 2mnho/cm in final topsoil mix; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 30 to 60 percent of dry weight.
2. Nutrients: Provide NPK level information.
3. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8 and an ash content not exceeding 15 percent as determined by ASTM D2974.

2.5 FERTILIZERS

A. Slow-Release Fertilizer: Granular or pellet fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 15 percent nitrogen, 15 percent phosphorous, and 15 percent potassium, by weight or as otherwise recommended by the soil analysis.

2. Registration: Fertilizer must be registered with the Maine State Department of Agriculture and shall meet their standard requirements.

2.6 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley. No material shall be used which is too wet, decayed or compacted as to inhibit even uniform spreading.

B. Fiber Mulch: Biodegradable, green dyed wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5. Provide in moisture resistant sealed bags marked with the manufacturer's name, the air dry weight and composition of the contents.

C. Hydro mulch: Shall be Terra-Sorb GB, or an approved equal. Add Terra-Sorb to the hydro seed tank at the amount of 60 pounds per acre.

D. Mulch Binder: Asphalt emulsion; ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

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

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Owner's Representative and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydro-seeding and hydro-mulching overspray.
2. Protect grade stakes set by others until directed to remove them.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared sub-grades, and from flooding project site and surrounding area.

C. Protect sub-grade from softening, undermining washout and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

D. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edges of excavation and outside drip line of remaining trees.

E. Uniformly moisten or aerate subgrade as required for proper placement and compaction.

F. It is critical that neither the sub-soil nor top-soil shall be over-compacted and that as soil is brought in to raise the grade that underlying areas be scarified to eliminate layering of materials. Heavy road building equipment should be avoided. Use wide tracked or tired equipment specifically designed to minimize compaction. Heavy equipment should be kept off subgrades and topsoil areas during wet conditions.

G. Place soil as indicated on the Drawings in layers not to exceed 8 inches or as directed by the Owner's Representative. Prior to placing soil scarify or otherwise loosen a minimum of 4 inches below sub-grade. Soils shall not be compacted beyond 85%.

H. Use tilling equipment to thoroughly mix soil amendments into the entire depth of soil prior to fine grading or as other wise directed to insure uniform mixing.

I. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches (100 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Spread topsoil, apply planting soil amendments and fertilizer on surface, and thoroughly blend planting soil.

   a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
   b. Incorporate lime into the full depth of dry topsoil.

2. Spread topsoil to a depth as indicated or a minimum to meet finish grades after light rolling and natural settlement. Do not spread if topsoil or subgrade is frozen, muddy, or excessively wet.

J. Owner will engage a qualified independent geotechnical testing agency. Testing agency to inspect and test sub-grades and each fill or backfill layer for compliance. Proceed with subsequent earthwork only after test results for previously completed work have been received and indicate compliance with these specifications.

K. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
2. Loosen surface soil to a depth of at least 6 inches (150 mm). Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches (100 mm) of soil. Till soil to a homogeneous mixture of fine texture.
3. Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

L. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

M. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

N. Before planting, obtain Owner’s Representative acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

O. Provide fertilizer and lime application as recommended by the soil testing lab.

3.4 SEEDING

A. Method of seeding may be varied at discretion of Contractor. It is his or her responsibility to establish a smooth, uniform turf composed of approved grasses.

B. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

C. Sow seed at rate as shown on the plans and specifications and as recommended by the supplier.

D. Rake seed lightly into top 1/8 inch (3 mm) of soil, roll lightly, and water with fine spray.

E. Mulch seeded areas with straw mulch, 1-1/2 to 2 tons per acre. Secure mulch at Contractor's discretion as to method or need.

3.5 HYDRO-SEEDING

A. Method of seeding may be varied at discretion of Contractor. It is his or her responsibility to establish a smooth, uniform turf composed of approved grasses.

B. Hydro-seeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydro-seed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with asphalt-emulsion tackifier.
2. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500-lb/acre (5.2-kg/92.9 sq. m) dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1400 lb/acre.

3.6 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and additional mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary areas where the soil has settled or washed out. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
4. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
5. Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.

B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain a grass height of 2-1/2 to 3 inches.

3.7 INSPECTION AND ACCEPTANCE

A. Turf installations shall meet the following criteria as determined by Owner's Representative. The Owner's Representative will inspect lawns upon written request by the Contractor. The request shall be received at least ten (10) days before the anticipated date of inspection.

1. Satisfactory Seeded and sodded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

C. If the grass is in satisfactory condition, the Contractor's care and maintenance responsibilities will end. If the grass stand is unsatisfactory, the Contractor's maintenance responsibility shall continue, including a normal program of mowing, trimming, reseeding, fertilization and repair until and acceptable stand of grass is achieved.

3.8 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION

SECTION 02930
PLANTING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS: The general provisions of the contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Lawns and Topsoiling: Section 02924

1.03 DESCRIPTION OF WORK: Work specified in this section shall consist of furnishing all labor, materials and equipment to perform the installation of plant materials as specified on the contract drawings and as specified herein. This work includes but is not limited to:

A. Planting of trees, shrubs, vines, ground covers and herbaceous material.

B. Maintenance and guarantee.

1.04 RELATED WORK UNDER OTHER SECTIONS:

A. Turf and Grasses: Section 02924

1.05 QUALITY ASSURANCE:

A. All plant materials shall be true to name according to "Standardized Plant Names", published by the American Joint Committee on Horticulture Nomenclature, current edition. Each plant or bundle shall be tagged with the name and size of plants in accordance with the standards of the American Association of Nurserymen (AAN). In all cases, botanical names shall take precedence over common names.

B. Quality and size shall conform to the latest edition of "Horticultural Standards" for number one grade nursery stock as adopted by the AAN.

C. All plants and plant materials shall comply with all Federal, State and local laws and regulations requiring inspection for plant disease and insect control.

1.06 PRODUCT HANDLING:

A. Delivery and Storage:

1. Deliver all items to the job site in their original containers with all labels intact and legible at time of the Owner's Representative inspection.

2. Immediately remove from the site all plants which are not true to name, damaged and all materials which do not comply with the specified

requirements.

3. Use all means necessary to protect plant materials before, during, and after installation and to protect the work and materials of all other trades.

4. Replacements: in the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative and at no additional cost to the Owner.

1.07 JOB CONDITIONS: The Contractor must examine the subgrade, verify the elevations, observe the conditions under which the work is to be performed and notify the Owner's Representative immediately of any unsatisfactory conditions. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner.

A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate as required. Maintain grade stakes set by others until removal is mutually agreed upon by all parties concerned.

B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions the Contractor shall notify the Owner's Representative prior to planting. The Contractor shall be responsible for correcting such conditions.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Topsoil – Used in the planting mix and plant beds shall meet the requirements of topsoil in Section 02924: Turf and Grasses.

B. Fertilizer - All plants, **with the exception of the plants located within the bio-retention areas** shall be fertilized with a controlled release 16-8-16 analysis fertilizer contained in polyethylene perforated bags with micropore holes as sold as "The Unique Feeder Fertilizer packet" by Unique Fertilizers Inc. Deptford, New Jersey (1-800-845-GROW). The bag shall contain 4 ounces minimum of water soluble fertilizer to be effective for 8 years. Pills, spikes, tablets and injections are not considered controlled release packets.

1. Deliver as specified in standard containers, showing weight, analysis and manufacturer. Store in a weather-proof place.

C. Mulch - aged spruce and pine bark, consisting of the outer bark of the trees with minimum hardwood bark. Bark shall be thoroughly mixed and aged in stock piles a minimum of 6 months, partially decomposed, dark brown in color, and generally

free of chunks of wood thicker than 1/4". Aged mulch containing an excess of fine particles will not be acceptable.

D. Water - The Contractor will furnish hose and connections required for watering all plant materials until completion of the project.

E. Tree Staking - Hardwood Stake - for tree guying - 30" long (min.). For tree staking - 8' long (min.). Install only when required as noted on the drawings or when Contractor believes wind or vandalism may be an issue.

F. Guy Wire - pliable No. 12 to 14 gauge galvanized soft steel wire with rubber hose or Chain Lock brand plastic tree tie or approved equivalent.

G. Wrapping material - first quality, heavy, waterproof crepe paper manufactured for this purpose; not less than 4" wide. Install only when required as noted on the drawings or when Contractor believes sun scald may be an issue.

2.02 PLANT MATERIALS:

A. Furnish and install all plants as per drawings in quantities as shown graphically on the plans and as listed on plant materials list. If there is any discrepancy between quantities listed and plant material graphically shown, notify the Owner's Representative immediately for clarification prior to bidding. **Contractor shall be responsible for quantity of plant material graphically shown on plans and as per clarification by Owner's Representative.**

B. All plants shall be nursery grown unless authorized to be collected.

C. Plants - in accordance with USDA Standard for Nursery Stock, latest edition, hardy under climatic conditions similar to locality of project, typical of species or variety, normal habit of growth, sound, healthy, vigorous, well-branched, densely foliated when in leaf, free of disease, insect pests, eggs, or larvae, with well developed root systems.

D. Upon signing of a contract the Contractor shall immediately arrange to have the required plant material put on reserve for potential inspection by the owner and use for the project. If plants of specified kind or size are not available within a reasonable distance, substitutions may be made upon request, if approved by Owner's Representative.

E. Plant Dimensions - conform to USDA Standard for Nursery Stock, latest edition, as specified. Exceptions as follows:

1. Plants larger than specified may be used if approved by the Owner's Representative at no increase in contract price. Increase spread of roots or

earth ball in proportion to size of plant.

2. Undersize plants (10% max.) in any one variety or grade may be used if approved by the Architect. Provide sufficient plants above size to make average equal to or above specified grade. Undersize plants shall be larger than average size of next smaller grade.

F. Balled and burlap (B & B) plants - dig with firm natural earth roots. Made balls are unacceptable.

G. Container grown container plants - grown in container long enough for root system to have developed sufficiently to hold its soil together firm and whole. Plants loose in container will not be acceptable. Plants in grow bags shall not be accepted.

H. Protect B & B and container plants not planted immediately upon delivery with soil, wet moss, or other acceptable material. Prevent voids among roots with careful filling. Bind no plants with wire or rope so as to damage bark or break branches.

I. The Owner's Representative reserves the right of inspection and rejection upon delivery at the site or during progress of work. Remove and replace defective plants immediately from site.

PART 3 - EXECUTION

3.01 INSPECTION:

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PLANTING OPERATIONS:

A. Plant nursery stock immediately upon delivery to the site and approval by the Owner's Representative.

B. Planting may be done whenever weather and soil conditions are favorable or as otherwise authorized by the Owner's Representative. If this is not feasible, heel-in material with damp soil or mulch to protect from sun and wind. It shall be the Contractors responsibility to preserve the plant material in a healthy condition until planting occurs.

C. Notify Owner's Representative at least 72 hours prior to beginning planting

operations.

D. Excavate tree and shrub pits two times the diameter of the rootball or spread of roots.

E. Set plants in center of pits, plumb and straight, with crown of plant 1"to 2" higher than surrounding finished grade. The trunk flare shall not be buried.

F. When B & B plants are set **Remove burlap, ropes or wires from top 2/3 of balls minimum** and tuck the remainder down on the sides before filling in with soil. Backfill with native soil or in disturbed areas where native soil has been removed provide planting soil mix of 20 parts topsoil, 4 parts peat moss and 1 part well rotted manure or other composted organic material of low pH. Tamp soil around bases of balls to fill all voids. Settle thoroughly with watering.

G. When container plants are set, remove plant from container, make sure root system is in good health and not root bound. Loosen the outside layer of the root system by scoring with a knife. Circling roots pose a serious health hazard to the plant and shall be divided.

H. Thoroughly tamp soil around roots or balls and water immediately after plant pit is backfilled. Form a shallow basin slightly larger than pit with a ridge of mulch to facilitate and contain watering. Cultivate soil in shrub beds, rake smooth and neatly outline after planting. Provide 12" (min.) of topsoil between all shrubs and 6" (min.) between all ground covers.

I. Distribute controlled release fertilizer packets equidistant within the planting pit adjacent to the root ball but not in direct contact with the roots. Placement depth shall be 6 to 8 inches. Packets shall not be cut, ripped or damaged.

1. Application rates as follows:

Planting Item	Size	No. of Packets
Deciduous Trees:	1-3" cal.	3
	4-6" cal.	4
Shrubs:	2-3'	2
	over 3'	3
Evergreen Trees:	5-10'	4
	over 10'	5
Vines:	1 gal.	1
Groundcover:	1 packet per four plants	

J. **When** specified on the drawings wrap all deciduous trees immediately after planting. Wrap spirally from bottom to top and adequately secure. Overlap wrapping approximately 2" and entirely cover trunk from ground to height of second branch.

K. **When** specified on the drawings stake trees as required.

L. Prune each plant in accordance with AAN standards to preserve natural character. Remove all dead wood, suckers, broken or badly bruised branches. Prune with clean, sharp tools.

M. Cover all tree and shrub pits immediately after planting with 3" layer of specified mulch. Cover all groundcover and herbaceous plant beds with 1-1/2" layer of specified mulch. Limit of mulch for trees shall be area of pit; for shrubs in beds, entire area of shrub bed unless otherwise specified on drawings. **Keep mulch 3" away from the trunk. See detail plans for mulching in bio-retention areas.**

N. Contractor shall furnish plans showing locations of underground utilities encountered, as required.

3.03 MAINTENANCE: Maintenance shall begin immediately after each plant is planted and shall continue until final acceptance of all planting. Maintenance shall include the following:

A. Maintenance shall consist of keeping the plants in a healthy growing condition and shall include but is not limited to watering, weeding, cultivating, re-mulching, tightening and repairing of guys, removal of dead material, resetting plants to proper grades or upright position, and maintaining the planting saucer.

1. Plants shall be inspected for watering needs and watered as necessary to promote plant growth and vitality.

2. **When** staking is called for stakes shall be kept plumb and neat in appearance. Guys, wires and anchoring cables shall be tightened and repaired weekly.

3. Planting beds and individual plant pits shall be kept free of weeds, and mulch shall be replaced as required to maintain the specified layer of mulch. Beds and individual pits shall be neat in appearance and maintained to the designed layout.

4. Plants that die during the maintenance period shall be removed and replaced at once, unless designated otherwise by the Owner's Representative.

5. Spraying for both insect pests and diseases shall be included during the maintenance period as required and as directed.

6. During the maintenance period, any decline in the condition of plants shall require the Contractor to take immediate action to identify potential problems and undertake corrective measures. If requested by the Owner's Representative, the Contractor shall engage a professional arborists and/or horticulturalists to inspect plant materials and to identify problems and recommend corrective procedures.

3.04 ACCEPTANCE STANDARDS FOR PLANTING:

A. Following the completion of all planting, the Contractor shall request, from the Owner's Representative in writing, a formal inspection of the completed work. If plant materials and workmanship for the site are acceptable, written notice will be given to the Contractor stating that the work has been accepted and that the maintenance period has been terminated. The one year guarantee period shall commence from the date of acceptance.

B. If a number of plants are sickly or dead at the time of inspection, or if, in the Owner's Representative's opinion, workmanship is unacceptable, written notice will be given by the Owner's Representative to the Contractor in the form of a punch list, which itemizes necessary planting replacements and/or other deficiencies to be remedied. The Contractor's responsibility for maintenance of all the plants shall be extended until replacements are made or other deficiencies are corrected. All dead and unsatisfactory plants shall be removed promptly from the project. Replacements shall conform in all respects to the Specifications for new plants and shall be planted in the same manner.

3.05 GUARANTEE FOR PLANT MATERIALS:

A. Plants shall be guaranteed for a period of one (1) year after written notification of acceptance and shall be alive and in satisfactory growth at the end of the guarantee period.

B. At the end of the guarantee period, a final inspection will be held to determine whether any additional plant material replacements are required. Each plant shall show at least 80% healthy growth and shall have the natural character of its species as determined by the Owner's Representative. Plants found unacceptable shall be removed promptly from the site and be replaced during the normal planting season, until the plants live through one year.

3.06 CLEAN UP:

A. Absolutely no debris, fencing or barricades may be left on the site. Excavated material

shall be removed as directed. Repair any damage to site or structures to restore them to their original condition, as directed by the Owner's Representative, at no cost to the Owner.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE FOR SITE IMPROVEMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Drive-thru Pads
2. Equipment Pads

B. Related Sections include the following:

1. Section 02315 – Excavation and Backfill

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Qualification Data: For manufacturer.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

1. Aggregates.

D. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

E. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, bent bar diagrams, bar arrangement, splices and laps, and supports for concrete reinforcement.

F. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Admixtures.
2. Applied finish materials.
3. Bonding agent or epoxy adhesive.
4. Joint fillers.
5. Saltguard Sealant

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

C. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:

a. Contractor's superintendent.

b. Independent testing agency responsible for concrete design mixtures.

c. Ready-mix concrete producer.

d. Concrete pavement subcontractor.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves with a radius 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

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

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

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

C. Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain type

1. Form: Coiled Roils

2. Mesh Size and Wire Gage: As indicated on drawings.

D. Recycled Content of Steel Products: Provide products with an average recycled content of steel with postconsumer recycled content not less than 75 percent and preconsumer recycled content not less than 10 percent.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: ASTM C 150, Type I or II.

B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Water: Potable.

2.5 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Concrete Water Repellent Agent: Clear liquid concrete surface penetrating agent that protects concrete from moisture intrusions and chemical attack of chloride salts. Apply to all exterior concrete surfaces.

1. Available Products: PROSOCO, Inc.; Consolideck Saltguard WB

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days):
   a. Drive-Thru pad: 5,000 psi.
   b. Mechanical Unit Pad: 4,500 psi

2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.

3. Slump Limit: 4 inches, plus or minus 1 inch.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 5 percent plus or minus 1 percent for 1.5-inch nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

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

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.

2. Butt Joints: Use epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Extend joint fillers full width and depth of joint.

2. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.

3. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.

4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

5. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Control Joints: From weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint with grooving tool. Repeat grooving of control joints after applying surface finishes. Eliminate groover marks on concrete surfaces.

2. Control joints to be spaced not more than 12 feet apart both longitudinally and horizontally.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site.

F. Do not add water to fresh concrete after testing.

G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.

J. Screed pavement surfaces with a straightedge and strike off.

K. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

L. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

M. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.

2. Do not use frozen materials or materials containing ice or snow.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

N. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.

b. Continuous water-fog spray.

c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

E. All exterior concrete surfaces shall be provided with a water repellent product equal to Consolideck Saltguard WB. Apply product per manufacturer’s recommendations.

3.8 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.

2. Thickness: Plus 3/8 inch, minus 1/4 inch.

3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.

4. Joint Spacing: 3 inches.

5. Contraction Joint Depth: Plus 1/4 inch, no minus.

6. Joint Width: Plus 1/8 inch, no minus.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: The Site Contractor shall pay for any required retesting by the Architect and Owner.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 5000 sq. ft. or fraction thereof of each concrete mix placed each day.

   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.

   a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 03300

SECTION 03 30 01 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.

B. Related Sections include the following:
1. Division 1 Section "Sustainable Design Requirements."
2. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
3. Division 32 Section "Concrete Paving" for concrete pavement and walks.

C. Products installed, but not furnished, under this Section include the following:
1. Leveling plates, anchor rods and other embedded steel items under Division 05 Metals.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

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

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
1. Name and Location of the Concrete Supplier and Plant.
2. Concrete Test Reports using the same mix design, such as on past projects.
3. Indicate amounts of mixing water to be withheld for later addition at Project site.
4. The methods proposed for curing and protection of concrete.
5. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
   a. Sieve analyses for coarse, fine and lightweight aggregates.
6. Product Data Material Certificates: For each of the following, signed by manufacturers:
   a. Cementitious materials.
   b. Admixtures.
   c. Steel reinforcement and accessories.

d. Waterstops.
e. Floor and slab treatments.
f. Joint-filler strips.
g. Repair materials.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement. Bar placement drawings shall be detailed on wall elevations; detailing on plans with schedules is unacceptable and will be rejected.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

F. Where tests show that concrete is below specified strength, the Contractor shall remove all such concrete as directed by the Architect. Full cost of removal of low strength concrete and replacement with concrete of proper specified strength shall be borne by the Contractor, as shall all work required by such remedial action.

1.6 DELIVERY, STORAGE, AND HANDLING

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

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 GROUT

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

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

2.3 STEEL REINFORCEMENT

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

2.4 REINFORCEMENT ACCESSORIES

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

2.5 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
1. Portland Cement: ASTM C 150, Type I or II.
a. Fly Ash: ASTM C 618, Class C or F.

b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Water: ASTM C 94/C 94M and potable.

2.6 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.7 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

2.8 RELATED MATERIALS

A. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, per ASTM D 2240.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.9 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
5. Silica Fume: 10 percent.
6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings, Foundation Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 5 inches, plus or minus 1 inch.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 4 inches, plus or minus 1 inch.
1. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.11 FABRICATING REINFORCEMENT

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

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Construct forms tight enough to prevent loss of concrete mortar.

D. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

E. Chamfer exterior corners and edges of permanently exposed concrete where specified on the Drawings.

F. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

G. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

H. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 STEEL REINFORCEMENT

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

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

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

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

1. Weld reinforcing bars according to AWS D1.4, where indicated.

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

3.4 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Space vertical joints in walls as indicated on the Drawings. Locate joints away from column piers integral with walls, but in concealed locations where possible.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Grade: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random control cracks.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

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

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

3.6 FINISHING FORMED SURFACES

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

1. Apply to concrete surfaces not exposed to public view.

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

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.

Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.7 FINISHING FLOORS AND SLABS

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

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

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

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route or as specified on the construction plans. Coordinate required final finish with Architect before application.

3.8 CONCRETE PROTECTING AND CURING

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

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3.9 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

3.10 FIELD QUALITY CONTROL

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

END OF SECTION 03 30 01

SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Face brick.
2. Mortar and grout.
3. Masonry joint reinforcement.
4. Ties and anchors.
5. Embedded flashing.
6. Miscellaneous masonry accessories.

B. Related Sections include the following:

1. Division 07 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
2. Division 07 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.

1.3 SUBMITTALS

A. Samples for Verification: For each type and color of the following:

1. Face brick, in the form of straps of five or more bricks.
2. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project**.** Label Samples to indicate types and amounts of pigments used.
3. Weep holes/vents.

B. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:

1. Masonry units.

   a. Include material test reports substantiating compliance with requirements.
   b. For bricks, include size-variation data verifying that actual range of sizes falls within specified tolerances.
   c. For exposed brick, include material test report for efflorescence according to ASTM C 67.
   d. For surface-coated brick, include material test report for durability of surface appearance after 50-cycles of freezing and thawing per ASTM C 67 or a list of addresses of buildings in Project's area where proposed brick has been used successfully and with a history of durability.

2. Cementitious materials. Include brand, type, and name of manufacturer.

3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Joint reinforcement.
6. Anchors, ties, and metal accessories.

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

1. Include test reports, per ASTM C 780, for mortar mixes required to comply with property specification.
2. Include test reports, per ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.4 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

1.5 DELIVERY, STORAGE, AND HANDLING

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

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings 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.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

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

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

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

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

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

2.2 BRICK

A. General: Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.

B. Face Brick: As manufactured by Morin Brick; Old Port Series – Full Range. ASTM C 216, Grade SW, Type FBS.

1. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
2. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
3. Size 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.

2.3 MORTAR AND GROUT MATERIALS

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

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

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

E. Colored Cement Product: Packaged blend made from portland cement and lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
2. Pigments shall not exceed 10 percent of portland cement by weight.
3. Products:

a. Colored Portland Cement-Lime Mix:

1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
3) Lafarge North America Inc.; Eaglebond.
4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

F. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

G. Aggregate for Grout: ASTM C 404.

H. Water: Potable.

2.4 REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A 951.

1. Exterior Walls: Hot-dip galvanized, carbon steel.
2. Wire Size for Side Rods: W1.7 or 0.148-inch diameter.
3. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter.
4. Wire Size for Veneer Ties: W1.7 or 0.148-inch diameter.
5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
6. Provide with prefabricated corner and tee units.

B. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.5 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with eight subparagraphs below, unless otherwise indicated.

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Adjustable Masonry-Veneer Anchors

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

2. Contractor's Option: Unless otherwise indicated, provide any of the following types of anchors:
3. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
   a. Anchor Section: Sheet metal plate, 1-1/4 inches wide by 6 inches to 9 inches long, with screw holes top and bottom and with raised rib-stiffened strap, 5/8 inch wide by 3-5/8 inches to 5-1/2 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie.
   b. Anchor Section: Zinc-alloy barrel section with flanged head with eye and corrosion-resistant, self-drilling screw. Eye designed to receive wire tie and to serve as head for drilling fastener into framing. Barrel length to suit sheathing thickness, allowing screw to seat directly against framing with flanged head covering hole in sheathing.
   c. Products:
      1) Heckmann Building Products Inc.; 315-D with 316 or Pos-I-Tie.

2.6 EMBEDDED FLASHING MATERIALS

A. Flexible Flashing: For flashing not exposed to the exterior, use one of the following, unless otherwise indicated:

1. Copper-Laminated Flashing: 5-oz./sq. ft. copper sheet bonded with asphalt between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

a. Products:

1) Advanced Building Products Inc.; Copper Fabric Flashing.
2) AFCO Products Inc.; Copper Fabric.
3) Hohmann & Barnard, Inc.; H & B C-Fab Flashing.
4) Phoenix Building Products; Type FCC-Fabric Covered Copper.
5) Polytite Manufacturing Corp.; Copper Fabric Flashing.
6) Sandell Manufacturing Co., Inc.; Copper Fabric Flashing.
7) York Manufacturing, Inc.; York Copper Fabric Flashing.

B. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

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

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

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

D. Weep/Vent Products: Use the following, unless otherwise indicated:

1. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches long.

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Provide one of the following configurations:

a. Strips, full-depth of cavity and 10 inches wide, with dovetail shaped notches 7 inches deep that prevent mesh from being clogged with mortar droppings.
b. Strips, not less than 1-1/2 inches thick and 10 inches wide, with dimpled surface designed to catch mortar droppings and prevent weep holes from being clogged with mortar.
c. Sheets or strips full depth of cavity and installed to full height of cavity.
d. Sheets or strips not less than 1 inch thick and installed to full height of cavity with additional strips 4 inches high at weep holes and thick enough to fill entire depth of cavity and prevent weep holes from being clogged with mortar.

2. Products:

a. Advanced Building Products Inc.; Mortar Break or Mortar Break II.
b. Archovations, Inc.; CavClear Masonry Mat.
c. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
d. Mortar Net USA, Ltd.; Mortar Net.

2.8 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.9 MORTAR AND GROUT MIXES

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

1. Do not use calcium chloride in mortar or grout.
2. Limit cementitious materials in mortar to portland cementand lime.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type S.
2. For mortar parge coats, use Type S or N.

3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
4. Min. comp. Strength at 28 days, 1800 psi.

C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Mix to match Architect's sample.

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

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

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

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

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

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

H. Construction Tolerances.

1. Comply with construction tolerance of referenced unit masonry standard:
   a. ACI 530.1/ASCE 6/TMS 602.

3.3 LAYING MASONRY WALLS

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

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

C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

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

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

3.4 MORTAR BEDDING AND JOINTING

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

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

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

3.5 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.

B. Provide continuity at wall intersections by using prefabricated T-shaped units.

C. Provide continuity at corners by using prefabricated L-shaped units.

D. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.6 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing withmasonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed tie sections in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
3. Locate anchor sections to allow maximum vertical differential movement of ties 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 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.

3.7 CONTROL AND EXPANSION JOINTS

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

B. Form expansion joints in brick made from clay or shale as follows:

1. Install preformed control joint gaskets designed to fit standard sash block.
2. Build in compressible joint fillers where indicated.
3. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

3.8 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows, unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and use specified weep/vent products to form weep holes.

D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.

E. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.9 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat and scarify first 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 parging until cured.

3.10 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

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

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

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.

3.11 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 31 Section "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 20 00

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Structural steel.

B. Related Sections include the following:

1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 09 painting Sections for surface preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.4 SUBMITTALS

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

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

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

1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
3. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
4. AISC's "Specification for the Design of Steel Hollow Structural Sections."
5. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
6. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.6 DELIVERY, STORAGE, AND HANDLING

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

1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.7 COORDINATION

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

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel with postconsumer recycled content not less than 75 percent and preconsumer recycled content not less than 10 percent.

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

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

D. Plate and Bar: ASTM A 36/A 36M or ASTM A 529/A 529M, Grade 50 as required at moment connections.

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

F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

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

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

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

C. Unheaded Anchor Rods: At contractor’s option: ASTM F 1554, Grade 36, ASTM F 1554, Grade 55, weldable, ASTM A 354, ASTM A 449, ASTM A 572/A 572M, Grade 50 ASTM A 36/A 36M, ASTM A 307, Grade A.

1. Configuration: As shown on the Drawings.
2. Nuts: ASTM A 563.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436 hardened carbon steel.
5. Finish: Plain.

2.3 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer compatible with field-applied finish paint.

2.4 GROUT

A. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404, Size No. 2. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
1. Mark and match-mark materials for field assembly.
2. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

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

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

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

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

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning SSPC-SP 2, "Hand Tool Cleaning or SSPC-SP 3, "Power Tool Cleaning."

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

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

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

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

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits.

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

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

D. Painting: Apply a 1-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.8 SOURCE QUALITY CONTROL

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

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

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

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

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
   1. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
   2. Ultrasonic Inspection: ASTM E 164.
   3. Radiographic Inspection: ASTM E 94.

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 PREPARATION

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

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

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."

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

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

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

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

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

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

E. Splice members only where indicated.

F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.

G. Do not use thermal cutting during erection.

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

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

3.4 FIELD CONNECTIONS

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

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.

a. Grind butt welds flush.
b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

3.5 FIELD QUALITY CONTROL

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

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

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
   a. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
   b. Ultrasonic Inspection: ASTM E 164.
   c. Radiographic Inspection: ASTM E 94.

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

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

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

3.6 REPAIRS AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories and abutting structural steel.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

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

END OF SECTION 05 12 00

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Exterior wall framing.

B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for top of wall embedded steel angles.
2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
3. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on the Drawings.

2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/600 of the wall height.
b. Roof Trusses: Vertical deflection of 1/360 of the span.
c. Shear Walls: In-plane wall deformation (racking) shall not exceed 5/16” under the full Wind Shear load specified on the Drawings.

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

a. Upward and downward movement of 1/2 inch.

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."

2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
3. Roof Trusses: Design according to AISI's "Standard for Cold-Formed Steel Framing - Truss Design."

1.4 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Shop Drawings: Show complete layout of studs, jambs and headers for all exterior walls on 1/4” = 1’-0” scale Wall Framing Elevations in their entirety, including but not limited to spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work. Shop drawing submittals without entire wall framing elevations are unacceptable and will not be reviewed. Architect's review includes but is not limited to suitability of the submittal for construction, inspection and as an Owner's record.

1. Layout plan for top of wall embedded steel angles and anchor rods (to be fabricated and installed by others) as required by shear wall panel design & layout.

2. For cold-formed metal framing indicated to comply with design loads, submit structural analysis calculations signed and sealed by the qualified professional engineer responsible for their preparation. The Engineer shall also sign and seal each shop drawing (or panel card). Review of structural analysis calculations is for general conformance with requirements, completeness and assumed load path back to the primary structure. The responsibility for correctness rests solely with the design professional. The Architect reserves the authority to require resubmittal for observed deficiencies, or incompleteness. Calculations and Shop Drawings must be submitted together in the same submittal package for concurrent review.

3. Nomenclature: Use Steel Stud Manufacturer Association (SSMA) four part identification code which identifies the size (both depth and flange width), style and material thickness of each member. Shop drawings without this nomenclature are unacceptable and will not be reviewed.

C. Welding certificates.

D. Special Inspection Field Reports: The professional engineer responsible for the design shall schedule at least three site visits and submit inspection field reports bearing his/her seal, including a final affidavit after the construction is complete and inspected stating that the Work is complete and is in accordance with all requirements.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

D. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

E. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

F. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:

1. Allied Studco.
2. AllSteel Products, Inc.
3. California Expanded Metal Products Company.
4. Clark Steel Framing.
5. Consolidated Fabricators Corp.; Building Products Division.
6. Craco Metals Manufacturing, LLC.
7. Custom Stud, Inc.
8. Dale/Incor.
9. Design Shapes in Steel.
10. Dietrich Metal Framing; a Worthington Industries Company.
11. Formetal Co. Inc. (The).
12. Innovative Steel Systems.
13. MarinoWare; a division of Ware Industries.
14. Quail Run Building Materials, Inc.
15. SCAFCO Corporation.
16. Southeastern Stud & Components, Inc.
17. Steel Construction Systems.

18. Steeler, Inc.
19. Super Stud Building Products, Inc.
20. United Metal Products, Inc.

2.2 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: ST50H.
2. Coating: G60, A60, AZ50, or GF30.

B. Steel Sheet for Vertical Deflection Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G60 minimum

2.3 EXTERIOR WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch.
2. Flange Width: 2 inches minimum.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches.

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 2 inches.

D. Steel Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Top Flange Width: 2 inches.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers, knee braces, and girts.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel and carbon-steel nuts; and flat, hardened-steel washers.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

D. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.7 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

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

3.2 PREPARATION

A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 EXTERIOR WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: To match stud spacing and as shown on Drawings.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:

1. Stud Spacing: 24 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced 48 inches. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of 2 screws into each flange of the clip angle for framing members up to 6 inches deep.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 FIELD QUALITY CONTROL

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

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 06 17 53 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Wood roof trusses.
2. Wood truss bracing. Identify all temporary and permanent out-of-plane wood truss bracing as required for erection and by the truss fabricator's engineer at diagonal web compression members to be provided under "Rough Carpentry."
3. Metal truss accessories. Identify all permanent wood truss-to-truss connectors as well as hurricane anchors as required by the truss fabricator's engineer at truss bearings to be provided under "Rough Carpentry."

B. Related Sections include the following:

1. Division 06 Section "Sheathing" for roof sheathing and subflooring.

1.3 DEFINITIONS

A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

B. TPI: Truss Plate Institute, Inc.

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

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. SPIB: The Southern Pine Inspection Bureau.
4. WCLIB: West Coast Lumber Inspection Bureau.
5. WWPA: Western Wood Products Association.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.

1. Design Loads: As indicated on the Drawings.
2. Maximum Deflection Under Design Loads:

a. Roof Trusses: Vertical deflection of 1/360 of span.

1.5 SUBMITTALS

A. Submit Fabricator's technical data covering lumber, metal plates, hardware, fabrication process, treatment, handling and erection.
   1. Submit certificate, signed by an officer of fabricating firm, indicating that trusses to be supplied for project comply with indicated requirements.
   2. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Shop Drawings: Submit shop drawings showing species, sizes, and stress grades of lumber to be used; pitch span, camber, configuration and spacing for each type of truss required; type, size, material, finish, design value, and location of metal connector plates; and bearing and anchorage details.
   1. All layout plans, calculations and details shall be signed and sealed by a professional engineer licensed in the State of Maine.
   2. Submit a fully dimensioned layout plan at 1/4” = 1’-0” scale for coordination with each truss type. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
   3. Submit design analysis and test reports indicating loading, section models, assumed allowable stress, stress diagrams and calculations, and similar information needed for analysis and to ensure that trusses comply with requirements for each truss, both typical and special trusses.
   4. Submit fully dimensioned elevations for each truss indicating size and location of all vertical and diagonal truss web members.
   5. Submit large scale details for truss to truss connections (including valley trusses) for review, approval, field use and inspection, as well as special truss girder hold downs or bearing reinforcement requirements.
   6. Indicate sizes, stress grades, and species of lumber.
   7. Indicate locations of permanent bracing (strongbacks) required to prevent buckling of individual truss members due to design loads.
   8. Indicate manufacturer and model of hurricane anchors and truss-to-truss connectors required due to design loads.
   9. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
   10. Show splice details and bearing details.
   11. For installed products indicated to comply with design loads, include structural analysis signed and sealed by the licensed professional engineer responsible for their preparation.

C. Qualification Data: For fabricator.

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

1.6 QUALITY ASSURANCE

A. Preinstallation Conference: In conjunction with Rough Carpentry and Sheathing, conduct conference at Project site to review the requirements of this Specification, the Drawings and to comply with requirements in Division 01 Section "Project Management and Coordination."

B. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.

   1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.

2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

C. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

D. Source Limitations for Connector Plates: Obtain metal connector plates from a single manufacturer.

E. Comply with applicable requirements and recommendations of the following publications:

1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
3. TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."

F. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses to comply with recommendations of TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."

1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
3. Provide for air circulation around stacks and under coverings.

B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.8 COORDINATION

A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

PART 2 - PRODUCTS

2.1 DIMENSION LUMBER

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Provide dressed lumber, S4S.
4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

B. Grade and Species: For truss chord and web members, provide dimension lumber of any species, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

C. Minimum Chord Size For Roof Trusses: 2x6 nominal for both top and bottom chords.

D. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 06 Section Rough Carpentry.

2.2 METAL CONNECTOR PLATES

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

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

1. Alpine Engineered Products, Inc.
2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
3. CompuTrus, Inc.
4. Eagle Metal Products.
5. Jager Building Systems, Inc.
6. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
7. Robbins Engineering, Inc.
8. TEE-LOK Corporation; a subsidiary of Berkshire Hathaway Inc.
9. Truswal Systems Corporation.

C. General: Fabricate connector plates to comply with TPI 1.

D. Hot-Dip Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.

1. Use for interior locations where stainless steel is not indicated.

2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

B. Nails: ASTM F 1667.

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

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

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

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry

assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.4 METAL TRUSS ACCESSORIES

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

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

C. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings or comparable products by one of the following:

1. Cleveland Steel Specialty Co.
2. Harlen Metal Products, Inc.
3. KC Metals Products, Inc.
4. Simpson Strong-Tie Co., Inc.
5. Southeastern Metals Manufacturing Co., Inc.
6. USP Structural Connectors.

D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

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

1. Use for interior locations where stainless steel is not indicated.

F. Truss Tie-Downs (Hurricane or Seismic Ties): As required for analysis and design loads. Install according to manufacturer's requirements.

G. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls. Clip is fastened to truss through slotted holes to allow for truss deflection.

2.5 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.

B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.

C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.

1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to TPI recommendations and as indicated.

E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

F. Space trusses as indicated on the Drawings; adjust and align trusses in location before permanently fastening.

G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in truss accessories according to manufacturer's fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses.

1. Anchor trusses to girder trusses as indicated.

I. Identify how to install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
1. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.

J. Install wood trusses within installation tolerances in TPI 1.

K. Do not cut or remove truss members.

L. Replace wood trusses that are damaged or do not meet requirements.

1. Do not alter trusses in field.

3.2 REPAIRS AND PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

C. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

D. Protective Coating: Clean and prepare exposed surfaces of metal connector plates. Brush apply primer, when part of coating system, and one coat of protective coating.

1. Apply materials to provide minimum dry film thickness recommended by coating system manufacturer.

END OF SECTION 06 17 53

SECTION 06 20 00 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to this Section.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Handle trusses with care, following the manufacturer's instructions.

B. Provide bearing supports and bracing to avoid damage from bending or overturning.

C. Protect from construction operation.

D. Deliver 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.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with AWI Architectural Workwork quality standards, premium grade and WIC manual of millwork, premium grade.

B. Fabricators must be pre-approved by the Architect.

C. Fabricators: Company specializing in fabricating the products specified in the section with minimum ten years documented experience.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable local code for fire retardant requirements.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

A. Exterior Softwood Lumber: PS 20, graded in accordance with AWI premium, cedar species, surfaced and smooth sawn maximum moisture content of 6 percent; with vertical grain of quality suitable for transparent finish. (SIS2E, select grade "Clear Heart", kiln dried).

B. Interior Softwood Lumber: Graded in accordance with AWI premium; birch species, fully surfaced and smooth sawn, maximum moisture content of 6 percent, with vertical grain of quality suitable for transparent finish (mill clear, kiln dried).

2.2 SHEET MATERIALS

A. Interior Softwood Plywood: PS 1 grade C-D; graded in accordance with AWI premium, veneer core; Douglas Fir, smooth faced species (mill clear, kiln dried).

B. Exterior Medium Density Overlay Plywood: Premium veneer grade PS 1-95, graded in accordance with AWI premium, veneer core; type of glue recommended for application. Paper saturated with phenolic resin solide face species. (Paper saturated, face one side only and Forrest products. Furnish factory primed two (2) sides and edges.)

2.3 FASTENERS

A. Fasteners: Of size and type to suit application stainless steel finish in concealed locations and finish in exposed locations to be selected by Architect for interior conditions and non-corrosive type for exterior conditions.

B. Concealed Joint Fasteners: Threaded steel.

2.4 ACCESSORIES

A. Lumber for Shimming, Blocking, and Miscellaneous Use: Softwood lumber of Douglas Fir, utility grade species. Size as required for condition unless shown otherwise.

B. Plastic Edge Trim: Extruded convex shaped, smooth finish, self-locking serrate tongue, width to match component thickness; color as selected.

C. Primer: Alkyd primer sealer type. Prime in accordance with manufacturers requirement and per Section 09900 (painting).

D. Wood Filler: Oil base, tinted to match surface finish color.

2.5 WOOD TREATMENT

A. Wood preservative by pressure treatment (PT type). AWPA treatment C2 using water borne preservative with 0.28 percent retainage.

B. Wood preservative (surface application clear to comply with AWPA M).

C. Shop pressure treat treatment to wood materials requiring preservatives to conceal wood blocking and exterior softwood lumber.

2.6 HARDWARE

A. Hardware: BHMA A146.9 as follows:

1. All hardware to be as shown on drawings. If not shown provide hardware as directed by Owner and/or required for a complete installation.

2.7 FABRICATION

A. Fabricate to AWI premium standards.

B. Shop assemble work for delivery to site, permitting passage through building openings.

C. Fit interior exposed sheet material. Edges with plastic edging where shown (never leave in finished edge exposed to view).

D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim of scribing and site cutting.

2.8 SHOP PRIMING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes use wood filler which matches surrounding surfaces and of types recommended for applied finishes.

D. Finish work in accordance with AWI as shown on drawings and as directed by Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Coordination and Meetings: Verification of existing conditions before starting work.

B. Verify adequacy of backing and support framing.

C. Verify mechanical, electrical, and building items affecting work of this section are placed are ready to receive this work.

3.2 INSTALLATION

A. Install work in accordance with AWI premium quality standard.

B. Set and secure materials and components in place, plumb, and level.

C. Carefully scribe work abutting other components, with maximum of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

D. Miter 90 degrees exterior corners of MDO exterior plywood.

E. Install hardware in accordance with manufacturer’s instructions.

F. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

3.3 ERECTION TOLERANCES

A. Maximum variation from true position 1/16 inch.

B. Maximum offset from true alignment with abutting materials. 1/32 inch.

END OF SECTION 06 20 00

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Foam-plastic board insulation.
2. Glass-fiber blanket insulation.
3. Loose-fill insulation.
4. Spray polyurethane foam insulation.
5. Vapor retarders.

1.3 SUBMITTALS

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

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

C. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

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

a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. Owens Corning.
d. Pactiv Building Products.

2. Type X, 15 psi.
3. Type IV, 25 psi.

B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

2.2 GLASS-FIBER BLANKET INSULATION

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

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Knauf Insulation.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. 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.

D. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:

1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.3 LOOSE-FILL INSULATION

A. Glass-Fiber Loose-Fill Insulation: ASTM C 764, Type I for pneumatic application or Type II for poured application; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

2.4 SPRAY POLYURETHANE FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

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

   a. BASF Corporation.
   b. BaySystems NorthAmerica, LLC.
   c. Dow Chemical Company (The).
   d. ERSystems, Inc.
   e. Gaco Western Inc.
   f. Henry Company.
   g. NCFI; Division of Barnhardt Mfg. Co.
   h. SWD Urethane Company.
   i. Volatile Free, Inc.

2. Minimum density of 1.5 lb/cu. ft., thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.5 VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.

D. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

A. On vertical footing and foundation wall surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 78 inches below exterior grade line or top of footing.

B. On horizontal surfaces under slabs, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. Insulation to extend to all edges of the exterior foundation wall and be sealed to the vertical insulation on exterior walls.

3.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Glass-Fiber Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.

D. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.

E. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

F. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.5 INSTALLATION OF VAPOR RETARDERS

A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders 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 no fewer than two studs.

1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.6 PROTECTION

A. 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 is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

3.7 INSULATION SCHEDULE

A. Type IV extruded-polystyrene board insulation “Rigid Insulation”. Located below grade on foundation walls and under concrete slab. Thickness / R-value: 2 inch / R-10.

B. Type X extruded-polystyrene board insulation “Rigid Insulation”. Located above grade on exterior walls. Thickness / R-value: 1-1/2 inch / R-7.5.

C. Type IV extruded-polystyrene board insulation “Rigid Insulation”. Located between slab edge and foundation wall. Thickness / R-value: 1 inch / Minimum R-5.

D. Unfaced, glass-fiber blanket insulation. Located in interior wall partitions. Thickness: 3-1/2 and 5-1/2 inch, refer to wall types in the drawing set for locations.

E. Polyurethane spray foam insulation. Located between the framing of the exterior walls. Thickness: 2-1/2 inch minimum thickness and fill stud to inside face 100% to a minimum of 8 inches depth at bottom plate, top plate, header, sill, jamb, and or any other penetration in the exterior envelope. Minimum R-value of R-16.

F. Glass-fiber loose-fill insulation. Located in all attics. R-value: Minimum R-42.

G. Polyurethane spray foam insulation. Located around exterior windows and doors.

END OF SECTION 07 21 00

SECTION 07 26 00 - AIR AND VAPOR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to this Section.

1.2 REFERENCES

A. ASTM E-96-90 “Standard test method for water transmission of materials”.

B. ASTM E-1677-95 “Standard specification for an air retarder (AR) material or system for low-rise framed building walls”.

C. AATCC-127 “Hydrostatic head test”.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide one of the following products, Tyvek, commercial building wrap by the Dupont Company or Jumbotex by Fortafiber or Ultra-Wrap by Pactiv Building Products.

2.2 WATER RESISTANT BARRIER

A. Spun bonded olefin, non-woven, non-perforated.

B. Performance characteristics ASTM EL677 Type 1 Air retarder. Air leakage at 25 MPH (75 PA) wind pressure of less than 0.6CFM/FT2. Water vapor transmission of greater than 20 Perms in accordance with ASTM E-96-90, method B. Water penetration resistance of 200 CM on hydrostatic head in accordance with AATCC-127.

2.3 SEALING TAPE / FASTENERS

A. Dupont contractor tape, by Dupont Company.

B. Fasteners for wood: Nails with plastic washer heads.

C. Fasteners for steel frame construction: Rust-resistant screws with washers.

D. Recommended head, jamb, and sill flashing for all penetrations. Provide manufacturer’s standard flashing system components.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instruction over exterior sheathing and under foam bard if applicable. Seal joints and penetrations through air infiltration barrier with specified tape, flashing and fasteners prior to installation of finish material. Air infiltration barrier shall be air tight and free from holes, tears, and punctures. All window and door penetrations are to be flashed and sealed per manufacturer instructions.

3.2 CLEAN-UP

A. At the end of each workday remove all debris from site.

END OF SECTION 07 26 00

SECTION 07 27 00 - FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to this Section.

1.2 QUALITY ASSURANCE

A. Fire-test-response characteristics provide firestopping that complies with the following requirements and those specified under “system performance requirements” article.

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Wamock Hersey, or another agency performing testing and follow-up inspection services for firestop systems that is acceptable to authorities having jurisdiction.
2. Through-penetration firestop systems are identical to those tested per ASTM E814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly. Provide rated systems complying with the following requirements.
   a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
   b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL in their “Fire Resistance Directory”, by Wamock Hersey.
3. Fire-resistive joint sealant systems are identical to those tested for fire-response characteristics per ASTM E119 under conditions where the positive furnace pressure differential is at least 0.01 inch of water, as measured 0.78 inch from the face exposed to furnace fire provide systems complying with the following requirements:
   a. Fire-resistance ratings of joint sealants as indicated by reference to design designations listed by UL in their “Fire Resistance Directory” or by another qualified testing and inspecting agency.
   b. Joint sealants including backing materials, bear classification marking of qualified testing and inspection agency.

B. Installer qualifications: Engage an experienced installer who has completed firestopping that is similar in material, design, and extent to that indicated for project and that was performed successfully.

C. Single-source responsibility, obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.

D. Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, “Polorized Light Miscroscopy”.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

1.4 PROJECT CONDITIONS

A. Environmental conditions do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation or other causes.

B. Ventilation: Ventilate firestopping per firestopping manufacturers instructions by natural means or where this is inadequate forced air circulation.

PART 2 - PRODUCTS

2.1 FIRESTOPPING, GENERAL

A. Compatibility: Provide firestopping composed of components that are compatible with each other. The substrates forming openings and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

B. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with “system performance requirements” article in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:
   1. Permanent forming/damming/backing materials including the following:
      a. Semirefractory fiber (mineral wood) insulation
      b. Ceramic insulation
      c. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state
      d. Fire-rated formboard
      e. Joint fillers for joint sealants

2.2 MATERIALS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS

A. Intumescent wrap strips, single-component elastomeric sheet with aluminum foil on one side.

B. Silicone foam, two-component, silicone-based liquid elastomer that, when mixed expands and cures in place to produce a flexible nonshrinking foam.

C. Silicone Sealant: Moisture-curing, single-component, silicone-based neutral-curing elastomeric sealant of nonsag grade for openings in vertical and other surfaces.

D. Intumescent Wrap Strips: Provide one of the following products, Fire Stop Intumescent Wrap Strip 2002 by Dow Corning, Corp or CS2420 Intumscent Wrap by Hilti Construction Chemicals Inc., or fire barrier FS-195 wrapstrip 3M Fire protection products.

E. Silicone Foams: Fire Stop Foam 2001 by Dow Corning Corp., or Pensil 200 Foam by General Electric Co.

F. Silicone Sealants: Firestrop Sealant 2003 by Dow Corning Corp., or Pensil 100 Firestop Sealant by General Electric Co or CS240 Firestop Sealant by Hilti Construction Chemicals, Inc.

2.3 FIRE-RESISTIVE ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that complies with ASTM C920 requirements, including those referenced for type, grade, class, and uses, and requirements specified in this section applicable to fire-resistive joint sealants.

B. Sealant Colors: Provide color of exposed joint sealant color selections made by Architect from manufacturers full range of standard colors for products of type indicated.

C. Single-component, neutral-curing silicone sealant, Type S, Grade NS, Class 26. Exposure-related use NT, and joint-substrate-related uses M, G, A, and (as applicable to joint substrates indicated) 0.
   1. Additional movement capability. Provide sealant with the capability to withstand the following percentage changes in joint width existing at time of installation, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, and remain in compliance with other requirements of ASTM C920 for uses indicated.
   2. 100 percent movement in extension and 50 percent movement in compression for a total of 150 percent movement.

D. Single-Component, Neutral-Curing, Silicone: Dow Corning 790 by Dow Corning Corp., or Spectrum 1 by Tremco.

PART 3 - EXECUTION

3.1 Examination:

A. Examine substrates and conditions, with installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements. Remove all foreign materials from surfaces of openings and joint substrates and from penetrating items that could interfere with adhesion of firestopping. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation. Remove laitance and form release agents from concrete.

B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond. Do not allow spillage and migration onto exposed surfaces.

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

3.3 INSTALLING THROUGH-PENETRATION FIRESTOPS

A. General: Comply with the “system performance requirements” article in Part 1 and the through-penetration firestop manufacturer’s installation instructions and drawings pertaining to products and applications indicated.

B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

3.4 INSTALLING FIRE-RESISTIVE JOINT SEALANTS

A. General: Comply with the “system performance requirements” article in Part 1, with ASTM C1193 and with the sealant manufacturer’s installation instructions and drawings pertaining to products and applications indicated.

B. Install joint fillers 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 and develop fire-resistive rating required.

C. 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 width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.

3.5 CLEANING

A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joint occur.

B. Protect firestopping during and after curing period from contact with contaminating substrates or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of contract completion. If despite, such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

END OF SECTION 07 27 00

SECTION 07 31 13 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Asphalt shingles.
2. Underlayment.

1.3 DEFINITION

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 SUBMITTALS

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

B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for asphalt shingles.

C. Maintenance Data: For each type of asphalt shingle to include in maintenance manuals.

D. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain ridge and hip cap shingles and self-adhering sheet underlayment from single source from single manufacturer.

B. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.

1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.

B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install asphalt shingles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.8 WARRANTY

A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Manufacturing defects.
b. Structural failures including failure of asphalt shingles to self-seal after a reasonable time.

2. Material Warranty Period: 30 years from date of Substantial Completion, prorated, with first five years nonprorated.
3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 80 mph for five years from date of Substantial Completion.
4. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor 10 years from date of Substantial Completion.
5. Workmanship Warranty Period: 10 years from date of Substantial Completion.

B. Special Project Warranty: Roofing Installer's Warranty, or warranty form at end of this Section, signed by roofing Installer, covering the Work of this Section, in which roofing Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within specified warranty period.

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

1.9 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Asphalt Shingles: 100 sq. ft of each type, in unbroken bundles.

PART 2 - PRODUCTS

2.1 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Laminated-Strip Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.

1. Product: IKO; Cambridge 30 AR (Eastern USA).
2. Butt Edge: Straight cut.
3. Strip Size: Manufacturer's standard.
4. Algae Resistance: Granules treated to resist algae discoloration.
5. Color and Blends: Harvard Slate.

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, minimum of 55-mil- thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied.

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

a. ALCO-NVC Inc.
b. Atlas Roofing Corporation.
c. Carlisle Coatings & Waterproofing, Inc.
d. CertainTeed Corporation.
e. GAF Materials Corporation.
f. Henry Company.
g. IKO.
h. Johns Manville.
i. Owens Corning.

B. Granular-Surfaced Valley Lining: ASTM D 3909, mineral-granular-surfaced, glass-felt-based, asphalt roll roofing; 36 inches wide.

2.3 RIDGE VENTS

A. Rigid Ridge Vent: Manufacturer's standard, rigid section high-density polypropylene or other UV-stabilized plastic ridge vent with nonwoven geotextile filter strips and external deflector baffles; for use under ridge shingles.

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

a. Air Vent, Inc.; a Gibraltar Industries company.
b. Cor-A-Vent, Inc.
c. GAF Materials Corporation.
d. Lomanco, Inc.
e. Mid-America Building Products.
f. Obdyke, Benjamin Incorporated.

g. Owens Corning.
h. RGM Products, Inc.
i. Trimline Building Products.

2. Minimum Net Free Area: 18 square inches of net free area per linear foot.
3. Width: 12 inch width.

2.4 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

B. Roofing Nails: ASTM F 1667; hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch-diameter, barbed shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.

1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.

2.5 METAL FLASHING AND TRIM

A. General: Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."

1. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

a. Surface: Smooth, flat
b. Exposed Coil-Coated Finishes: Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
c. Color: As selected by Architect from manufacturer's full range .
d. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.

a. Surface: Smooth, flat and with manufacturer's standard clear acrylic coating on both sides.
b. Exposed Coil-Coated Finish: Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
c. Color: As selected by Architect from manufacturer's full range.
d. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item.

1. Apron Flashings: Fabricate with lower flange a minimum of 4 inches over and 4 inches beyond each side of downslope asphalt shingles and 6 inches up the vertical surface.
2. Step Flashings: Fabricate with a headlap of 2 inches and a minimum extension of 4 inches over the underlying asphalt shingle and up the vertical surface.
3. Drip Edges: Fabricate in lengths not exceeding 10 feet with 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.

C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 UNDERLAYMENT INSTALLATION

A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

B. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install over entire roof, lapped in direction to shed water. Lap sides not less than 3 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.

1. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
2. Eaves: Extend from edges of eaves 36 inches beyond interior face of exterior wall.
3. Rakes: Extend from edges of rake 36 inches beyond interior face of exterior wall.
4. Valleys: Extend from lowest to highest point 18 inches on each side.
5. Hips: Extend 18 inches on each side.
6. Ridges: Extend 36 inches on each side without obstructing continuous ridge vent slot.
7. Sidewalls: Extend beyond sidewall 18 inches, and return vertically against sidewall not less than 4 inches.
8. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend beyond penetrating element 18 inches, and return vertically against penetrating element not less than 4 inches.
9. Roof Slope Transitions: Extend 18 inches on each roof slope.

3.3 METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."

1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.

C. Step Flashings: Install with a headlap of 2 inches and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.

D. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.

E. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.

F. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT SHINGLE INSTALLATION

A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip at least 7 inches wide with self-sealing strip face up at roof edge.

1. Extend asphalt shingles 1/2 inch over fasciae at eaves and rakes.
2. Install starter strip along rake edge.

C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

D. Fasten asphalt shingle strips with a minimum of four roofing nails located according to manufacturer's written instructions.
1. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.

E. Closed-Cut Valleys: Extend asphalt shingle strips from one side of valley 12 inches beyond center of valley. Use one-piece shingle strips without joints in valley. Fasten with extra nail in upper end of shingle. Install asphalt shingle courses from other side of valley and cut back to a straight line 2 inches short of valley centerline. Trim upper concealed corners of cut-back shingle strips.

1. Do not nail asphalt shingles within 6 inches of valley center.
2. Set trimmed, concealed-corner asphalt shingles in a 3-inch- wide bed of asphalt roofing cement.

F. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.

G. Ridge and Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.

1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.5 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: _____.
2. Address: _____.
3. Building Name/Type: _____.
4. Address: _____.
5. Area of Work: _____.
6. Acceptance Date: _____.
7. Warranty Period: _____.
8. Expiration Date: _____.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

a. Lightning;
b. Peak gust wind speed exceeding 110 mph;
c. Fire;
d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
f. Vapor condensation on bottom of roofing; and
g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on

date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 07 31 13

SECTION 07 46 00 – FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fiber-cement siding.

1.3 SUBMITTALS

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

B. Samples for Verification: For each type, color, texture, and pattern required.

1. 12-inch- long-by-actual-width Sample of siding.

C. Product Certificates: For each type of siding, from manufacturer.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.

E. Maintenance Data: For each type of siding and related accessories to include in maintenance manuals.

F. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

B. Source Limitations: Obtain each type, color, texture, and pattern of siding, including related accessories, from single source from single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a dry, well-ventilated, weathertight place.

1.6 COORDINATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.7 WARRANTY

A. Warranty against manufacturing defects in lap siding for 50 years.

B. Workmanship: Application limited warranty for 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

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

a. CertainTeed Corp.
b. James Hardie.

2. Horizontal Pattern: Boards 6-1/4 to 6-1/2 inches wide with 5 inch exposure in plain style.

a. Texture: Wood grain.

3. Factory Priming: Manufacturer's standard acrylic primer.

2.2 ACCESSORIES

A. Colors for Decorative Accessories: As selected by Architect from manufacturer's full range of industry colors.

B. Flashing: Provide aluminum flashing complying with Division 07 Section "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

1. Finish for Aluminum Flashing: Siliconized polyester coating, same color as siding or High-performance organic finish, same color as siding.

C. Fasteners:

1. Use stainless steel fasteners as recommended by manufacturer’s written specifications and in compliance with all applicable building codes for maximum basic wind speed for exposure category and/or applicable shear values.

D. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of 40-mil- thick, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and related accessories.

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

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Do not install damaged components.

B. Install fiber-cement siding and related accessories.

1. Install fasteners no more than 24 inches o.c.

C. Install joint sealants as specified in Division 07 Section "Joint Sealants" and to produce a weathertight installation.

D. Install a piece of self-adhering sheet underlayment under the butt joints of the siding to fully cover the joint with out being exposed.

3.4 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 07 46 00

SECTION 07 61 00 - STANDING SEAM METAL ROOF

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide certified test results by a recognized testing laboratory of agency in accordance with test method for each system.
   1. Air infiltration. Provide roof panel with no air leakage when tested in accordance with ASTM E 283 at pressure differentials up to 1.57 PSF.
   2. Water penetration. Provide panel system with no air leakage when tested in accordance with ASTM E 331 at an inward static air pressure differential of not less than a 6.24 PSF and not more than 12.0 PSF.

1.3 QUALITY ASSURANCE

A. Field measurements. Where possible, before fabrication of the panels, take field measurements to structure or substrates to receive panel system. Allow for trimming panel units where final dimensions cannot be established before fabrication.

1.4 SUBMITTALS

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

B. Samples for Initial Selection: For each type of metal roofing indicated.

   1. Include similar Samples of trim and accessories involving color selection.

C. Qualification Data: For Installer, including certificate signed by manufacturer stating that Installer is approved, authorized, or licensed to install roofing system indicated.

D. Maintenance Data: For asphalt shingles to include in maintenance manuals.

E. Warranties: Special warranties specified in this Section.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver panels and other components so they will not be damaged or deformed. Package panels for protection against transportation damage.

B. Exercise care in unloading, storing and erecting roof panels to prevent bending, warping, twisting and surface damage.

C. Stack materials on platforms or pallet, covered with tarpaulins or suitable watertight ventilated covering. Store panels so they will not accumulate water. Do not store panels in contact with other materials that might cause staining, denting or other surface damage.

1.6 WARRANTY

A. Manufacturer to provide a twenty (20) year warranty on system finish.

B. Installer to provide a twenty (20) year warrantee on system components, installation and water tightness

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Dimensional Metals, Inc. 58 Klema Drive North, Reynoldsburg, Ohio 43068
1. Interlock standing beam metal roof
2. Model: CR10 Panel
3. Profile as chosen by Architect.

B. Approved equals by Peterson Aluminum Co. or Berridge Manufacturing Co.

2.2 Roof Panels

A. Structural quality galvanized steel sheet. Hot-dip zinc coated steel sheet complying with ASTM A 446 with G90 coating complying ASTM A525 Grad C or to suit manufacturer's standards.

B. Face sheets. Fabricate roof panel face to the profile or configuration indicated from 24 gauge zinc-coated steel sheets.

C. Finish. Thermocured fluorocarbon top finish containing "Kynar 500" resin. 1.0 Mil minimum dry film thickness and on the reverse side a wash coat and primer or .04 mil dry mil thickness. Provide strippable protective coating.

2.3 PREFORMED METAL VENTED SOFFIT

A. Dimensional Metals, Inc. Vented Soffit.
1. Color: As chosen by Architect.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets, self-locking bolts, end-welded studs and other suitable fasteners designed to withstand design loads.
1. Exposed screw fasteners shall be 300 series alloy stainless steel with integrally bonded neoprene washers or zinc aluminum cast head covers with integral neoprene gaskets.
2. Exposed pop rivets shall be stainless steel, rivet and mandrel self plugging type #44-1/8" diameter. 1/4" grip range minimum. Exposed pop rivets shall be painted to match the metal roof system.
3. Concealed fasteners for anchor clips shall be #10-12-1" long pancake head #2 Phillips drive as required to meet the performance criteria in this specification.

4. Concealed fasteners for flashing attachment shall be #8-15-1 ¼” long truss head #2 Phillips drive screw as required to meet the performance criteria in this specification.
5. There shall be no exposed fasteners except to fasten flashing at fixing points, or as indicated on the shop drawings.

B. Felts: Asphalt saturated in organic felts conforming with ASTM D226. Type II (no 30) install horizontally with 6” min. overlap.

C. Accessories: Except as indicated as work of another specification section, provide components required for complete roof panel system, including trim, fascias, clips, seam covers, battens, flashings, sealants, gaskets, fillers, closure strips and similar items. Match materials and finishes of panels.
1. Closure Strips. Closed cell, self-extinguishing expanded cellular rubber or cross-linked poly-olefin foam closure strips. Cut or pre-mold to match configuration of roof panels. Provide closure strips where indicated or required to.
2. Sealing tape. Pressure sensitive 100 percent solids polysobutylene compound sealing tape with release paper backing. Provide permanent elastic, nonsag, nontoxic, nonstaining tape.
3. Joint Sealant. One part elastomeric polyurethane polysulfide or silicone rubber sealant as recommended by the manufacture.

D. Bituminous coating: Cold applied asphalt mastic, SSPC paint 12, compound mil dry film thickness per coat.

E. Eave, valley and hip protection: Grace construction products, ice and water shield ASTM D1970 sheet barrier or self-adhering rubberized asphalt membrane. Underlayment: Provide material with warranty equal in duration to that of shingles being applied.

F. Snow guards: Provide where indicated on drawings.
1. “Polar Blox” snow guard for standing seam metal roofs.
2. Include optional ice bars.

2.5 PANEL FABRICATION

A. Factory fabricate and finish panels and accessories to the greatest extent possible, by manufacturer’s standard procedures and processes. As required to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with profiles and dimensional requirements and structural requirements.

B. Apply bituminous coating or other permanent separation materials on concealed panel surfaces where panels would otherwise be in direct contact with substrate materials that are non compatible or could result in corrosion or deterioration of either material or finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and installation conditions. Do not proceed with metal roof panel work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Cover entire roof area with a minimum of one (1) layer of 30# roofing felt laid horizontally, starting at the eaves provide minimum 6 inch laps. Provide ice and watershield membrane at the eaves, ridges, hips, valleys, rake walls, rake edges, and around all penetrations.

3.3 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the work securely in place, with provisions for thermal and structural movement.
   1. Field cutting of exterior panels is not permitted.
   2. Install panels with concealed fasteners.

B. Accessories: Install components required for a complete roof panel system. Including trim, fascias, clips, seam covers, battens, flashing, sealants, gaskets, fillers, closure strips and similar items.

C. Joint Sealers: Refer to section 07920. Joint sealers for post installation requirements on joint sealers that are not work of this section.

3.4 CLEANING AND PROTECTION

A. Replace panels and other components of the work that have been damaged or have deteriorated beyond successful repair by means of finis touch up or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films (if any) as soon as each panel is installed. Upon completion of panel installation, clean finished surfaces as recommended by manufacturer, and maintain in clean condition during construction.

END OF SECTION 07 61 00

SECTION 07 62 00 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to this Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Counter Flashings: Fry reglet, type M-A Masonry Springlock Flashing or Cheney type B, Snaplock System or O'Keefe's Inc., Type M, masonry reglet.

B. Parapet Cap/Copings: Dimensional Metals, Inc. or Peterson Aluminum Corporation metal Pac-Loc coping or Atlas Aluminum, Inc.

2.2 SHEET METAL FLASHING AND TRIM MATERIALS

A. Zinc-coated steel commercial quality with 0.20 percent copper, ASTM A526, except ASTM A627 for lock forming, G90 hot-dipped galvanized mill phosphatised where indicated for painting.

B. Material gauges to be as follows:

1. Metal flashing: 26 ga.
2. Metal Cap/Coping: 24 ga.
3. Miscellaneous Trim: 24 ga.
4. Louver Rain Hoods: 22 ga.

C. All flashings and copings to be self-locking with permanent hold-down clips. All exposed edges to be hemmed.

D. All exposed metals shall be pre-finished in "Kynar 500" and shall have a 20 year limited paint warranty. All parapet copings and flashings in contact with metal roof to match standing seam metal roof color.

2.3 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Solder: For use with steel or copper. Provide 50-50 tin/lead solder (ASTM B32) with Rosin flux.

B. Fasteners: Same metal as flashing sheet metal or other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

C. Bituminous Coating: SSPC - Paint 12, solvent type bituminous mastic, nominally free of sulfur, confounded of 15 mil dry film thickness per coat.

D. Mastic Sealant: Polyisobutylene, non-hardening, non-skinning, non-drying, non-migrating sealant.

E. Elastomeric Sealant: Generic type recommended by manufacturers of metal and fabricated components being sealed and complying with requirements for joint sealants as specified in Division 7 – Sealants.

F. Epoxy Seam Sealer: Two-part non-corrosive metal seam cementing compound, recommended by the metal manufacturer for exterior/interior non-moving joints including riveted joints.

G. Adhesive: Type recommended by flashing sheet manufacturers for weatherproof/weather-resistant seaming and adhesive application for flashing sheet.

H. Paper Slip Sheet: 5-lb. Rosin – sized building paper.

I. Polyethylene Underlayment: Minimum and mil carbonated polyethylene film, resistant to decay when tested in accordance with ASTM E154.

J. Reglets: Metal units of type and profile indicated, compatible with flashing, indicated, non-corrosive.

K. 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. Non-corrosive, size, and gauge recurred for performance.

L. Elastic Flashing Filler: Closed cell polyethylene or other soft 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 D2822, asphaltic.

2.4 FABRICATED UNITS

A. General Metal Fabrication: comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate 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 substrates. Comply with material manufacturer's instructions and recommendations for forming material form exposed sheet metal work without excessive oil-canning, buckling or tool marks. True to line, and levels indicated with all exposed edges folded back to form seams and solder.

B. Seams: Fabricate non-moving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.

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 with joint).

D. Sealant Joints: Where moveable, non-expansion 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 substrate by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separations as recommended by the manufacturer/fabricator.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Unless otherwise indicated, comply with the manufacturer's 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, set units true to line and level as indicated. Install work with laps, joints, and seams to be permanently watertight and weaterproof.

B. Underlayment: Where stainless steel or aluminum is to be installed directly on cement 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 a manner and by methods indicated where shown in concrete furnish reglets to trades of concrete work for installations work of Division 8. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of Division 4.

1. Install counterflashing in reglets, either by snap-in seal arrangement, or by welding in place of anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.

E. Install elastic flashing in accordance with manufacturer's recommendations. Where required provide for movement at joints by forming loops of bellows in width of flashing. Locate cover or filler strips at joints to facilitate completed drainage of water from flashing seam adjacent flashing sheets with adhesive seal and anchor edges in accordance with the manufacturer's recommendations.

3.2 CLEANING

A. Clean exposed metal surfaces, removing substrates that might cause corrosion of meal or deterioration of finishes.

B. Advise the Contractor of required procedures for surveillance and protection of flashing and sheet metal work during construction to ensure that work will be without damage or deterioration other that natural weathering at time of substantial completion

END OF SECTION 07 62 00

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to this Section.

1.2 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. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials a single manufacturer for each different product required.

C. 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 associate.

1. Test elastomeric sealants for compliance with requirements specified by reference to ASTM C920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C719), low-temperature flexibility, and modulus of elasticity at 100 percent strain, effects of heat aging, and effects accelerated weathering.
2. Include test results performed on joint sealants after they have cured for 1 year.

D. Preconstruction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows. Locate test joints where indicated or, if not indicated, as directed by associate. Conduct field tests for each application indicated for each type of elastomeric sealant and joint substrate indicated.

1.3 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 multi-component 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.

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 selections made by associate from manufacturer's full range of standard colors for products of type indicated.

2.2 MANUFACTURERS

A. Provide products from one of the following Tremco or Dow Chemical or Sonneborn.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturers standard chemically curing elastomeric sealants that comply with ASTM C920 and other requirements indicated one each elastomeric joint sealant data sheet at end of this section, including those requirements referencing ASTM C920 classifications for type, grade, class, and uses.

B. Products: Subject to compliance with requirements, provide one of the products specified in each elastomeric joint sealant data sheet.

2.4 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.

C. 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.

2.5 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.

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.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturers printed installation instructions applicable to products and applications indicated except where more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

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 joint occur.

END OF SECTION 07 92 00

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

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

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10B.

C. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Ceco Door Products; an Assa Abloy Group company.
2. Curries Company; an Assa Abloy Group company.
3. Steelcraft; an Ingersoll-Rand company.

2.2 MATERIALS

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

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

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

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

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

F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

H. Glazing: Comply with requirements in Division 08 Section "Glazing."

I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.

a. Fire Door Core: As required to provide fire-protection ratings indicated.
b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 12.3 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.

1) Locations: Exterior doors and interior doors where indicated.

3. Vertical Edges for Single-Acting Doors: Beveled edge.

a. Beveled Edge: 1/8 inch in 2 inches.

4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.
6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
   1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).

C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
   1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

   1. Fabricate frames with mitered or coped corners.
   2. Fabricate frames as full profile welded unless otherwise indicated.
   3. Frames for Level 3 Steel Doors: 0.053-inch- thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet.

   1. Fabricate frames with mitered or coped corners.
   2. Fabricate frames as full profile welded unless otherwise indicated.
   3. Frames for Level 3 Steel Doors: 0.053-inch- thick steel sheet.
   4. Frames for Wood Doors: 0.053-inch- thick steel sheet.
   5. Frames for Borrowed Lights: 0.053-inch- thick steel sheet.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

   1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
   2. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
   3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

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

2.6 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.7 FABRICATION

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

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/NAAMM-HMMA 861.

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

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

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

   a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

      1) Three anchors per jamb up to 60 inches high.
      2) Four anchors per jamb from 60 to 90 inches high.
      3) Five anchors per jamb from 90 to 96 inches high.
      4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
      5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.

   b. Compression Type: Not less than two anchors in each jamb.
   c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

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

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

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

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

2.8 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Factory-Applied Paint Finish: Manufacturer's standard, complying with ANSI/SDI A250.3 for performance and acceptance criteria.

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

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

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

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

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

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

    a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
4. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
5. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

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

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

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

3.4 ADJUSTING AND CLEANING

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

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

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

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

END OF SECTION 08 11 13

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

1.3 SUBMITTALS

A. Product Data: For each type of door indicated. Include details of core and edge constructionand trim for openings.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire-protection ratings for fire-rated doors.

C. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.

D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors from single manufacturer.

B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated." and WDMA I.S.1-A, "Architectural Wood Flush Doors."

1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10B.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.

C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Algoma Hardwoods, Inc.
2. Eggers Industries.
3. Marshfield Door Systems, Inc.
4. Mohawk Flush Doors, Inc.; a Masonite company.

2.2 DOOR CONSTRUCTION, GENERAL

A. WDMA I.S.1-A Performance Grade: Heavy Duty.

B. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, Grade LD-2.

2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

C. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Comply with specified requirements for exposed edges.
3. Pairs: Provide formed-steel edges and astragals with intumescent seals.

a. Finish steel edges and astragals with baked enamel same color as doors.

D. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.

3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade A faces.
2. Species: Birch.
3. Cut: Quarter sliced.
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Running match.
6. Pair and Set Match: Provide for doors hung in same opening.
7. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
8. Exposed Vertical Edges: Same species as faces.
9. Core: Particleboard.
10. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.
11. Construction: Seven plies, either bonded or nonbonded construction.
12. WDMA I.S.1-A Performance Grade: Heavy Duty.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish.

D. Finish doors at factory where indicated in schedules or on Drawings as factory finished.

E. Transparent Finish:

1. Grade: Premium.
2. Finish: WDMA TR-6 catalyzed polyurethane.
3. Staining: Cherry Stain.
4. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Job-Fitted 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 for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Storefront framing for punched openings.
2. Exterior and interior manual-swing entrance doors and door-frame units.

1.3 DEFINITIONS

A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:

a. Deflection exceeding specified limits.
b. Thermal stresses transferring to building structure.
c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
d. Noise or vibration created by wind and by thermal and structural movements.
e. Loosening or weakening of fasteners, attachments, and other components.
f. Sealant failure.
g. Failure of operating units.

B. Structural Loads:

1. Wind Loads:

a. Basic Wind Speed: 90 mph.
b. Importance Factor: 1.0.
c. Exposure Category: B.

C. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.

D. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

E. Windborne-Debris-Impact-Resistance Performance: Provide aluminum-framed systems that pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 or AAMA 506.

1. Large-Missile Impact: For aluminum-framed systems located within 30 feet of grade.
2. Small-Missile Impact: For aluminum-framed systems located more than 30 feet above grade.

F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft..

G. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

H. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

1. Maximum Water Leakage: According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.

I. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

   a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
   b. Low Exterior Ambient-Air Temperature: 0 deg F.

3. Interior Ambient-Air Temperature: 75 deg F.

J. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.

K. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.57 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

L. Sound Transmission: Provide aluminum-framed systems with fixed glazing and framing areas having the following sound-transmission characteristics:

1. Sound Transmission Class (STC): Minimum 30 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
2. Outdoor-Indoor Transmission Class (OITC): Minimum 30 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.

1.5 SUBMITTALS

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

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.

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

D. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

F. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

G. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

C. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one

another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

D. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

E. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."

G. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall area as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration caused by thermal movements.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
d. Water leakage through fixed glazing and framing areas.
e. Failure of operating components.

2. Warranty Period: Five years from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. 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 entrance door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Arcadia, Inc.
2. Arch Aluminum & Glass Co., Inc.
3. CMI Architectural.
4. Commercial Architectural Products, Inc.
5. EFCO Corporation.
6. Kawneer North America; an Alcoa company.
7. Leed Himmel Industries, Inc.
8. Pittco Architectural Metals, Inc.
9. TRACO.
10. Tubelite.
11. United States Aluminum.
12. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.
13. YKK AP America Inc.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Center.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

2. Door Design: Wide stile; 5-inch nominal width.

a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.

3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

a. Provide nonremovable glazing stops on outside of door.

2.6 ENTRANCE DOOR HARDWARE

A. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products or products equivalent in function and comparable in quality to named products.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
3. Opening-Force Requirements:

    a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
    b. Accessible Interior Doors: Not more than 5 lbf to fully open door.

B. Opening-Force Requirements:

1. Delayed-Egress Locks: Lock releases within 15 seconds after applying a force of not more than 15 lbf for not more than 3 seconds.
2. Latches and Exit Devices: Not more than 15 lbf required to release latch.

C. Pivot Hinges: BHMA A156.4, Grade 1.

1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.

D. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.

E. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.

F. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

G. Cylinders: As specified in Division 08 Section "Door Hardware."

1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation.

H. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

I. Operating Trim: BHMA A156.6.

J. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet field conditions and requirements for opening force.

K. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

L. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

M. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

N. Silencers: BHMA A156.16, Grade 1.

O. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

P. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.7 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Storefront Framing: Fabricate components for assembly using shear-block system.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

B. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 08 Section "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

3.3 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment:

a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.4 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

END OF SECTION 08 41 13

SECTION 08 71 00 - FINISH HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Definition: "Finish Hardware" includes items known commercially as finish hardware which are required for swing, sliding, and folding doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.

B. Provide labor, materials, transportation, services, and appliances necessary to complete the following work:

1. Finish door hardware installation including necessary screws, bolts, special fasteners, expansion shield and other devices necessary and required for proper hardware application and use.
2. Furnish and install cylinders and latches at exterior storefront entrance as indicated. Coordinating keying with other locksets.
3. Provide temporary locksets at exterior doors during construction.
4. If items of hardware are not definitely specified, but required for completion of the work, furnish items of type of quality suitable to the service and function required and comparable to adjacent hardware.

1.2 QUALITY ASSURANCE

A. All hardware shall be provided and installed per all applicable building codes, and comply with Americans with Disabilities Act (ADA), Section 4.1B, Doors.

B. Contractor shall be responsible for final coordination of shop submittals per the drawings and specifications. The Contractor shall notify the Architect of any conflicts or omission within documents.

1.3 SUBMITTALS

A. Suppliers shall submit for approval five copies of a proposed hardware schedule listing complete architectural finish hardware derived from the drawings and these specifications.

1.4 PRODUCT HANDLING

A. Supplier is responsible for delivery of proper items to proper installer, with tag attached identifying: Catalog, number, specific location, and manufacturer.

1.5 WARRANTY

A. This Contractor shall warrant and guarantee all materials for which he/she is responsible under this section that all materials will be free from defects of material, workmanship and function for a period of one (1) year from the date of final acceptance. This Contractor further agrees that he will at his/her own expense replace any defective items and damaged articles resulting from such defective materials. This Contractor must notify the Construction Manager in writing if any of the materials and/or items he/she has supplied have been damaged by other trades on the project.

PART 2 - PRODUCTS

2.1 MATERIALS AND FABRICATION

A. Hardware supplier shall furnish paper templates with copies of approved hardware schedule to installer.

B. Miscellaneous Items: Furnish hardware with all incidental items (i.e., screws, bolts, expansion sleeves, or shields anchors, and other fasteners, as recommended by manufacturer to insure heavy usage and long life.

C. Instructions: Full manufacturers printed instructions and special information needed for the proper installation and adjustment of hardware and any assistance necessary to make hardware function as intended shall be provided by the supplier to insure proper operation.

2.2 MANUFACTURERS

A. Subject to code compliance and these specifications provide hardware by manufacturers scheduled on drawings.

2.3 HINGES, BUTTS, AND PIVOTS

A. Screws: Furnish Phillips flat-head or machine screws for installation of units, except furnish Phillips flat-heat wood screws for installation into woods. Finish screw heads to match surface of hinges or pivots.

B. Hinge Pins: Except as otherwise indicated provide hinge pins as follows:

1. Hinges: Five-knuckle
2. Exterior Doors: Non-removable pins.
3. Number of Hinges: Provide number of hinges indicated, but not less than 3 for door leaf 90 degrees or less in height and one additional hinge for each 30 degree of additional height.

2.4 LOCK CYLINDRICAL AND KEYING

A. General: Supplier will meet with owner to finalize keying and obtain final instructions in writing.

B. All lockable doors to receive interchangeable cores keyed to owners existing system.

C. Keying: Provide a master-keyed system with keying arrangements as scheduled. Provide three (3) master keys and three (3) keys per lock clearly labeled with location of lockset they operate.

2.5 SOUND STRIPPING

A. Provide sound stripping at all toilet and mechanical room doors.

2.6 MISCELLANEOUS PROVISIONS

A. Silencers: Provide three (3) silencers per door unless otherwise specified.

B. Provide one pair of flush bolts at inactive leaf of all double doors.

C. Provide a wall stop at each door unless a floor stop is required or otherwise specified.

D. No stick-on adhered weatherstripping will be accepted.

2.7 HARDWARE SCHEDULE

A. Refer to schedule on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount hardware units at heights indicated in “recommended locations for builders hardware for standard steel doors and frames” by the door and hardware institute, except as specifically indicated or required to comply with governing regulations, and as may be otherwise directed by Architect.

B. Install each hardware item in compliance with the manufacturer’s instruction and recommendations using fully experienced and qualified personnel. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way. Coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrate.

C. Coordinate with door and frame suppliers to obtain door frame hardware installations which are listed by approved testing agency.

D. Set units level, plumb, and true to line location. Adjust and reinforce the attachment substrate necessary for proper installation and operation.

E. All surface mounted closer to be mounted on the room side of doors in all corridors, lobbies and other public spaces.

1. Provide six bolts for mounting.

3.2 ADJUST AND CLEAN

A. Adjust and check each operating item of hardware and each door to ensure proper operation of function of every unit. Replace units that cannot be adjusted to operate freely and smoothly as determined by the Architect.

1. Upon completion, door shall latch without forcing and close latch under the force of the closer.
2. Provide door control equipment as required. Mount equipment so as to permit maximum door operating, but to prevent contact of the door with building construction and equipment.

B. Remove all hardware from doors prior to painting.

C. Clean adjacent surfaces soiled by hardware installation.

D. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of space or area. Return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as

necessary to restore function and finish of hardware and doors. Adjust door devices to compensate for final operation of heating and ventilating equipment.

E. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustments.

F. Provide to the Owner six (6) door adjustment tools at the project close-out.

END OF SECTION 08 71 00

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Interior borrowed lites.

1.3 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

   a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures" : Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.

   b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.

      1) Load Duration: 60 seconds or less.

   c. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.

      1) For monolithic-glass lites heat treated to resist wind loads.
      2) For insulating glass.

   d. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

   1. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
   2. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:

      a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F.
      b. Solar Heat Gain Coefficient: NFRC 200.
      c. Solar Optical Properties: NFRC 300.

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: For the following products, in the form of 12-inch- square Samples for glass.

   1. Color of tinted float glass.
   2. Fire-resistive glazing products.
   3. Insulating glass.

C. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

D. Qualification Data: For installers.

E. Product Test Reports: For each of the following types of glazing products:

1. Float glass.
2. Coated float glass.
3. Insulating glass.
4. Glazing gaskets.

F. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Source Limitations for Glass Sputter-Coated with Solar-Control Low-E Coatings: Where solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-e-coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer.

C. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

D. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.

1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

E. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.

F. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.

1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency or manufacturer acceptable to authorities having jurisdiction.
2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.9 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Product: Subject to compliance with requirements, provide product specified.

2.2 GLASS PRODUCTS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
4. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.

C. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.

D. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.

1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
4. Sealing System: Dual seal, with primary and secondary sealants as follows:

    a. Manufacturer's standard sealants.
    b. Polyisobutylene and polysulfide.
    c. Polyisobutylene and silicone.
    d. Polyisobutylene and hot-melt butyl.
    e. Polyisobutylene and polyurethane.

5. Spacer Specifications: Manufacturer's standard spacer material and construction.
6. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:

    a. Spacer Material: Aluminum with mill or clear anodic finish.
    b. Desiccant: Molecular sieve or silica gel, or blend of both.
    c. Corner Construction: Manufacturer's standard corner construction.

2.3 FIRE-RATED GLAZING PRODUCTS

A. Film-Faced Ceramic Glazing Material: Proprietary Category II safety glazing product in the form of a 3/16-inch- thick, ceramic glazing material unpolished on both surfaces, faced on one surface with a clear glazing film, and as follows:

1. Fire-Protection Rating: As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
2. Product: "FireLite NT" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.

2.4 GLAZING GASKETS

A. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.5 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.6 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.7 MONOLITHIC FLOAT-GLASS UNITS

A. Uncoated Clear Float-Glass Units MG-1: Class 1 (clear) Kind FT (fully tempered) float glass.

1. Thickness: ¼ inch.

2.8 INSULATING-GLASS UNITS

A. Solar-Control Low-E Insulating-Glass Units IG-1:

1. Basis-of –Design Product: Solar Seal Company, “Clear Float Glass Outer Lite and Pyrolitic Low E Float Glass Inner Lite” or a comparable product by one of the following:

   a. PPG Industries
   b. Pilkington Building Products North America
   c. Visteon Corporation
   d. AFG Industries Inc

2. Overall Unit Thickness and Thickness of Each Lite: 1 inch and ¼ inch.
3. Interspace Content: Argon.
4. Outdoor Lite: Class 2 (clear) float glass.

a. Kind FT (fully tempered).

5. Indoor Lite: Class 1 (clear) float glass.

a. Kind FT (fully tempered).

6. Low-E Coating: Sputtered on second surface.
7. Visible Light Transmittance: 53 percent minimum.
8. Winter Nighttime U-Factor: 0.29 maximum.
9. Summer Daytime U-Factor: 0.28 maximum.
10. Solar Heat Gain Coefficient: 0.46 maximum.
11. Shading Coefficient: 0.53
12. Outdoor Visible Reflectance: 0.09 percent maximum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.4 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Install gaskets so they protrude past face of glazing stops.

3.5 LOCK-STRIP GASKET GLAZING

A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system, unless otherwise indicated.

3.6 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08 80 00

SECTION 09 25 00 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to this Section.

1.2 DEFINITIONS

A. Gypsum Board Construction Technology: Refer to ASTM C11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this section or in other referenced standards.

1.3 ASSEMBLY PERFORMANCE REQUIREMENTS

A. Fire Resistance: Provide gypsum board assemblies with fire-resistive ratings indicated.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

B. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

C. Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements: Fire-resistance ratings as indicated by GA file number in GA-600 fire resistance design manual or design designations in UL “Fire Resistance Directory” or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather; direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

1.6 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C640 requirements or gypsum board manufacturer’s recommendations, whichever are more stringent.

B. Room Temperatures: For non-adhesive attachment of gypsum board to framing, maintain not less than 40 degree F. For adhesive attachment and finishing of gypsum board, maintain not less than 50 degree F for 48 hours before application and continuously after until dry. Do not exceed 95 degrees F when using temporary heat sources.

C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products from one of the following Georgia-Pacific Corp. or National Gypsum Co, Gold Bond Building Products Division or United States Gypsum Co.

2.2 STEEL FRAMING

A. Steel Framing, General: Comply with ASTM C754 for conditions indicated.

1. Steel Sheet Components: Metal complying with ASTM C645 requirements.
   a. Protective Coating:
      1) Interior Applications: ASTM A653/A, 658M, G40 (Z120), hot dip galvanized zinc coating.
      2) Exterior Applications: ASTM A653/A, 653M, G60 (Z180), hot dip galvanized zinc coating.

B. Steel Framing Components for Suspended and Furred Ceiling:

1. General: Provide components complying with ASTM C754 for conditions indicated.
2. Wire Ties: ASTM A641, Class 1 Zinc coating, soft temper, 0.062 inch thick.
   a. Not less than thickness required for fire-resistance rated assemblies of which wire tie is a part.
3. Wire Hangers: ASTM A641, Class 1 Zinc coating, soft temper, 0.162-inch diameter.
   a. Not less than thickness for fire-resistance rated assemblies of which wire hanger is a part.
4. Channels: Cold-rolled steel, 0.0598-inch minimum thickness of base (uncoated) metal and 7/16-inch-wide flanges, and as follows:
   a. Carrying Channels: 2 inches deep, 590 lb/1000 feet, unless otherwise indicated.
   b. Finish: Rust-inhibitive paint, unless otherwise indicated.
5. Steel Studs for Furring Channels: ASTM C645, with flange edges of studs bend back 90 degrees and doubled over to form 3/16-inch-wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth.
   a. Thickness: 0.0829 inch, unless otherwise indicated.
   b. Depth: 3-5/8 inches, unless otherwise indicated.
   c. Protective Coating: ASTM A653, G40 hot-dip galvanized coating.

C. Partition and Soffit Framing:

1. Steel Studs and Runners: ASTM C645, in depth indicated.
   a. A Minimum base metal thickness: 0.0188 inch.
2. Deep-Leg Deflection Track: ASTM C645 top runner with 2-inch-deep flange.
3. Cold-Rolled Channel Bridging: 0.0538-inch bare steel thickness, with minimum 1/2-inch wide flange, and in depth indicated.

4. Hat-Shaped, Rigid Furring Channels: ASTM C645, in depth indicated.
5. Cold-Rolled Channels: 0.0566-inch bare steel thickness, with minimum 1/2-inch wide flange, and in depth indicated.
   a. Furring Brackets: Adjustable corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0312-inch.
   b. The wire ASTM A A641/A, Class 1 zinc coating, soft temper, 0.0625-inch diameter wire, or double strand of 0.0475-inch diameter wire.
6. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attached flange of 7/8 inch, minimum bare metal thickness of 0.0188-inch and depth required to fit insulation thickness indicated.
7. Fasteners for Metal Framing: Of type, material size, corrosion resistance, holding power and other properties required to fasten steel members to substrates.

2.3 GYPSUM BOARD PRODUCTS

A. General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application widths. Provide gypsum board in widths of 46 inches.

B. Gypsum Wallboard: ASTM C36 and as follows:

1. Type: Type X
2. Type: Sag-resistant type for ceiling surfaces.
3. Edges: Tapered and featured (rounded or beveled) for pre-filling.
4. Thickness: 5/8 inch, unless otherwise indicated.

C. Gypsum Board Base Layer(s) for Multi-Layer Applications: Gypsum wallboard, ASTM C36, and as follows:

1. Type: Type X
2. Type: Sag-resistant type for ceiling surfaces, unless otherwise indicated.
3. Edges: Manufacturer's standard.
4. Thickness: 5/8 inch, unless otherwise indicated.

D. Denseglass Exterior Sheathing: Install sheathing in accordance with manufacturer's instructions and applicable instructions in accordance with ASTM C1280.

1. Size: 5/8" thick x 4'-0" x 8'-0" sheets.
2. Composition: Gypsum sheathing manufactured in accordance with ASTM C1177 with glass mats both sides and long edges, water resistant core.
3. Location: Vertical and horizontal surfaces to receive EIFS and/or face brick.

E. Toughrock Soffit Board: ASTM C981 and as follows:

1. Size: 4'-0" x 8'-0" sheets.
2. Type: Type X
3. Edges: Tapered for pre-filling
4. Thickness: 1/2 inch, unless otherwise indicated.

2.4 TRIM ACCESSORIES

A. Accessories for Interior Installation: Cornerbead, edge trim, and control joints complying with ASTM C1047 and formed metal or plastic, with metal complying with the following requirements.

1. Steel sheet zinc coated by hot-dip process or rolled zinc.
2. Shapes indicated below by reference to Fig. 1 designations in ASTM C1047.

B. Cornerbead on outside corners, unless otherwise indicated.

C. LC-Bead with both face and back flanges, face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.

D. One-piece control joint formed with V-shaped slot and removable strip covering slot opening.

2.5 JOINT TREATMENT MATERIALS

A. General: Provide joint treatment materials complying with ASTM C475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

B. Joint tape for gypsum board. Paper-reinforcing tape, unless otherwise indicated.

C. Drying-Tape Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use. Ready-mixed formulation. Factory-mixed product, all-purpose compound formulated for both taping and topping compounds.

2.6 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum panels.

C. Steel drill screws complying with ASTM C1002 for fastening gypsum board to steel members less than 0.033-inch thick.

PART 3 - EXAMINATION

3.1 EXAMINATION

A. Examine substrates to which gypsum board assemblies attach or abut. Installed wood frames, cast-in-anchors, and structural framing, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings and all related items.

3.3 NON-LOAD-BEARING STEEL FRAMING INSTALLATION

A. General: Comply with ASTM C754, and ASTM C840 requirements that apply to framing installation.

B. Suspended Ceiling and Soffit Framing:

1. Suspend ceiling hangers plumb and free from contact with installation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hanger in form of trapezes or equivalent devices. Size supplemental suspension member and hangers to support ceiling loads within performance limits established by referenced standards.
3. Attached hangers to structural members. Do not support ceilings from or attach hangers to permanent metal forms, steel deck tabs, steel roof decks, ducts, pipes, or conduit.
4. Screw furring to wood framing.
5. Wire-tie furring channels to supports as required to comply with requirements for assemblies indicated.
6. Grid Suspension System: Attached perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross furring members to each other and butt-cut to fit into wall track.

C. Partition and Soffit Framing:
1. Where studs are installed directly against exterior walls, install isolation strip between studs and wall.
2. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicted to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
3. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jam anchor clips on door frames; install runner track section (for cripple studs) at head and secure jamb studs.
   a. Install two studs at each jamb, unless otherwise indicated.
   b. Extend jamb studs through suspended ceilings and attached to underside of floor or roof structure above.
4. Frame openings other than floor openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

D. Z-Furring Members: Erect insulation vertically and hold in place with Z-furring members.

1. Until gypsum board is installed, hold insulation in place with 10-inch stapes fabricated from 0.0625-inch-diameter, tie wire and inserted through slot in web of member.

E. Polyethlyene Vapor Retarder: Install to comply with requirements specified in Division 7 Section "Building Insulation".

3.4 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C840 and GA-216.

B. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install gypsum panels with face side out. Do not install imperfect damaged or damp panels. Butt panels together for a light contact at edges and ends with no more than 1/16 inch of open space between panels. Do not force into place.

D. Locate both edge or end joints over supports, except if ceiling applications where intermediate supports or gypsum board back blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.

E. Attach gypsum panels to studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

F. Attach gypsum panels to framing provided at openings and cutouts.

1. Fire tape, spackle, and fire caulk all penetrations into rated and/or shaft walls.

G. Form control and expansion joints at locations indicated and as detailed with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.

H. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2 –inch-wide spaces at these locations and trim edges with LC-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

I. Space Fasteners in Gypsum Panels: According to referenced gypsum board application and finishing standard and manufacturer’s recommendations.

3.5 GYPSUM BOARD APPLICATION METHOD

A. Single-Layer Application: Install gypsum wallboard panels as follows:

1. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated on partitions/walls. Apply gypsum panels vertically (parallel to framing), unless otherwise indicated and provide panel lengths that will minimize end joints.

B. Multilayer Application on Ceilings: Apply gypsum board indicated for base layers prior to applying base layers on walls/partitions. Apply gypsum wallboard face layers in same sequence. Offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints.

C. Multilayer Application on Partitions/Walls: Apply gypsum board indicated for base layers and gypsum wallboard face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints. Stagger joints on opposite sides of partitions.

D. Acoustical Tile Base: Where gypsum panels form the base for adhesively applied acoustical tile, install gypsum wallboard panels with tapered edges taped and finished to produce a flat surface.

E. Single-Layer Fastening Methods: Apply gypsum panels to supports with screws.

F. Multilayer Fastening Methods: Apply base layers of gypsum panels and face layer to base layers. Fasten both base layers and face layers separately to supports with screws.

G. Direct-Bonding to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturers recommendations, and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.6 INSTALLING TRIM ACCESSORIES

A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturers directions for type, length, and spacing of fasteners.

B. Install corner bead at external corners.

C. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound. Except where other types are indicated.
   1. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing of supporting substrate

D. Install control joints according to ASTM C840 and manufacturer's recommendations and in specified locations approved by associate visual effect.

3.7 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, flanges or corner-bead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.

C. Apply joint tape over gypsum board joints, except those with trim accessories having flanges not requiring tape.

D. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

   1. Level 4 for gypsum board surfaces, unless otherwise indicated.

E. Use the following joint compound combination as applicable to the finish levels specified:

   1. Embedding and First Coat: Ready-mixed, drying-tape, all –purpose or taping compound.
   2. Fill (second) Coat: Ready-mixed drying-tape, all purpose or topping compound.
   3. Finish (third) Coat: Ready-mixed, drying-tape, all-purpose or topping compound.

F. For Level 4 gypsum board finish, embed tape in joint compound and apply first. Fill (second), and finish (third) coats of joint compound over joints, angles, fasteners heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

G. Base for Acoustical Tile: Where gypsum board is indicated as a base for adhesively applied acoustical tile, install joint tape and a 2-coat compound treatment, without sanding.

3.8 FIELD QUALITY CONTROL

A. Above Ceiling Observation: The owner's field representative will conduct an above-ceiling observation prior to installation of gypsum board ceilings and report any deficiencies in the work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.

3.9 CLEANING AND PROTECTION

A. Promptly remove any residue joint compound from adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to installer. Ensure that gypsum board assemblies are without damage or deterioration at the time of contract completion.

END OF SECTION 09 25 00

SECTION 09 30 00 - CERAMIC TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to this Section.

1.2 REFERENCE STANDARDS

A. American National Standards Institute (ANSI):

1. ANSI A108.5 “Ceramic Tile installed with dry-set Portland cement mortar.
2. ANSI A108.10 “Installation of Group in Tilework”.
3. ANSI A118.4 “Latex-Portland cement mortar”.
4. ANSI A136.1 “Organic Adhesives for Installation of Ceramic Tile”.
5. ANSI A137.1 – 1988 “Ceramic Tile”.

B. ASTM C144 “Aggregate for Masonry Mortar” and ASTM C150 “Portland Cement”.

C. Tile Council of America (TCA): TCA “Handbook for Ceramic Tile Installation”, current edition.

D. Conform to standards of the American National Standards Institute as specified and applicable to file work in this project and recommendations of the Tile Council of America.

1.3 QUALITY ASSURANCE

A. Installer must be approved by tile manufacturer, and must have a minimum of 5 years installation experience.

B. The ceramic wall tile installer shall guarantee his/her installation against bond failure, cracking, or other defects resulting from poor workmanship, inferior or incompatible materials, etc., for a period of one-year from the date of acceptance by the owner.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver all products to job site in manufacturers unopened original containers with standard grade markings intact.

B. Protect materials from damage.

1.5 JOB CONDITIONS

A. Maintain temperature at 50 degrees F minimum during installation of tile work and for seven (7) days after completion.

B. Prohibit all foot and wheel traffic from using newly tiled floor for at least three (3) days, preferably seven (7) days, when traffic is unavoidable, use large flat boards for walkways for seven (7) days and installed in manner to prevent damage or marring of tile repair and replace damaged units.

1.6 EXTRA MATERIALS

A. Furnish extra materials for Owner's future use. Floor, base, and wall tile: One full box, of each type and pattern of tile material installed. Deliver in plainly marked boxes. Include grout in quantities to match tile. Store as directed by owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Ceramic Tile: As scheduled on floor finish drawing.

B. Mortar, Grout, and Adhesive: As scheduled on floor finish drawing.

2.2 MATERIALS

A. Setting Bed Materials

1. For standard thin-set method on concrete or masonry: Pre-sanded, factory mixed dry-set mortar per ANSI A118.1 or latex/cement mortar per ANSI A118.4.
2. For waterproofing thin-set method: Applied polymers of America, Inc., "Tile-Tite" a trowel-applied, one part polyurethane waterproofing membrane adhesive, distributed by American Olean Tile Company.
3. Setting material shall be an organic adhesive (ANSI A136.1) Type II. Use Type 1 in shower rooms, tub rooms, toilet rooms, and all spaces subject to damp or wet conditions.

B. Grout Material

1. For ceramic wall tile, grout shall be latex and white waterproof Portland cement.
2. For ceramic floor tile, grout shall be grout and joint filler fortified with a stainless admix and chemical resistants as recommended by the floor tile manufacturer. All rendering, screeding, sound control, weatherproofing, tile installation, and grouting/pointing materials shall be as supplied by manufacturer recommended by the ceramic tile supplier. Color chosen by Architect.

C. Trim

1. Provide necessary caps, stops, returns, trimmers, and other shapes to complete installation.
2. Color and finish to match wall tile.

2.3 ACCESSORIES

A. Subject to compliance with requirements herein, provide products from one of the following: Custom building products or Schluter Systems, LP.

B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

C. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.

1. Available Products:

a. Bonsal, W. R., Company; Grout Sealer.
b. Bostik; CeramaSeal Grout Sealer.
c. C-Cure; Penetrating Sealer 978.
d. Custom Building Products; Grout Sealer.
e. Jamo Inc.; Penetrating Sealer.
f. MAPEI Corporation; KER 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.
g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
h. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
i. TEC Specialty Products Inc.; TA-256 Penetrating Silicone Grout Sealer.

D. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

A. Inspect surfaces to receive tile work and report defects or unsatisfactory conditions to the Architect in writing. Clean and prepare surfaces as required to assure proper bonding. Commencing work signifies acceptance.

3.2 TILE LAYOUT AND WORKMANSHIP

A. Layout tile work so as to minimize cut tile less than one-half tile in size.

B. Seal surface of taped joints on water resistant gypsum board backing to prevent water damage. Prime surfaces before applying adhesives when recommended by adhesive manufacturer.

C. Except as otherwise shown or directed by Architect, make joints in floor tile perpendicular and parallel to walls and evenly spaced. Align units for straight grout lines. Verify layout with Owner.

D. Fit tile carefully at trim, penetrations and built-in items.

E. Back-up board for ceramic wall tile shall be water-resistant gypsum board.

3.3 SETTING OF TILE

A. Use thin-bed setting for all tile work. Provide level finished surface of tile with all units aligned. If necessary, provide leveling coat to assure top quality installation using a leveling compound, compatible with related work and as recommended by tile manufacturer.

B. Mix and apply setting material per manufacturer’s instructions.

3.4 GROUTING OF TILE

A. Grout tile joints with type and color of group materials specified and approved by Architect.

B. Mix and apply grout per manufacturer’s instructions.

C. Grout Sealer: Apply grout sealer togrout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.

3.5 CLEANING

A. Clean setting bed and grout materials from tile surfaces to remain exposed as soon as possible as work progresses.

B. Clean all exposed surfaces of tile after installation and curing of grout is complete.

C. Use no acid, agent, or device that will mar tile surfaces.

D. Rinse tile work thoroughly with clean water after use of cleaning agent.

3.6 PROTECTION

A. Protect tile from damage as required until substantial completion.

B. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

1. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 09 30 00

SECTION 09 50 00 - ACOUSTICAL CEILING TILES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract apply to this Section.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has successfully completed acoustical ceiling similar in material, design, and extent to that indicated for project with a minimum of 5 years experience.

B. Fire performance characteristics (if required): Provide acoustical ceilings that are identical to those tested for the following fire performance characteristics, per ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristics: Flame spread of 25 or less and smoke developed of 50 or less, tested per ASTM E84 and complying with ASTM E1264 for Class A products.

C. Single-Source Responsibility for Ceiling Units: Obtain each type of acoustical ceiling unit from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the work.

D. Single-Source Responsibility for Suspension System: Obtain each type of suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the work.

E. Coordination of Work: Coordinate layout and installation of acoustical ceiling units and suspension system components with other construction that penetrates ceiling or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components, and partition system.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.4 PROJECT CONDITIONS

A. Space Enclosure: Do not install interior acoustical ceilings unit space is enclosed and weatherproof. Wet work in space is completed and nominally dry, work above ceilings (by other trades) is complete, and

ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

1.5 EXTRA MATERIALS

A. Furnish extra materials for owner's future use in full opened boxes, ten percent (10%) of each type and pattern of acoustic material installed. Deliver in plainly marked boxes. Store as directed by Owner.

PART 2 - PRODUCTS

2.1 ACOUSTIC CEILING TILES AND SUSPENSION SYSTEM

A. Tile: USG Interiors, Inc. – Eclipse-Clima Plus #767775 (panel edge type slt).

B. Suspension System: Down brand DX/DXL.

C. Wall Angle:

1. Straight Walls: USG M7, 7/8" Face.
2. Curved Walls: Kenbeck Ultra-Flex, 7/8" face.

2.2 ACCESSORY MATERIALS

A. Attachment Devices: Size for 5 times design load indicated in ASTM C635 table.

1. Direct hung unless otherwise indicated.

B. Wire Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper, sized so stress at 3 times hanger design load (ASTM C635, Table 1, Direct-Hung), will be less than yield stress of wire, but provide not less than 0.10% inch diameter (12 gauge).

C. Edge moldings and trim, metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturers standard moldings for edges and penetrations that fit type of edge detail and suspension system indicated.

1. Lay-in panels with reveal edge details. Stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
2. Circular penetrations of ceiling. Provide edge moldings fabricated to diameter required to fit penetration exactly.
3. Narrow faced suspension systems suspension system manufacturer's standard edge moldings that match width and configuration of exposed rubber.

D. Suspension system shall not be less in size and strength than required to support itself and shall be increased in size and strength as necessary to support the light fixtures, acoustical units, and related items without deflecting more than 1/360 of the span when tested as a simple beam, ends free.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which ceiling system attaches or abuts, with installer present for compliance with requirements specified in this and other sections that affect installation and anchorage of ceiling system. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

1. Furnish inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite ends of each ceiling. Avoid use of less-than-half-width units at borders, and comply with reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical ceiling systems in accordance with ASTM C636 requirements, manufacturer's instructions, and Cisca "Ceiling Systems Handbook".

B. Arrange acoustical units and orient directionally patterned units in manner shown by reflected ceiling plans.

C. Suspend ceiling hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with installation of other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter-playing or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members. Install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices that are secure and appropriate for substrate and in a manner that will not cause them to deteriorate or otherwise fail due to age. Corrosion or elected temperature.
4. Do not attach hangers to steel roof deck. Attach hangers to structural members.
5. Space hangers not more than 4 feet on center along back member support directly from hangers, unless otherwise shown, and provide hangers not more than 8 inches from ends of each member.

D. Install edge moldings of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical units.

1. Screen-attach moldings to substrate at intervals not over 16 inches O.C. and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12'-0" miter corners accurately and connect securely.

E. Install acoustical panels in coordination with suspension systems, with edges concealed by support of suspension members. Scribe and cut panel to fit accurately at borders and at penetrations.

3.4 CLEANING

A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturers instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repairs to permanently eliminate evidence of damage.

END OF SECTION 09 50 00

SECTION 09 65 00 - RESILIENT TILE FLOORING AND BASE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 QUALITY ASSURANCE

A. Single-source responsibility for floor tile and base. Obtain each type, color, and pattern from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the work.

B. Fire performance characteristics: Provide resilient floor tile and accessories with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Critical radiant flux, 0.45 watts per sq. cm or more per ASTM E648.
   2. Smoke density. Less than 450 per ASTM E662.

1.3 DELIVERIES, STORAGE, AND HANDLING

A. Deliver tiles and installation accessories to project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer. Project identification, and shipping and handling instructions.

B. Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 50 deg F (10 deg C) and 90 deg F (32 deg C).

C. Store tiles and bases on flat surfaces. Move tiles and base and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

1.4 PROJECT CONDITIONS

A. Maintain a minimum temperature of 70 deg F (21 deg C) in spaces to receive tiles for at least 48 hours prior to installation. During installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 deg F (13 deg C).

B. Do not install material until they are at the same temperature as the space where they are to be installed. Close spaces to traffic during tile installation.

1.5 SEQUENCING AND SCHEDULING

A. Install tiles, base and accessories after other finishing operations, including painting, have been completed.

B. Do not install tiles over concrete slabs until the slabs have cured and are sufficiently dry to bond with adhesive as determined by tile manufacturer's recommended bond and moisture test.

1.6 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. Furnish not less than one box for each 20 tiles and 20 lineal feet of base of each class, wearing surface, color, pattern and size of floor tile installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Vinyl composition tile: provide vinyl composition tile as scheduled on the drawings.

B. Cove Base: Provide vinyl base as scheduled on the drawings.

2.2 INSTALLATION ACCESSORIES

A. Concrete slab primer nonstaining type as recommended by flooring manufacturer.

B. Trowelable underlayments and patching compounds: Latex-modified Portland-cement based formula provided or approved by tile manufacturer for applications indicated.

C. Adhesives (cements): water-resistant type recommended by tile manufacturer to suit resilient floor tile products and substrate conditions indicated.

D. Edge reducer strips: tapered vinyl edge strips for flooring thickness involved x1” wide. Colors as selected by owner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Examine areas where installation of tiles and base will occur, with installer present to verify that substrates and conditions are satisfactory for installation and comply with the tile manufacturer’s requirements and those specified in this section.

B. Concrete subfloors: verify that concrete slabs comply with ASTM F710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by tile manufacturer.
   2. Finishes of subfloors comply with tolerances and other requirements specified in division section “cast-in-place concrete” for slabs receiving resilient flooring.
   3. Subfloors are free of cracks, ridges, depressions, scale and foreign deposits of any kind.

3.2 PREPARATION

A. General: comply with manufacturer’s installation specifications to prepare substrates indicated to receive tile.

B. Use trowelable leveling and patching compounds per tile manufacturer's directions to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.

D. Broom or vacuum clean substrates to be covered by tiles and base immediately before installation. Following leaning, examine substrates for moisture alkaline salts, carbonation, or dust.

E. Apply concrete slab primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.

3.3 INSTALLATION

A. General: Comply with tile and base manufacturer's installation directions and other requirements indicated that are applicable to each type of installation included in project.

B. Lay out tiles from center marks established with principal walls. Discounting minor offsets so tiles at opposite edges of room are equal width. Adjust as necessary to avoid using cut widths at perimeter that equal less than one-half of a tile. Install tiles square with room axis, unless otherwise indicated.

C. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped or deformed tiles.
   1. Lay tiles with grain running in one direction.

D. Scribe, cut, and fit tiles to butt tightly to vertical surfaces, permanent fixtures, built-in furniture including cabinets, pipes, outlets, edgings, thresholds and nosings.

E. Extend tiles into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor, use chalk or other nonpermanent-marking device.

G. Adhere tiles to flooring substrates without producing open cracks, voids, raising and puckering at joints. Telegraphing of adhesive spreader marks, or other surface imperfections in completed tile installation.

H. Use full spread of adhesive applied to substrate in compliance with tile manufacturer's directions including those for trowel notching, adhesive mixing, and adhesive open and working times.

I. Hand roll tiles where required by tile manufacturer.

J. Place resilient accessories so they are butted to adjacent materials of type indicated and bond to substrates with adhesive. Install reducer strips at edges of flooring that otherwise would be exposed.
   1. Provide transition strips at exposed edges of resilient flooring as shown on drawings.

K. Top set base to be installed on walls, columns, base cabinets, and all vertical surfaces over flooring where ceramic tile base is not used.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing tile and base installation.

1. Remove visible adhesive and other surface blemishes using cleaner recommended by manufacturers.
2. Sweep or vacuum floor thoroughly and wet wipe base as required.
3. Do not was floor until after time period recommended by resilient floor tile manufacturer.
4. Damp-mop tile to remove black marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by tile manufacturer.
   1. Apply protective floor polish to tile surfaces that are free from soil, visible adhesive and surface blemishes. Use commercially available, metal, cross-linked acrylic product acceptable to tile manufacturer.

C. Clean tiles not more than 2 days prior to dates scheduled for inspections intended to establish date of contract completion in each area of project clean tiles using method recommended by manufacturer.
   1. Strip protective floor polish that was applied after completing installation prior to cleaning.
   2. Reapply floor polish after cleaning.

END OF SECTION 09 65 00

SECTION 09 68 00 - GLUE DOWN CARPET

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 REFERENCES

A. ASTM D2859 – Doc-FF-1-70 pill test – test method for flammability of finished textile floor covering materials.

B. ASTM E64 – Surface burning characteristics of building material.

C. ASTM E645 – NFPA class 1 – critical radiant flux of floor covering systems using a radiant heat energy source.

D. NFPA 253 – NFPA 258 – NBS smoke chamber (450 or less) flaming mode. Test for critical radiant flux of floor covering systems.

1.3 QUALIFICATIONS

A. Installer: Company specializing in installing carpet with minimum three years documented experience.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable codes for flame/smoke rating requirements of DOC-FF-1-70 pill test. NFPA class 1 when tested in accordance with ASTM E648 and in accordance with ASTM E64.

B. Conform to NFPA 253 ASTM E648 class 1 for flooring radiant panel test.

C. Conform to ASTM D2859 for surface flammability ignition test.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Store materials for 3 days prior to installation in area of installation to achieve temperature stability.

B. Maintain minimum 70 degrees F ambient temperature 3 days prior to, during and 24 hours after installation.

1.6 EXTRA MATERIAL

A. Provide 18 Sq. Ft. of carpeting of each type, color, and pattern specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Carpet: provide carpet as scheduled on the drawings.

2.2 MATERIALS – CARPET

A. Backing construction guarantee no edge ravel under normal use for the life of the carpet.

B. Secondary back adhesion: guaranteed not to delaminate with normal lifetime use of carpet.

C. Guarantee tuft bind loss for lifetime of carpet.

D. Guarantee against mold and mildew for the lifetime of the carpet.

E. Wear to be no more than 10% face yarn loss with normal use for the lifetime of the carpet.

F. Permanent dyeing with stain resistance, ease of cleaning and superior fade resistance to sunlight and gas.

G. Fiber to be treated by Dupont fiber standards for resistance of stains including bleach.

H. Antimicrobial solutions such as bioguard testing and registered with EPA under No. 42182-1 and also with the food and drug administration. (EPA_ AATCC test method 174 part I, II, III.

I. 100% man made fiber.

2.3 ACCESSORIES

A. Sub-floor filler: white premix latex: type recommended by adhesive material manufacturer.

B. Adhesive: Recommended by carpet manufacturer.

C. Edge strips: as recommended for installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are smooth and flat with maximum variations of ¼ inch in 10 ft., and are ready to receive work.

B. Verify concrete floors are dry to a maximum moisture content of 7%, and exhibit negative alkalinity, carbonization, or dusting.

3.2 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor or local low spot, cracks, joints, holes, and other defects with sub-floor filler.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

C. Vacuum clean substrate.

3.3 INSTALLATION

A. Apply carpet and adhesive in accordance with manufacturer's instructions.

B. Verify carpet match before cutting to ensure minimal variation between dye lots.

C. Double cut carpet, to allow intended seams and pattern match. Make cuts straight, true, and unfrayed. Edge seam carpet at open areas.

D. Locate seams in area of least traffic.

E. Join seams by hot adhesive tape method. Form seams straight, not overlapped or peaked and free of gaps.

F. Lay carpet tight and flat on subfloor, well fastened at edges, with a uniform appearance. Provide monolithic color pattern, and texture match within any one area.

G. Do not change run of pile in any room where carpet is continuous through a hall opening into another room. Locate change of color or pattern between rooms under door centerline.

H. Cut and fit carpet around interruptions.

I. Fit carpet tight to intersection with vertical surfaces without gaps.

3.4 CLEANING

A. Clean up after each installation. Remove scrap and debris from job site.

B. Remove excess adhesive without damage, from floor, base, and wall surfaces.

C. Clean and vacuum caret surfaces.

END OF SECTION 09 68 00

SECTION 09 90 00 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 QUALITY ASSURANCE

A. Application qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the project that have resulted in a construction record of successful in-service performance.

B. Single-source responsibility, provide primers and undercoat paint produced by the same manufacturer as the finish coats.

1.3 DELIVERIES, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information.
   1. Product name or title of material
   2. Product description (generic classification or binder type).
   3. Manufacturer's stock number and date of manufacture.
   4. Contents by volume for pigment and vehicle constituents
   5. Thinning instructions
   6. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.
   1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing and application.

1.4 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).

C. Do not apply paint in snow, rain, fog, or mist or when the relative humidity exceeds 85 percent. Or at temperatures less than 5 def F (3 deg C) above the dew point, or to damp or wet surfaces.
   1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Paint: Provide paint as scheduled on drawings.

2.2 PAINT MATERIALS, GENERAL

A. Material compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

B. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

C. The paint manufacturers listed in these specifications is included to establish a basis of quality for each related paint material. The contractor is to provide all paint material as shown on the drawings and which is of the same quality as the manufacturer's paint material listed wherein.

2.3 MASONRY BLOCK FILLER

A. Filler coat materials: Provide the manufacturer's recommended factory formulated latex-type concrete masonry block fillers that are compatible with the finish materials indicated.

B. Subject to compliance with requirements, provide the following: Benjamin Moore: #285 Moorcraft Super Craft Latex Block Filler.

2.4 PRIMERS

A. Primers: Provide the manufacturer's recommended factory formulated primers that are compatible with the substrate and finish coats indicated.

B. Subject to compliance with requirements, provide the following:
1. Gypsum Drywall Primer: Benjamin Moore: #263 Moorcraft Super Spec Latex Enamel Undercoater & Primer Sealer.
2. Exterior Metal Primers: Benjamin Moore: #M06 ALKYD Metal Primer.
3. Interior Structural Steel: Benjamin Moore: #M55 Latex Sweep-up Spray.
4. Interior Hollow Metal Doors and Frames: Benjamin Moore: #253 Moorcraft Super Spec Latex Enamel Undercoater and Primer Sealer

2.5 EXTERIOR FINISH PAINT MATERIALS

A. Finish Paint: Provide the manufacturer's recommended factory-formulated finish-coat materials that are compatible with the substrate and undercoats indicated.

B. Subject to compliance with requirements, provide the following:
1. Semi-Gloss ALKYD Enamel: weather resistant semi-gloss enamel. Benjamin Moore: #175 Moorcraft Super Spec Gloss House Paint.

2.6 INTERIOR FINISH PAINT MATERIALS

A. Finish Paint: Provide the manufacturer's recommended factory-formulated finish-coat materials that are compatible with the substrate and undercoats indicated.

B. Subject to compliance with requirements, provide the following:
   1. Interior, flat, latex-based paint, Benjamin Moore: #274 Moorcraft Super Spec Latex Eggshell Enamel.
   2. Interior, semi-gloss, odorless ALKYD enamel: Benjamin Moore: #C305 Dulamel Eggshell Enamel.

C. Paste Wax: Provide paste wax as recommended by the coating manufacturer for use on interior stained and natural-finished woodwork.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.
   1. Do not begin to apply paint until unsatisfactory conditions have been corrected.
   2. Start of painting will be construed as the applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination: Review other sections in which primers are provided to ensure compatibility of the total system for various substrates. Verify all factory primed items for compatibility with scheduled finished coatings. If factory applied primer is incompatible with finish coatings specified, either remove factory applied primer or provide intermediate primer that is compatible with both factory applied primer and finish coating.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar times already installed that are not to be painted, or provide surface applied protection prior to surface preparation and painting. Remove these items, if necessary, to completely paint the times and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on the wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.
   1. Provide barrier coats over incompatible primers or remove and re-prime. Notify owner in writing about anticipated problems using the specified finish-coat material with substrates primed by others.
   2. Cementitious materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen, as required to remove glaze (except pre-glazed units). Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces

are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

3. Ferrous Metals: Clean ungalvanized ferrous metal surfaces that have not been shop-coated, remove oil, grease, dirt, loose mill scale and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the steel structures painting council (SSPC). Touch-up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.
4. Galvanized surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials preparation: Carefully mix and prepare paint materials according to manufacturer's directions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
3. Use only thinners approved by the paint manufacturer and only within the recommended limits.

E. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provided sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Provide finish coats that are compatible with primers used.
3. The number of coats and the film thickness required are the same regardless of the application method. Do no apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.
4. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
5. The tem exposed surfaces includes areas visible when permanent or built-in fixtures, convector covers, grilles, and similar components are in place. Extend coatings in these areas as required, to maintain the system integrity and provide desired protection.

C. Scheduling painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

D. Application procedure: apply paints and coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.

E. Minimum coating thickness: Apply materials no thinner than the manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

F. Block fillers: apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

G. Prime coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

H. Pigmented (opaque) finishes: Completely cover to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

I. Completed work: match approved samples for color, texture, and coverage. Remove, refinish or repaint work not complying with specified requirements.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site. After completing painting, clean glass and paint spattered surfaces. Removed spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being painted or not against damage by painting. Correct damage by cleaning, repairing, or replacing, and repainting, as acceptable by architect.

B. Provide "wet paint" signs to protect newly painted finishes. Remove Temporary protective wrappings provided by others to protect their work. After completing painting operations.
   1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 09 90 00

SECTION 10 14 53 – SITE SIGNS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

This section includes the following: all signage on school property as indicated on the Drawings:

A. Traffic Guide Signs.
B. Traffic Regulatory, Warning Signs.
C. Parking Signs including ADA signs.
D. Miscellaneous Informational signs.
E. Posts, attachment hardware and accessories.

1.3 RELATED SECTIONS

A. Section 013300, Submittal Procedures.
B. Section 321216, Hot Mix Asphalt Pavement
C. Section 099113, Exterior Painting

1.4 QUALITY ASSURANCE

A. Quality, grades of materials and installation procedures: In accordance with applicable code and referenced standards including:

1. American Society for Testing Materials (ASTM).
2. State of Maine, Department of Transportation Standard Specifications for Highways and Bridges (MDOT).
3. Manual on Uniform Traffic Control Devices (MUTCD).

1.5 SUBMITTALS

A. Product Data: All materials.

B. Schedule: Submit schedule of all required signs with drawing of locations.

PART 2 PRODUCTS

2.1 MATERIALS

A. Signs: MDOT Type I; engineering grade reflective sheeting letters, numerals, symbols and border on engineering grade reflective sheeting background adhered to sheet aluminum sign panel.

B. Sizes, Colors, Legend Designs: As indicated on drawings and as required by MUTCD and MDOT.

C. Posts:
1. All Signs within project limits: Steel U-channel, painted green on galvanized or zinc oxide primer.

D. Attachment Hardware: Aluminum or galvanized.

PART 3 EXECUTION

3.1 INSTALLATION

A. Attach signage to supports with fasteners concealed at face of sign.

B. Install items firmly in place at prescribed locations, straight, plumb, level, and anchored for long life under hard use.

END OF SECTION 10 14 53

SECTION 10 52 00 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 QUALITY ASSURANCE

A. Single-source responsibility, obtain extinguishers and cabinets from a single manufacturer.

B. Coordination: Verify that cabinets are sized to accommodate type and capacity of extinguishers indicated.

C. UL-Listed products: Fire extinguishers shall be UL Listed with UL Listing mark for type, rating, and classification of fire extinguisher.

D. NFPA Compliances: Fabricate and label fire extinguishers to comply with NFPA 10, “standard for portable fire extinguishers.”

E. Fire Extinguishers: Listed and labeled for the rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Portable fire extinguishers and cabinets: Subject to compliance with requirements, provide products by one of the following: J.L. Industries, Inc. or Larsen’s.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet. Carbon Steel, complying with ASTM a366-A366M, commercial quality, stretched leveled, temper rolled.

B. Aluminum, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated as follows:
   1. Sheet, ASTM B209.
   2. Extruded shapes: ASTM B221.

C. Stainless-steel sheet: ASTM A666, type 302 or type 304 alloy.

2.3 PORTABLE FIRE EXTINGUISHERS

A. General: Provide Fire extinguishers of type, size, and capacity for each cabinet and other locations indicated.

B. Multipurpose dry-chemical type UL-rated 4-A:60-B:C, 10-LB nominal capacity, in enameled steel container.

2.4 FIRE-PROTECTION CABINETS

A. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth, miter and weld perimeter door frames. Contractor to verify color selection of all fire-protection cabinets with owner prior to any work.
   1. Fire-rated cabinets: listed and labeled to meet requirements of ASTM B814 for fire-resistance rating of wall where it is installed. Construction fire-rated cabinets with double walls fabricated from 0.0473 inch thick, cold-rolled steel sheet lined with minimum 5/8 inch thick, fire-barrier material. Provide factory drilled mounting holes.
   2. Cabinet Metal: Enameled steel holes.

B. Cabinet type: suitable for fire extinguisher.

C. Cabinet mounting: Provide semi-recessed cabinet box partially to suit style of trim indicated. Locate cabinet per ADAAG's reach requirements. For an unobstructed approach, the maximum reach is 48 inches (1220 MM) above the floor. The maximum reach for a side approach is 64 inches (1870 MM).

D. Cabinet trim style: Fabricate trim in one piece with corners mitered, welded and ground smooth. Exposed trim: one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backend). Rolled-edge trim: 2-1/2 inch backbend depth.

E. Cabinet trim material: Manufacturer's standard, same metal and finish as door.

F. Door material: Manufacturer's standard, sheet metal.

G. Door style: Manufacturer's standard design, solid opaque panel with frame.

H. Door construction: Fabricate doors according to manufacturer's standards of materials indicated, and coordinated with cabinet types and trim styles selected.

I. Door hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door full and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

2.5 ACCESSORIES

A. Mounting brackets: Manufacturer's standard steel, designed to secure extinguisher, of sixes required for types and capacities of extinguishers indicated, with plated or baked enamel finish.
   1. Provide brackets for extinguishers not located in cabinets.
   2. Provide brackets for extinguishers located in cabinets.

B. Identification: Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as directed by the owners representative.
   1. Identify fire extinguisher in cabinet with the words "fire extinguisher" applied to door, apply black vinyl letters, horizontally.

2.6 COLORS AND TEXTURES

A. Colors and Textures: as selected by owner from manufacturer's full range for characteristics.

2.7 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designation finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of finished work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of the approved samples and are assembled or installed to minimize contrast.

D. Cabinet and door finishes: provide manufacturer's standard baked-enamel paint for the following:
   1. Exterior of cabinets and doors.
   2. Interior of cabinets and doors.

2.8 STEEL FINISHES

A. Surface preparation: cleaning surfaces of dirt, oil, grease, mill scale, rust, and contaminant's that could impair paint bond using manufacturer's standard methods.

B. Factory priming for field painted finish: apply shop primer specified below immediately after surface preparation and pretreatment.
   1. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead and chromate-free, universal primer, selected for resistance to normal atmospheric corrosion, for compatibility to provide a sound foundation for field-applied topcoats despite prolonged exposure.

C. Baked-enamel finish: Immediately after cleaning, pretreating, apply manufacturer's standard two-coat, coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
   1. Color and gloss: as selected by owner from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls rough-in for hose, valves, hose racks, and cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where recessed and semi-recessed cabinets are to be installed.

C. Examine fire extinguishers for proper charging and tagging.
   1. Remove and replace damage, defective, or undercharged units.

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

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing fire-protection specialties.

B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
   1. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
   2. Fasten mounting brackets to structure and cabinets, square and plumb.
   3. Fasten cabinets to structure, square and plumb.

3.3 ADJUSTING, CLEANING AND PROTECTION

A. Adjust cabinet doors that do not swing or operate freely.

B. Refinish or replace cabinets and doors damaged during installation.

C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of substantial completion.

3.4 FIRE-PROTECTION CABINET SCHEDULE

A. Fire-protection cabinet "FPC-1", where this designation is indicated, provide fire-protection cabinet complying with the following:
   1. Construction: nonrated.
   2. Cabinet Material: enameled-steel sheet.
   3. Type: fire extinguisher.
   4. Mounting: semirecessed.
   5. Trim Style: exposed, rolled, 2-1/2 inch.
   6. Cabinet trim material: same metal and finish as door.
   7. Door Material: steel sheet.
   8. Door Style: solid opaque with frame.
   9. Accessories: mounting brackets, and identification lettering.
   10. Color and Texture: as selected by Architect from manufacturer's full range.
   11. Steel Finish: baked enamel.

B. Fire protection cabinet FPC-2 shall be same as FPC-1 but shall also be rated for 1-hour fire resistant construction.

END OF SECTION 10 52 00

SECTION 10 80 00 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 QUALITY ASSURANCE

A. Single-source responsibility: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same area.

1.3 PROJECT CONDITIONS

A. Coordination: Coordinate accessory locations, installation, and sequencing with other work to avoid interference and to assure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Bobrick Washroom Equipment Inc. or approved equal.

2.2 MATERIALS GENERAL

A. Stainless steel: AISI type 302/304, with polished no. 4 finish, 22 gauge (.034 inch) minimum thickness.

B. Brass: leaded and unleaded, flat products, ASTM B19: rods, shapes, forgings, and flat products with finished edges, ASTM B16: castings, ASTM B30.

C. Chromium plating: nickel and chromium electro-deposited on base metal, ASTM V456, type SC2.

D. Fasteners: screws, bolts, and other devices of same material as accessory unit or of galvanized steel where concealed.

E. All steel products shall be fabricated utilizing only domestically produced steel.

2.3 PAPER TOWEL DISPENSERS

A. Semi-recessed mounted type, fabricated of stainless steel with hinged front equipped with tumbler lockset. Provide pierced slots at sides as refill indicators. Bobrick Model #B-359.

2.4 TOILET PAPER DISPENSERS

A. Surface mounted stainless steel type, Bobrick Model #B-2B40.

2.5 GRAB BARS

A. Stainless steel type: Provide grab bars with wall thickness not less than 0.05 inch (18 gauge). Mounting: Concealed, manufacturer's standard flanges and anchorage. Mounting per manufacturer's standard flanges and anchorage. Clearance: 1-1/2 inch clearance between wall surface and inside face of bar. Gripping surfaces: Manufacturers standard non-slip texture. Heavy-duty size: outside diameter of 1-1/2 inches. Provide one 36"l and one 42"l grab bar per water closet Bobrick Model #B-6802.99x36" and 42".

2.6 SOAP DISPENSERS

A. Surface mounted type: 20 gauge stainless steel. One for each sink is required. Bobrick Model #B-155.

2.7 MIRROR UNITS

A. Stainless steel framed mirror units. Fabricate frame with angle shapes not less than 0.05 inch (15 gauge), with square corners mitered, welded, and ground smooth. Provide in No. 4 satin polished finish. One required over each toilet room sink. Bobrick Model #B-290 2436.

2.8 MISCELLANEOUS ACCESSORIES

A. Mop and broom holder/utility shelf. Combination unit with 0.05 inch (18 gauge) support brackets for wall mounting. Provide 0.062 inch (16 gauge) stainless steel hooks for wiping rags on front shelf, together with spring-loaded, rubber hat, cam-type mop/broom holders, ¼ inch diameter stainless steel drying rod suspended beneath shelf. Provide unity 36 inches long and complete with four mop/broom holders and three hooks. Bobrick Model #B-224x36

B. Double-Prong Robe Hook: Heavy duty satin finished stainless steel double-prong robe hook. Rectangular wall bracket with backplate for concealed mounting. One required for each toilet room. Bobrick model #B-672.

2.9 FABRICATION

A. General: a maximum 1-1/2 inch diameter, unobtrusive stamped logo of manufacturer, as approved by architect, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by means of either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.

B. Surface-mounted toilet accessories. General: except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors of access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.

C. Keys: provide universal keys for access to toilet accessory units requiring internal access for servicing, re-supply, etc. Provide minimum of six keys to owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install toilet accessory units in accordance with manufacturer's instructions, using fasteners appropriate to substrate as recommended by manufacturer. Install units plumb and level, firmly anchored in locations and at heights indicated.

B. In locations marked for handicapped accessibility, install toilet acce4ssories in compliance with requirements of the American with Disabilities Act Accessibility Guidelines (ADAAG).

C. Secure Mirrors to walls in concealed tamperproof manner with special hangers. Toggle bolts or screws. Set units plumb, level, and square at locations indicated, in accordance with manufacturer's instruction for type of substrate involved.

D. Install grab bars to withstand a downward load of at least 250 LBF. Complying with ASTM F446.

3.2 ADJUSTING AND CLEANING

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish all exposed surfaces in strict accordance with manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION 10 80 00

EXPLORATIONS AND GEOTECHNICAL ENGINEERING SERVICES
PROPOSED BANK BRANCH BUILDING
314 ALLEN AVENUE
PORTLAND, MAINE

09-1161.1 S JUNE 22, 2010

PREPARED BY

S.W.COLE ENGINEERING, INC.

PREPARED FOR:
BANGOR SAVINGS BANK, INC
ATTENTION: MR. JEFFREY JETER, SR. VICE PRESIDENT
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S.W.COLE
ENGINEERING, INC. • Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

09-1161.1 S

June 22, 2010

Bangor Savings Bank, Inc.
Attention: Mr. Jeffrey Jeter, Senior Vice President
3 State Street
Bangor, ME 04401-5100

Subject: Explorations and Geotechnical Engineering Services
Proposed Bank Branch Building
314 Allen Avenue
Portland, Maine

1.0 INTRODUCTION

1.1 Scope of Work

In accordance with our Proposal dated May 17, 2010, we have provided geotechnical engineering services for a proposed bank branch building on 314 Allen Avenue in Portland, Maine. The purpose of the work was to explore the subsurface conditions at the site and provide geotechnical recommendations relative to foundation design, earthwork and pavement section associated with the proposed construction. The work has included the making of ten test borings, laboratory testing and a geotechnical evaluation of the findings as they relate to the proposed construction. The contents of this report are subject to the limitations set forth in Attachment A.

1.2 Existing Conditions

The site is located on the westerly side of Allen Avenue, south of an existing Walgreens Pharmacy in the City of Portland. The predominant site feature is a two-story building occupying a footprint of about 2,100 square feet. The area surrounding this building is generally paved, with a few landscaped islands. The site is fairly level, with ground surface elevations varying from about 81 to 83 feet (NGVD29).

1.3 Proposed Construction

Based on a drawing 2287-phase R2007 forwarded to us by Gorrill-Palmer Consulting Engineers, Inc. of Gray, Maine via e-mail on June 18, 2010, we understand the proposed bank branch will occupy a footprint of approximately 3,320 square feet. The building will be one-story in height and wood/metal framed with an exterior masonry veneer along the lower portion of the walls. The finish floor is planned at elevation 84.0 feet, about 2 feet above current pavement grade. Easterly portions of the proposed bank branch are within the footprint of the existing building that will undergo demolition.

A three lane drive-through will be located on the westerly side of the bank branch. Concrete sidewalks will surround much of the building. A new paved entry is planned along the southerly portion of the site. Paved parking and access drives will surround the building.

The area of proposed construction in relation to existing site features is shown on the "Exploration Location Plan," attached as Sheet 1. Sheet 1 is based on the above described site plan provided by Gorrill-Palmer.

2.0 EXPLORATION AND TESTING

2.1 Exploration

Ten test borings, designated B-1 through B-7 (including B-6A, B-7A and B-7B), were made at the site on June 09, 2010 by Northern Test Boring of Gorham, Maine. The test boring locations were selected by S. W. COLE ENGINEERING, INC. and field located by taping from existing site features. Ground surface elevations for each boring were estimated by interpolating from contours shown on Sheet 1.

The borings were carried to depths varying from 3.1 to 24.1 feet. Soil samples were obtained where shown on the logs using Standard Penetration Testing procedures. With the exception of Boring B-2, the borings were carried to refusals (the inability to penetrate deeper without coring). Shallow refusals encountered in Borings B-7 and B-7A represent repeated attempts to penetrate obstacles in near surface fills. Borings B-6 and B-6A encountered fairly shallow refusals at similar depths (4.8 and 4.6 feet, respectively).

Approximate test boring locations are shown on Sheet 1. Logs are attached as Sheets 2 through 11. A key to the notes and symbols used on the logs is attached as Sheet 12.

2.2 Laboratory Testing

Soil samples retrieved from the borings were visually classified in our laboratory. We performed a gradation test on a sample of pavement base gravel. Results are presented on Sheet 13.

3.0 SUBSURFACE CONDITIONS

3.1 Soils

Beneath surficial pavement and base gravel materials, the soils encountered are generally fills, silty clays, silty sands and glacial till. The fills were observed in each boring and are variable in constituency, including gravelly silty sands and clayey materials. Brick fragments and/or organic debris were observed in several samples. The fills extend to depths varying from approximately 1.5 to 6 feet in the borings.

Beneath the fills, most of the borings encountered layers of medium to hard consistency brown silty clays and brown to gray loose to medium dense silty fine sands. In Boring B-2, made near the proposed bank branch building's northerly corner, loose gray silty sand with clay seams was encountered from a depth of about 10 to 14 feet. In Boring B-7B, made in the drive-through area west of the proposed building, medium consistency gray silty clay with sand layers overlies loose to medium dense sand that extends to refusal at a depth of 24.1 feet.

Glacial till was sampled in Borings B-1, B-4 and B-5. The till consists of a heterogeneous mixture of medium dense brown or gray silt, sand, gravel and cobbles. Thin layers (less than 2 feet in thickness) of till are inferred to be present in Borings B-2 and B-3 based on increased resistance while advancing the augers.

It is likely that refusals in the boring locations are on or near the bedrock surface (with the exception of B-7 and B-7A). For more information relative to the borings, please refer to the attached logs.

3.2 Groundwater

Generally, soil samples appeared to be wet to saturated 5 to 10 feet below the ground surface. Groundwater was not observed. However, the soils encountered have poor drainage characteristics, and observations made during the relatively short period of time the boreholes were open were likely not indicative of actual groundwater conditions.

Long term groundwater information is not available. Based on the soils encountered, we expect that groundwater becomes perched over relatively impermeable clayey soils. Groundwater levels will fluctuate seasonally and in response to heavy precipitation and snow melt.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

Based on the subsurface findings and our understanding of the proposed construction, the site is suitable to support the proposed bank branch building on conventional spread footing foundations with slab-on-grade construction. The fills encountered are variable, and contain organics and foreign debris. We recommend that all fills, old foundations and demolition debris be removed beneath areas of proposed construction.

A gradation test performed on a sample of the existing base gravel from Boring B-2 suggests the material is suitable for reuse as MDOT Aggregate Subbase 703.06 Type D. This material may be stockpiled for reuse for the new pavement section provided it is properly segregated from the underlying fills during earthwork to avoid contamination. We caution that there may be some variation in existing base materials throughout the site, therefore, gradation testing will be required during construction.

Refusals encountered in the test boring areas indicate that bedrock is below expected excavation levels for building and pavement construction. Relatively shallow refusals were encountered in Borings B-6 and B-6A (4.8 and 4.6 feet, respectively). Upon review of a Utility Plan prepared by Gorrill-Palmer (Drawing No. C102, Revision 2 dated April 06, 2010), a new sewer line will be installed in the area. We recommend the design team include a budget contingency for possible bedrock removal by blasting.

Site soils are frost susceptible and have poor drainage characteristics. These conditions need to be considered in the planning and design of this project.

4.2 Foundation Design

It is expected that footings will be cast on stiff to hard silty clays, medium dense silty sands or on compacted Structural Fill overlying these materials. The native materials will be susceptible to disturbance when wet, and perched groundwater conditions are likely present at the site. We recommend that all building and drive-through canopy footings as well as exterior foundations for signs be cast on at least 12 inches of compacted ¾-inch crushed stone fully wrapped with a non-woven geotextile filter fabric such as Mirafi 160N or equivalent.

We recommend that net allowable foundation bearing pressures not exceed 2.5 ksf. Wall footings should be at least 18 inches in width and column footings at least 24 inches in width. Total post-construction settlements are expected to be 1 inch or less.

The design freezing index for the Portland, Maine area is approximately 1,250 Fahrenheit degree days. Exterior building and canopy footings will be exposed to freezing temperatures and should be cast at least 4.5 feet below exterior finish grade to provide frost protection.

Design should consider the following lateral earth pressure criteria:

- Active Earth Pressure Coefficient 0.3 (Structural Fill)
- At Rest Earth Pressure Coefficient 0.5 (Structural Fill)
- Passive Earth Pressure Coefficient 3.0 (Structural Fill)
- Total Unit Weight of Backfill 130 pcf (Structural Fill)

Relative to seismic design evaluation, site conditions reflect a Site Class D per the 2006 International Building Code.

4.3 Site Preparation

The soils that will be exposed during construction will be susceptible to erosion. Site preparation should begin with construction of an erosion control system to protect drainageways and areas outside the construction limits. All pavement, landscaped islands, fills, old foundations and construction debris should be removed from the construction area. As much vegetation as possible should remain adjacent to the construction site to reduce the potential for erosion.

4.4 Excavation Work

Excavation work will encounter materials that can undergo substantial strength loss when subjected to construction traffic and excavation activities, particularly during periods of precipitation. Care must be exercised during construction to reduce disturbance of the bearing soils. Should the subgrade become yielding or difficult to work, disturbed areas should be excavated and backfilled with compacted Structural Fill (dry subgrades) or ¾ crushed stone overlying a non-woven geotextile filter fabric such as Mirafi 160N, or equivalent (wet subgrades). Structural Fill should be placed in lifts and compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Crushed stone, if used, should be compacted to at least 100 percent of its dry rodded unit weight as determined by ASTM C-29.

The contractor should anticipate the need for dewatering excavations by sumping and pumping.

Excavations must be sloped or adequately shored to prevent sloughing and caving of the sidewalls during construction. We recommend that temporary, unsupported excavations be cut to a slope of 1.5 horizontal to 1 vertical or flatter. All excavations should be made in accordance with OSHA regulations.

4.5 Structural Fill and Backfill

We recommend that all fill placed beneath the building area consist of Structural Fill as described below. Structural Fill should as well be used for interior and exterior foundation backfill and backfill of exterior foundations such as bollards and light pole bases.

STRUCTURAL FILL	
Sieve Size	**Percent Finer by Weight**
4 Inch	100
3 Inch	90 to 100
¼ Inch	25 to 90
No. 40	0 to 30
No. 200	0 to 5

Fill should be placed in horizontal lifts and be compacted. Lift thickness should be such that desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. We recommend that all soil fill that is placed below building, sidewalk and paved areas be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557.

4.6 Slab-on-Grade

At least 12 inches of Structural Fill should be placed beneath the slab-on-grade. The Structural Fill should be compacted to at least 95 percent of its maximum dry density per ASTM D-1557 (Modified Proctor). We recommend that a subgrade modulus of 150 pci be used for slab design.

We recommend a sub-slab vapor retarder to help reduce the potential for floor covering damage from moisture. The vapor retarder should have a permeance that is less than the floor cover that is applied to the slab. The vapor retarder must have sufficient durability to withstand direct contact with the sub-slab base material and construction activity. The vapor retarder material should be placed according to the manufacturer's recommended method, including the taping and lapping of all joints and wall connections. The architect and/or flooring consultant should select the vapor retarder products compatible with flooring and adhesive materials.

The floor slab should be appropriately cured using moisture retention methods after casting. Typical floor slab curing methods should be used for at least 7 days. The architect or flooring consultant should assign curing methods consistent with current applicable American Concrete Institute (ACI) procedures with consideration of curing method compatibility to proposed flooring and adhesive materials.

4.7 Foundation Drainage

We recommend that exterior perimeter underdrains be provided within the fabric wrapped crushed stone layer beneath perimeter footings. Underdrains should have perforations of ¼ to ⅝ inch. We recommend that at least 6 inches of ¾ inch crushed stone bedding be provided around the underdrains. The stone should be wrapped with a geotextile filter fabric such as Mirafi 160N or equivalent.

The underdrains must have positive gravity outlets. Exterior foundation backfill should be sealed with a surficial layer of clayey or loamy soil in areas that are not to be paved or occupied by entrance slabs. This is to reduce direct surface water infiltration into the backfill. General underdrain details are shown on Sheet 14.

4.8 Control Joints

We recommend that control joints be provided in the floor slabs and foundation walls to accommodate minor post-construction movement and shrinkage in the concrete as it cures. Control joints in floor slabs are typically established at intervals of 12 to 15 feet, unless other provisions are made for controlling random cracking. Control joint spacing and detailing around columns should be designed by the Structural Engineer.

4.9 Entrances and Sidewalks

The existing site soils are susceptible to frost heaving. Entrances and sidewalks should be designed to reduce the effects of frost action. We recommend that excavation beneath entrances and sidewalks abutting the building continue to at least 4.5 feet below finish grade. The entire length and width of entrance slabs and adjacent sidewalk areas should be underlain with compacted Structural Fill to a depth of at least 4.5 feet below finish grade. A gradual transition (3H:1V) of the Structural Fill thickness should be provided from the 4.5-foot depth up to the bottom of the pavement subbase material at adjacent paved areas. This transition will reduce the potential for abrupt differential movement due to frost action (see details on Sheet 14).

4.10 Paved Areas

4.10.1 Bituminous Pavement

Considering the site soils and the proposed development usage, we offer the following recommendations for a new bituminous pavement section. Materials are based on Maine Department of Transportation specifications.

Flexible Pavement	
Maine DOT 9.5 mm Superpave 703.09 (50 gyration design)	1.25 Inches
Maine DOT 19 mm Superpave 703.09 (50 gyration design)	2.25 Inches
Maine DOT Crushed Aggregate Base 703.06 Type A	6 Inches
Maine DOT Aggregate Subbase 703.06 Type D	12 Inches

The bituminous pavement should be compacted to 92 to 97 percent of its theoretical maximum density as determined by ASTM D-2041. Tack coat should be used between successive lifts of asphalt.

The base and subbase materials should be compacted to at least 95 percent of their maximum dry densities as determined by ASTM D-1557. If fill is needed below the Aggregate Type D subbase material, we recommend that either additional Type D subbase or Structural Fill be utilized. We recommend that all fill placed below the subbase materials be compacted to at least 95 percent of its maximum dry density per ASTM D-1557.

4.10.2 Concrete Pavement

The site plan indicates the drive-through surface will be concrete paved. We recommend that the area beneath all concrete pavement be excavated to at least 4.5-feet below finish grade. The area should be backfilled with MDOT Type D Sub-base, compacted to 95 percent of its maximum dry density per ASTM D-1557 up to the bottom of the Type A aggregate base material. A gradual transition (3H:1V) of the sub-base should be provided up to the adjacent bituminous pavement sub-base materials to reduce the potential for abrupt differential movement due to frost action. We recommend the following pavement section:

CONCRETE PAVEMENTS		
Pavement Layer	**Standard Duty**	**Heavy Duty**
Concrete Pavement (5,000 psi compressive, 550 psi flexural, 1½" aggregate with 5±1% air)	5 inches	8 inches
Maine DOT Crushed Aggregate Base 703.06 Type A, (Standard Specifications for Highways and Bridges, 2002, Pages 7-17)	6 inches	9 inches

We recommend that control joints be provided in the concrete pavement surface to reduce random cracking. We recommend control joint spacing of not more than 12-feet both longitudinally and horizontally. The control joints may consist of construction breaks or sawed joints. The sawed joints should be installed as early as practicable after placement of the concrete to avoid random cracking. We recommend that dowels be provided at construction joints to help load transfer.

S. W. COLE ENGINEERING, INC. should be on-site to observe all paved area subgrades prior to placing new fills. Any soft or wet areas, or areas exhibiting unsuitable, unstable soil, will need to be removed and replaced with additional Sub-base material or Structural Fill. Additionally, a geotextile fabric (such as Mirafi 500X) may be needed on paved area subgrades in areas where the subgrade is wet prior to placing and compacting new fill.

Consideration should be given to the development of both surface and subgrade drainage. The paved areas should be graded to promote surface drainage away from the building area and design should consider sloping of the subgrade to enhance drainage.

Where new utilities are proposed beneath the new paved areas, backfilling of the utility trenches should be made in a manner to reduce potential differential frost action. Utility pipes should be bedded and surrounded using materials consistent with the manufacturer's specifications. Above the utility bedding, backfill in trenches should be material similar to that in the trench sidewalls to reduce the potential for differential frost action between the trench and the adjacent materials. The backfill materials should be

placed in horizontal lifts not exceeding 12-inches in thickness and should be compacted to a density similar to that of the material in the adjacent trench sidewalls.

Frost penetration can be on the order of 4.5-feet in this area of the state. In the absence of full depth excavation of frost susceptible soils or use of insulation, frost will penetrate into the subgrade and some frost heaving and pavement distress must be anticipated.

4.11 Weather Considerations

If foundation construction takes place during fall or winter, foundations and floor slabs must be protected during freezing conditions. Concrete and new soil must not be placed on frozen soil and once placed, the soil beneath the concrete structures must be protected from freezing.

Site soils are moisture sensitive and subgrades will be susceptible to disturbance during wet conditions. Site work and construction activities should take appropriate measures to protect exposed subgrades.

4.12 Design Review and Construction Testing

S. W. COLE ENGINEERING, INC. should be retained to review the site work and foundation drawings to determine that our recommendations have been appropriately interpreted and implemented.

S. W. COLE ENGINEERING, INC. should be retained to observe subgrades and to provide observation and testing services during the excavation and foundation phases of the work. This is to observe compliance with the design concepts, specifications and design recommendations and to allow design changes in the event that subsurface conditions are found to differ from those anticipated prior to start of construction. S. W. COLE ENGINEERING, INC is available to provide testing and special inspection services for soils, concrete, masonry, steel, spray-applied fireproofing and asphalt construction materials.

5.0 CLOSURE

It has been a pleasure to be of assistance to you with this phase of your project. We look forward to working with you as the design progresses and during the construction phase.

Very truly yours,

S. W. COLE ENGINEERING, INC.

Anthony J. Hersh, P. E.
Senior Geotechnical Engineer

STATE OF MAINE
ANTHONY
J.
HERSH
No. 7675
LICENSED
PROFESSIONAL ENGINEER

AJH:slh/jlw
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ATTACHMENT A
Limitations

This report has been prepared for the exclusive use of Bangor Savings Bank, Inc. for specific application to the proposed Bank Branch Building at 314 Allen Avenue in Portland, Maine. S. W. COLE ENGINEERING, INC. has endeavored to conduct the work in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S. W. COLE ENGINEERING, INC.'s scope of work has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S. W. COLE ENGINEERING, INC. should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S. W. COLE ENGINEERING, INC.

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-1
SHEET:	1 OF 1
PROJECT NO.:	09-1161.1
DATE START:	6/9/2010
DATE FINISH:	6/9/2010
ELEVATION:	82' +/-
SWC REP.:	E. WALKER

PROJECT: PROPOSED BANGOR SAVINGS BANK
CLIENT : BANGOR SAVINGS BANK, INC.
LOCATION: 314 ALLEN AVENUE, PORTLAND, MAINE
DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION
SOILS APPEAR SATURATED BELOW 5'
OPEN HOLE CAVED @ 1.9' UPON COMPLETION

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									4" +/-	BITUMINOUS ASPHALT PAVEMENT
									1'	BROWN SAND AND GRAVEL WITH SOME SILT (PAVEMENT BASE/FILL)
	1D	24"	14"	2.4'	10	14	10	11		GRAY-BROWN GRAVELLY SILTY SAND (FILL) ~ MEDIUM DENSE ~
									5'	
	2D	16"	12"	7.0'	7	10	50-4"		5.7'	GRAY WITH RUST BROWN STAINING SILTY FINE SAND WITH SILTY LAYERS ~ MEDIUM DENSE ~
	3D	0"	0"	10.0'	50/0"				9.8'	BROWN GRAVELLY SAND, SOME SILT WITH COBBLES (GLACIAL TILL) ~ MEDIUM DENSE ~
									10'	PROBABLE WEATHERED BEDROCK
										REFUSAL @ 10.0' PROBABLE BEDROCK

SAMPLES:
D = SPLIT SPOON
C = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: B-1

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-2
SHEET:	1 OF 1
PROJECT NO.:	09-1161.1
DATE START:	6/9/2010
DATE FINISH:	6/9/2010
ELEVATION:	82' +/-
SWC REP.:	E. WALKER

PROJECT: PROPOSED BANGOR SAVINGS BANK
CLIENT: BANGOR SAVINGS BANK, INC.
LOCATION: 314 ALLEN AVENUE, PORTLAND, MAINE
DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION
SOILS APPEAR SATURATED BELOW 10' +/-

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									4" +/-	BITUMINOUS ASPHALT PAVEMENT
	1D	24"	12"	2.3'	7	16	17	16	3'	BROWN SAND AND GRAVEL WITH SOME SILT (PAVEMENT BASE/FILL) ~ MEDIUM DENSE TO DENSE ~
									4'	DARK GRAY-BROWN SILTY CLAY (FILL)
	2D	24"	16"	4.3'	11	6	6	7		BROWN TO OLIVE BROWN MOTTLED SILTY CLAY q_p = 8.5 ksf WITH OCCASIONAL FINE SAND SEAMS, TRACE ROOTLETS
	3D	24"	22"	7.0'	4	5	6	8		q_p = 7 ksf ~ VERY STIFF TO HARD CONSISTENCY ~
									10'	
	4D	24"	18"	12.0'	2	1	1	1		GRAY SILTY SAND WITH FREQUENT 2"-3" THICK GRAY SILTY CLAY SEAMS ~ LOOSE ~
									13.8'	
									15.0'	INCREASED AUGER RESISTANCE - POSSIBLE GLACIAL TILL
										BOTTOM OF EXPLORATION @ 15.0'

SAMPLES:
D = SPLIT SPOON
C = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS: MOVED 3' +/- SOUTHWEST TO ATTEMPT FIELD VANE IN LOOSE MATERIALS. ENCOUNTERED SAND LAYERS. STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: B-2

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-3
SHEET:	1 OF 1
PROJECT NO.:	09-1161.1
DATE START:	6/9/2010
DATE FINISH:	6/9/2010
ELEVATION:	82' +/-
SWC REP.:	E. WALKER

PROJECT: PROPOSED BANGOR SAVINGS BANK
CLIENT : BANGOR SAVINGS BANK, INC.
LOCATION: 314 ALLEN AVENUE, PORTLAND, MAINE
DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION
SOILS APPEAR SATURATED BELOW 5'
OPEN HOLE CAVED @ 4' UPON COMPLETION

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									4" +/-	BITUMINOUS ASPHALT PAVEMENT
									1.2'	BROWN SAND AND GRAVEL WITH SOME SILT (PAVEMENT BASE/FILL)
	1D	24"	16"	2.4'	7	8	14	8	1.5'	BROWN SANDY SILTY CLAY WITH BRICK FRAGMENTS (FILL)
										BROWN SILTY CLAY q_p = 9 ksf
	2D	24"	14"	4.4'	7	8	9	12	5'	~ HARD CONSISTENCY ~
	3D	24"	18"	7.0'	3	3	6	5		ALTERNATING LAYERS OF BROWN SILTY CLAY q_p = 4 ksf AND SILTY FINE SAND
									8.5'	~ STIFF CONSISTENCY ~
									9.5'	INCREASED AUGER RESISTANCE - POSSIBLE GLACIAL TILL
									9.7'	PROBABLE WEATHERED BEDROCK
										REFUSAL @ 9.7' PROBABLE BEDROCK

SAMPLES:
D = SPLIT SPOON
C = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: B-3

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-4
SHEET:	1 OF 1
PROJECT NO.:	09-1161.1
DATE START:	6/9/2010
DATE FINISH:	6/9/2010
ELEVATION:	82' +/-
SWC REP.:	E. WALKER

PROJECT: PROPOSED BANGOR SAVINGS BANK
CLIENT : BANGOR SAVINGS BANK, INC.
LOCATION: 314 ALLEN AVENUE, PORTLAND, MAINE
DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION
SOILS APPEAR SATURATED BELOW 5'

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									5" +/-	BITUMINOUS ASPHALT PAVEMENT
									1.5'	BROWN SAND WITH SOME GRAVEL AND SILT (PAVEMENT BASE/FILL)
	1D	24"	15"	2.4'	9	19	7	8		DARK GRAY AND BLACK SILTY CLAY WITH SOME SAND AND TRACE GRAVEL WITH BRICK FRAGMENTS (FILL)
	2D	24"	14"	4.4'	11	7	8	10	5'	~ MEDIUM DENSE ~
									6'	BROWN SILTY CLAY WITH OCCASIONAL SAND SEAMS q_p = 7 ksf
	3D	24"	22"	7.0'	5	5	6	7		q_p = 6.5 ksf
									9'	ALTERNATING LAYERS OF BROWN SILTY CLAY AND BROWN SILTY FINE SAND ~ VERY STIFF CONSISTENCY ~
	4D	24"	12"	12.0'	10	9	13	13		GRAY GRAVELLY SILTY SAND (GLACIAL TILL) ~ MEDIUM DENSE ~
									15.2'	REFUSAL @ 15.2' PROBABLE BEDROCK

SAMPLES:
D = SPLIT SPOON
C = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: B-4

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-5
SHEET:	1 OF 1
PROJECT NO.:	09-1161.1
DATE START:	6/9/2010
DATE FINISH:	6/9/2010
ELEVATION:	83' +/-
SWC REP.:	E. WALKER

PROJECT: PROPOSED BANGOR SAVINGS BANK
CLIENT : BANGOR SAVINGS BANK, INC.
LOCATION: 314 ALLEN AVENUE, PORTLAND, MAINE
DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION
SOILS APPEAR SATURATED BELOW 10'
OPEN HOLE CAVED @ 4' UPON COMPLETION

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									4" +/-	BITUMINOUS ASPHALT PAVEMENT
									1'	BROWN SAND AND GRAVEL WITH SOME SILT (PAVEMENT BASE/FILL)
	1D	24"	14"	2.4'	3	3	3	3	1.5'	BROWN SILTY CLAY WITH ORGANICS AND BRICK FRAGMENTS (FILL)
	2D	24"	12"	4.4'	4	6	7	6		q_p = 9 ksf BROWN SILTY CLAY WITH OCCASIONAL FINE SAND SEAMS
	3D	24"	18"	7.0'	6	7	9	11		q_p = 9 ksf ~ HARD, TRANSITIONING TO STIFF CONSISTENCY WITH DEPTH ~
	4D	24"	3"	12.0'	3	2	2	7	11.5'	
										GRAY SILTY GRAVELLY SAND (GLACIAL TILL) ~ MEDIUM DENSE ~
									14.5'	
										REFUSAL @ 14.5' PROBABLE BEDROCK

SAMPLES:
D = SPLIT SPOON
C = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: B-5

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-6
SHEET:	1 OF 1
PROJECT NO.:	09-1161.1
DATE START:	6/9/2010
DATE FINISH:	6/9/2010
ELEVATION:	83' +/-
SWC REP.:	E. WALKER

PROJECT: PROPOSED BANGOR SAVINGS BANK
CLIENT : BANGOR SAVINGS BANK, INC.
LOCATION: 314 ALLEN AVENUE, PORTLAND, MAINE
DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION
NO FREE WATER OR SATURATED SOIL
CUTTINGS OBSERVED

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									4" +/-	BITUMINOUS ASPHALT PAVEMENT
	1D	24"	16"	2.4'	13	18	13	14	2.5'	BROWN SAND AND GRAVEL WITH SOME SILT (PAVEMENT BASE/FILL) ~ MEDIUM DENSE ~
	2D	24"	14"	4.4'	7	10	12	6	4.8'	BROWN SILTY SAND WITH SOME GRAVEL (FILL) ~ MEDIUM DENSE ~
										REFUSAL @ 4.8' PROBABLE BOULDER OR BEDROCK

SAMPLES:
D = SPLIT SPOON
C = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: B-6

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-6A
SHEET:	1 OF 1
PROJECT NO.:	09-1161.1
DATE START:	6/9/2010
DATE FINISH:	6/9/2010
ELEVATION:	83' +/-
SWC REP.:	E. WALKER

PROJECT:	PROPOSED BANGOR SAVINGS BANK			
CLIENT :	BANGOR SAVINGS BANK, INC.			
LOCATION:	314 ALLEN AVENUE, PORTLAND, MAINE			
DRILLING FIRM:	NORTHERN TEST BORING, INC.	DRILLER:	MIKE NADEAU	
	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION

NO FREE WATER OR SATURATED SOIL

CUTTINGS OBSERVED

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									4" +/-	BITUMINOUS ASPHALT PAVEMENT
									4.6'	NO SAMPLING - AUGER PROBE SEE BORING B-6 FOR APPROXIMATE STRATA
										REFUSAL @ 4.6' PROBABLE BOULDER OR BEDROCK

SAMPLES:

D = SPLIT SPOON
C = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:

	DRILLER - VISUALLY
X	SOIL TECH. - VISUALLY
	LABORATORY TEST

REMARKS:

STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: B-6A

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-7
SHEET:	1 OF 1
PROJECT NO.:	09-1161.1
DATE START:	6/9/2010
DATE FINISH:	6/9/2010
ELEVATION:	81' +/-
SWC REP.:	E. WALKER

PROJECT:	PROPOSED BANGOR SAVINGS BANK			
CLIENT :	BANGOR SAVINGS BANK, INC.			
LOCATION:	314 ALLEN AVENUE, PORTLAND, MAINE			
DRILLING FIRM:	NORTHERN TEST BORING, INC.	DRILLER:	MIKE NADEAU	
	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION

NO FREE WATER OR SATURATED SOILS OBSERVED

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									1" +/-	BITUMINOUS ASPHALT PAVEMENT
									0.9'	BROWN SAND AND GRAVEL WITH SOME SILT (PAVEMENT BASE/FILL) ~ DENSE ~
	1D	24"		2.1'	15	18	16	33		WOVEN GEOTEXTILE AT 0.9' +/-
	2D	10"		2.9'	17	50/4"				DARK GRAY SILTY SAND WITH TRACE GRAVEL (FILL)
									3.1'	~ DENSE ~
										REFUSAL @ 3.1'
										PROBABLE COBBLES OR BOULDER

SAMPLES:

D = SPLIT SPOON
C = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:

	DRILLER - VISUALLY
X	SOIL TECH. - VISUALLY
	LABORATORY TEST

REMARKS:

STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: B-7

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-7A
SHEET:	1 OF 1
PROJECT NO.:	09-1161.1
DATE START:	6/9/2010
DATE FINISH:	6/9/2010
ELEVATION:	81' +/-
SWC REP.:	E. WALKER

PROJECT: PROPOSED BANGOR SAVINGS BANK
CLIENT : BANGOR SAVINGS BANK, INC.
LOCATION: 314 ALLEN AVENUE, PORTLAND, MAINE
DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2 1/4"		
SAMPLER:				
CORE BARREL:				

WATER LEVEL INFORMATION
NO SATURATED AUGER CUTTINGS OBSERVED

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									1" +/-	BITUMINOUS ASPHALT PAVEMENT
									4.0'	NO SAMPLING, SEE BORING B-7 FOR APPROXIMATE STRATA
										REFUSAL @ 4.0' PROBABLE COBBLES OR BOULDER

SAMPLES:
D = SPLIT SPOON
C = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: B-7A

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-7B
SHEET:	1 OF 1
PROJECT NO.:	09-1161.1
DATE START:	6/9/2010
DATE FINISH:	6/9/2010
ELEVATION:	81' +/-
SWC REP.:	E. WALKER

PROJECT: PROPOSED BANGOR SAVINGS BANK
CLIENT : BANGOR SAVINGS BANK, INC.
LOCATION: 314 ALLEN AVENUE, PORTLAND, MAINE
DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HW	4"	140 LBS.	30"
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION
SOILS APPEAR SATURATED BELOW 10'

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
SSA									1" +/-	BITUMINOUS ASPHALT PAVEMENT
									5'	NO SAMPLING, SEE BORING B-7 FOR APPROXIMATE STRATA
HW										DARK GRAY WITH BLACK STAINING SILTY CLAY WITH ROOTLETS
	1D	24"	18"	7.0'	5	4	6	7	6'	(FILL OR DISTURBED NATIVE SOILS)
										q_p = 9 ksf OLIVE WITH BROWN MOTTLING SILTY CLAY WITH OCCASIONAL FINE SAND SEAMS
	2D	24"	20"	12.0'	4	3	4	4		~ HARD, TRANSITIONING TO MEDIUM CONSISTENCY WITH DEPTH ~ q_p = 1.5 - 3ksf
									15'	
	3D	24"	20"	17.0'	1	1	1	1		GRAY SILTY CLAY WITH FREQUENT 2"-3" THICK FINE SAND SEAMS ~ MEDIUM CONSISTENCY ~
	1V			18.2'	3 5/8" ACKER VANE				20'	FIELD VANE ATTEMPTED - NO ROTATION, LIKELY SAND SEAMS
	4D	24"	16"	22.0'	9	11	4	6		GRAY FINE TO MEDIUM SAND WITH SOME SILT AND TRACE GRAVEL ~ LOOSE TO MEDIUM DENSE ~
									24.1	
										REFUSAL @ 24.1 PROBABLE BEDROCK

SAMPLES:
D = SPLIT SPOON
C = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: B-7B

KEY TO THE NOTES & SYMBOLS
Test Boring and Test Pit Explorations

All stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q_u	-	unconfined compressive strength, kips/sq. ft. - based on laboratory unconfined compressive test
S_v	-	field vane shear strength, kips/sq. ft.
L_v	-	lab vane shear strength, kips/sq. ft.
q_p	-	unconfined compressive strength, kips/sq. ft. based on pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W_L	-	liquid limit - Atterberg test
W_P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass. RQD is computed from recovered core samples.
γ_T	-	total soil weight
γ_B	-	buoyant soil weight

Description of Proportions:

0 to 5% TRACE
5 to 12% SOME
12 to 35% "Y"
35+% AND

REFUSAL: **Test Boring Explorations** - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: **Test Pit Explorations** - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.

S.W.COLE ENGINEERING, INC.

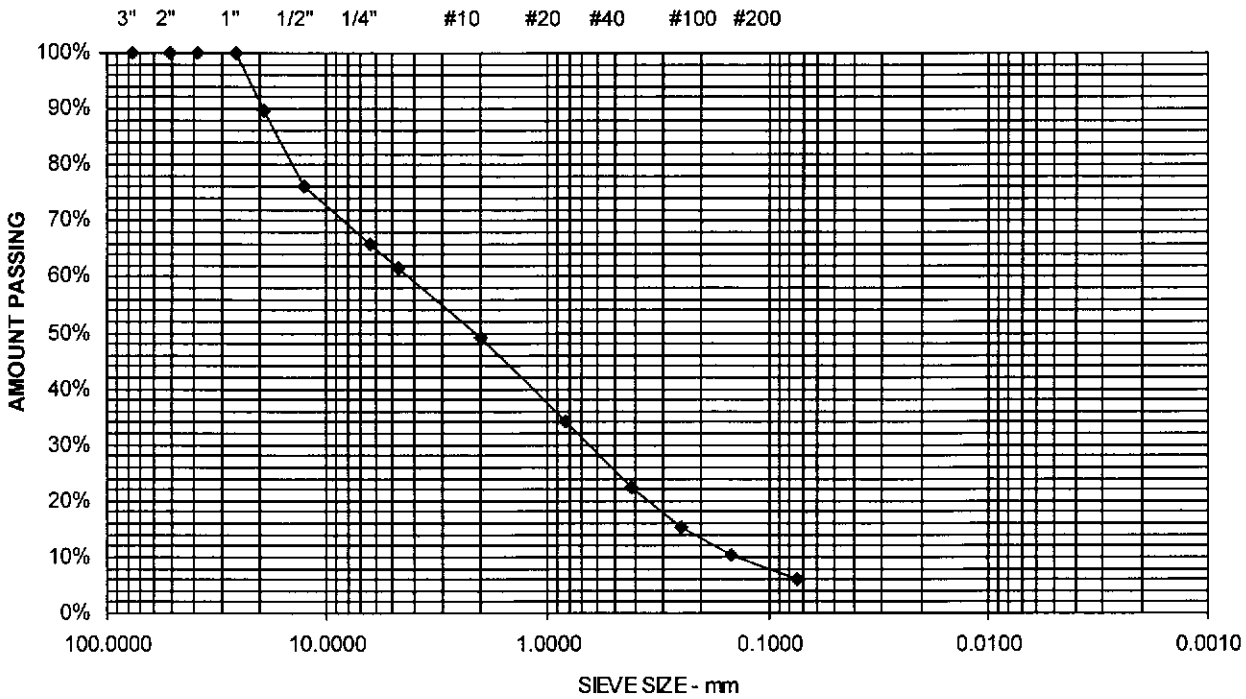
Report of Gradation

ASTM C-117 & C-136

Project Name	PORTLAND, ME - BANGOR SAVINGS BANK - GEOTECHNICAL	Project Number	09-1161.1
Client	BANGOR SAVINGS BANK	Lab ID	12510G
		Date Received	6/14/2010
		Date Completed	6/17/2010
Material Source	**B-2 2D 2-2.8**	Tested By	DAVID COWALLIS

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	6"	100	
125 mm	5"	100	
100 mm	4"	100	
75 mm	3"	100	
50 mm	2"	100	
38.1 mm	1-1/2"	100	
25.0 mm	1"	100	
19.0 mm	3/4"	90	
12.5 mm	1/2"	76	
6.3 mm	1/4"	66	
4.75 mm	No. 4	61	38.5% Gravel
2.00 mm	No. 10	49	
850 um	No. 20	34	
425 um	No. 40	22	55.3% Sand
250 um	No. 60	15	
150 um	No. 100	10	
75 um	No. 200	6.2	6.2% Fines

SAND AND GRAVEL WITH SOME SILT



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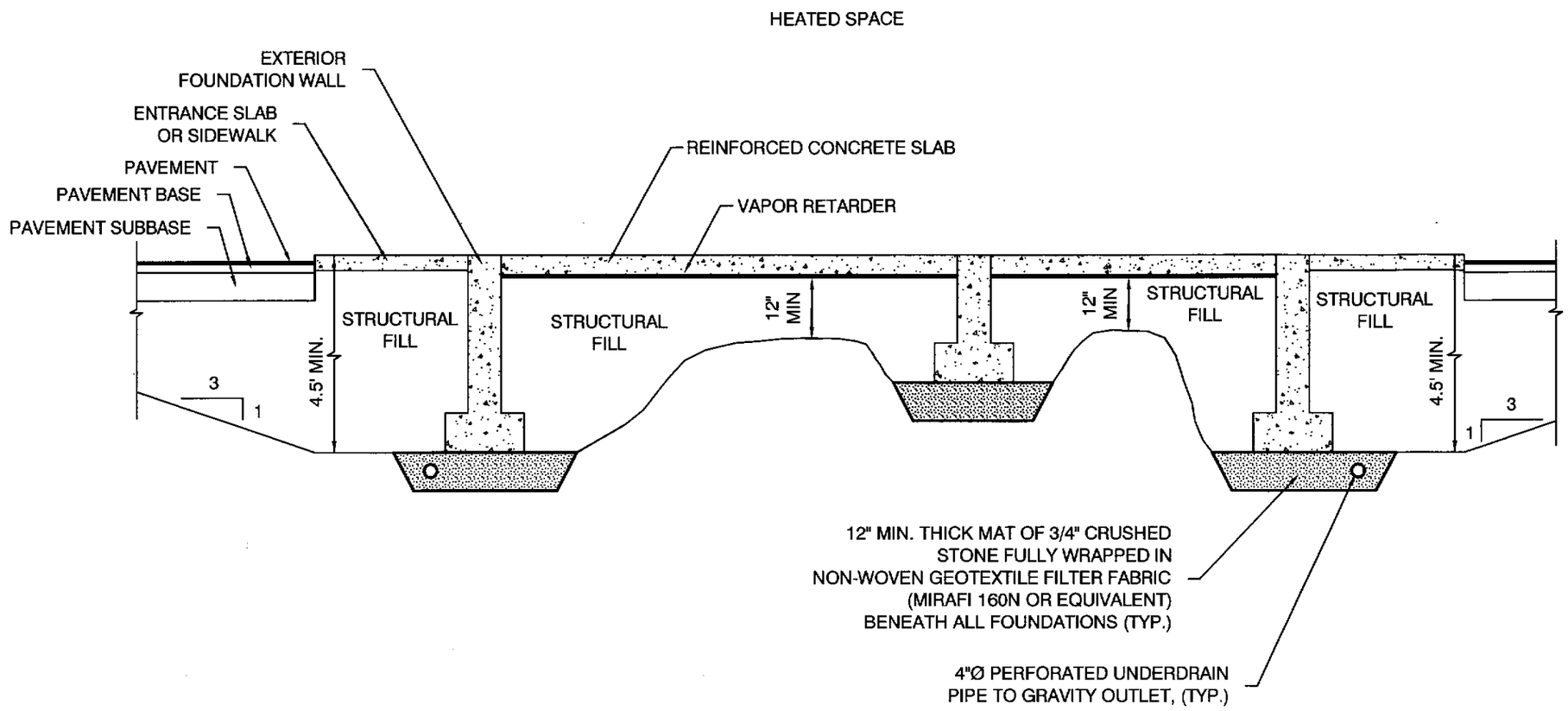

NOTE:

1. UNDERDRAIN INSTALLATION AND MATERIAL GRADATION AND COMPACTION RECOMMENDATIONS ARE CONTAINED WITHIN THIS REPORT.
2. DETAIL IS PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY, NOT FOR CONSTRUCTION.
3. GEOTEXTILE FABRIC SUCH AS MIAFI 500X MAY BE NEEDED ON SOME SUBGRADE AREAS PRIOR TO PLACING NEW FILL.

S.W.COLE ENGINEERING, INC.

BANGOR SAVINGS BANK, INC.

UNDERDRAIN AND FOUNDATION DETAIL

PROPOSED BANK BRANCH BUILDING
314 ALLEN AVENUE AVENUE
PORTLAND, MAINE

Job No.	09-1161.1 S	Scale	Not to Scale
Date :	06/21/10	Sheet	14

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