

SECTION 00 01 00

TITLE PAGE

ARCHITECT

WALLACE ARCHITECTS L.L.C.

**302 CAMPUSVIEW DRIVE, SUITE 208
COLUMBIA, MO 65201
(573) 256-7200**

**3999 HARBORWALK DRIVE, SUITE D
RIDGELAND, MS 39157
(601) 813-9154**

SIGNATURE AREA

ARCHITECT: Wallace Architects LLC

302 Campusview Drive, Suite 208, Columbia, MO 65201

By: _____ Title: _____ Date: _____

OWNER: Valley Springs Cottages, LP

1525 E. Republic Road, Suite B100, Springfield, MO 65804

By: _____ Title: _____ Date: _____

CONTRACTOR: Salter Construction Inc.

201 Lee Andrew Lane, Conway, AR 72034

By: _____ Title: _____ Date: _____

STATE AGENCY REPRESENTATIVE: (ADFA)

900 W. Capitol Ave., Little Rock, AR 72201

By: _____ Title: _____ Date: _____

Wallace Job No. 3522

03/30/2018



**Valley Springs Cottages
Little Rock, Arkansas**

ISSUE SET

**SECTION 00 01 09
ADDENDUM AS ISSUED**

PARTICULARS

- 1.01 DATE: _____
- 1.02 PROJECT: VALLEY SPRINGS COTTAGES
- 1.03 ARCHITECT'S PROJECT NUMBER: 3522
- 1.04 OWNER: VALLEY SPRINGS COTTAGES, LP
- 1.05 ARCHITECT: WALLACE ARCHITECTS L.L.C.

TO: PROSPECTIVE BIDDERS:

- 2.01 THIS ADDENDUM FORMS A PART OF THE CONTRACT DOCUMENTS AND MODIFIES THE ORIGINAL BIDDING DOCUMENTS DATED 03/30/2018, AND ADDENDUM NUMBER ____ ISSUED _____ , WITH AMENDMENTS AND ADDITIONS NOTED BELOW.
- 2.02 ACKNOWLEDGE RECEIPT OF THIS ADDENDUM IN THE SPACE PROVIDED IN THE BID FORM. FAILURE TO DO SO MAY DISQUALIFY THE BIDDER.
- 2.03 THIS ADDENDUM CONSISTS OF X PAGE(S) AND THE FOLLOWING DRAWINGS:

CHANGES TO THE PROJECT MANUAL - SPECIFICATIONS:

- 3.01 SECTION _____ - _____
 - A.
 - B.

CHANGES TO THE PROJECT MANUAL - _____ :

- 4.01 SECTION _____ - _____
 - A.
 - B.

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 - A.
 - B.
- 5.02 DRAWING ____ - _____
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INVITATION FOR SUB-CONTRACT BIDS

ISSUED BY:

Salter Construction Inc.

Address:

201 Lee Andrew Lane
Conway, AR 72034

AND

Wallace Architects L.L.C.

Address:

302 Campusview Drive, Suite 208
Columbia, MO 65201

DATE: 01/05/2018

TO: POTENTIAL BIDDERS

Your firm is invited to submit a Stipulated Sum proposal under seal to furnish all labor, materials, and equipment necessary to perform the work of the appropriate bid package for the construction work of:

Valley Springs Cottages
Geyer Springs Road
Little Rock, Arkansas 72209

Sealed proposals will be received until _____ pm local standard time on the _____ day of _____, 2017 by Salter Construction Inc., 201 Lee Andrew Lane, Conway, AR 72034.

Envelopes shall be clearly marked "Valley Springs Cottages - Proposal" and delivered to, or left with the receptionist.

Proposals will be opened in private.

Bid Documents may be obtained by contacting Salter Construction Inc.

Submit your offer on the Bid Form provided. Bidders may supplement this form as appropriate.

No proposals may be withdrawn for a period of 30 days after scheduled closing date for submission.

The Contractor reserves the right to reject any or all proposals, and/or waive any technicalities therein, and/or determine the lowest responsible bidders.

As a precondition to the contract award, the type of work completed, and the bidders' financial status will be reviewed and considered.

Contract Documents are on file at the office(s) of Wallace Architects L.L.C. and available for review by appointment. Call (573) 256-7200 to schedule appointments.

Wallace Architects L.L.C., 302 Campusview Drive, Suite 208, Columbia MO, 65201

SIGNATURE

For: Salter Construction Inc.

By: _____

Signed: _____
(Authorized signing officer)

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

SUMMARY

1.01 DOCUMENT INCLUDES

- A. Invitation
 - 1. Bid Submission
 - 2. Intent
 - 3. Work Identified in the Contract Documents
- B. Bid Documents and Contract Documents
 - 1. Definitions
 - 2. Contract Documents Identification
 - 3. Availability
 - 4. Examination
 - 5. Inquiries/Addenda
 - 6. Product/Assembly/System Substitutions
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- E. Bid Submission
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 - 4. Bid Form Signature
 - 5. Additional Bid Information
 - 6. Selection and Award of Alternates
- G. Offer Acceptance/Rejection
 - 1. Duration of Offer
 - 2. Acceptance of Offer

INVITATION

2.01 BID SUBMISSION

- A. Bids signed and under seal, executed, and dated will be received at the office of the Contractor at _____ before _____ a.m. local standard time on the ____ day of _____.
- B. Offers submitted after the above time shall be returned to the bidder unopened.
- C. Offers will be opened privately immediately after the time for receipt of bids.
- D. Amendments to the submitted offer will be permitted if received in writing prior to bid closing and if endorsed by the same party or parties who signed and sealed the offer.

2.02 INTENT

- A. The intent of this Bid request is to obtain an offer to perform work to complete a new multi-family residential project located on Geyer Springs Road, Little Rock, AR for a Stipulated Sum contract, in accordance with the Contract Documents.

2.03 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS

- A. Work of this proposed Contract comprises building construction and site development, including general construction, structural, mechanical, electrical, and landscape Work.

2.04 CONTRACT TIME

- A. Identify Contract Time in the Bid Form. The completion date in the Agreement shall be the Contract Time added to the commencement date.

BID DOCUMENTS AND CONTRACT DOCUMENTS

3.01 DEFINITIONS

- A. Contract Documents: Defined in AIA A201 Article 1 including issued Instructions and Addenda.
- B. Bid, Offer, Proposal, or Bidding: Act of submitting an offer under seal.
- C. Bid Amount: Monetary sum identified by the Bidder in the Bid Form.

3.02 CONTRACT DOCUMENTS IDENTIFICATION

- A. The Contract Documents are identified as Job Number 3522, as prepared by Architect who is located at 302 Campusview Drive, suite 208, Columbia, MO 65201, and with contents as identified in the Table of Contents.

3.03 AVAILABILITY

- A. Bid Documents may be obtained by contacting Salter Construction Inc.
- B. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.

3.04 EXAMINATION

- A. Bid Documents may be viewed, by appointment only, at the office of Architect which is located at 302 Campusview Drive, Columbia, MO 65201.
- B. Upon receipt of Bid Documents verify that documents are complete. Notify Architect should the documents be incomplete.
- C. Immediately notify Architect upon finding discrepancies or omissions in the Bid Documents.

3.05 INQUIRIES/ADDENDA

- A. Written Instructions and Addenda may be issued during the bidding period. All Instructions and Addenda become part of the Contract Documents. Include resultant costs in the Bid Amount.
- B. Verbal answers are not binding on any party.
- C. Clarifications requested by bidders must be in writing not less than 7 days before date set for receipt of bids. The reply will be in the form of written Instructions or an Addendum, a copy of which will be forwarded to known recipients and all other bidding parties.

3.06 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

- A. Substitute products will be considered if submitted as an attachment to the Bid Form. Approval to submit substitutions prior to submission of bids is not required.
- B. When a request to substitute a product is made, Architect may approve the substitution and will issue an Addendum to known bidders.
- C. In submission of substitutions to products specified, bidders shall include in their bid all changes required in the work and changes to Contract Time and Contract Sum to accommodate such substitutions. A later claim by the bidder for an addition to the Contract Time or Contract Sum because of changes in work necessitated by use of substitutions shall not be considered.
- D. The submission shall provide sufficient information to determine acceptability of such products.
- E. Provide complete information on required revisions to other work to accommodate each proposed substitution.
- F. Provide products as specified unless substitutions are submitted in this manner and accepted.

SITE ASSESSMENT

4.01 SITE EXAMINATION

- A. Examine the project site before submitting a bid.

QUALIFICATIONS

5.01 EVIDENCE OF QUALIFICATIONS

- A. To demonstrate qualification for performing the Work of this Contract, bidders may be requested to submit written evidence of financial position, previous experience, and license to work in the State.

BID SUBMISSION

6.01 SUBMISSION PROCEDURE

- A. Bidders shall be solely responsible for the delivery of their bids in the manner and time prescribed.
- B. Submit one copy of the executed offer on the Bid Forms provided, signed and sealed in a closed opaque envelope, clearly identified with bidder's name, project name and Contractor's name on the outside.
- C. Improperly completed information or irregularities in bid bond, may be cause not to open the Bid Form envelope and declare the bid invalid or informal.

6.02 BID INELIGIBILITY

- A. Bids that are received verbally, by telephone, facsimile, or electronic/email shall be declared unacceptable.
- B. Bids containing alternate proposals of bidder's own choosing, not previously approved, shall be declared unacceptable.
- C. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, unexplained erasures or alterations, or irregularities of any kind, may at the discretion of the Contractor, be declared unacceptable.
- D. Bid Forms, Appendices, and enclosures that are improperly prepared may, at the discretion of Contractor, be declared unacceptable.
- E. Failure to provide security deposit, bonding or insurance requirements may, at the discretion of Contractor, be waived.

BID ENCLOSURES/REQUIREMENTS

7.01 SECURITY DEPOSIT

- A. Bids shall be accompanied by a security deposit as follows:
 - 1. Bid Bond in the amount of \$ _____.
- B. Endorse the Bid Bond in the name of the Contractor as obligee, signed and sealed by the principal (Contractor) and surety.
- C. The security deposit will be returned after delivery to the Contractor of the required Performance and Payment Bond(s) by the accepted bidder.
- D. Include the cost of bid security in the Bid Amount.
- E. After a bid has been accepted, all securities will be returned to the respective bidders and other requested enclosures.
- F. If no contract is awarded, all security deposits will be returned.

7.02 INSURANCE

- A. Provide an executed "Undertaking of Insurance" on a standard form provided by the insurance company stating their intention to provide insurance to the bidder in accordance with the insurance requirements of the Contract Documents.

7.03 BID FORM REQUIREMENTS

- A. Complete all requested information in the Bid Form and Appendices.

7.04 BID FORM SIGNATURE

- A. The Bid Form shall be signed by the bidder, as follows:
 - 1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature.
 - 2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature.
 - 3. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, a copy of the by-law resolution of their board of directors authorizing them to do so, must also be submitted with the Bid Form in the bid envelope.

4. The signature of the individual or individuals authorized to bind the Bidder shall be in longhand.

7.05 SELECTION AND AWARD OF ALTERNATES

- A. Indicate variation of bid price for Alternates listed on the Bid Form. Unless otherwise indicated, indicate Alternatives as a difference in bid price by adding to or deducting from the base bid price.
- B. Bids will be evaluated on the total of the base bid price and all of the Alternates. After determination of the successful bidder, consideration will be given to which Alternates will be included in the Work.

OFFER ACCEPTANCE/REJECTION

8.01 DURATION OF OFFER

- A. Bids shall remain open to acceptance and shall be irrevocable for a period of thirty (30) days after the bid closing date.
- B. Alternates shall remain open to acceptance and prices stipulated shall be irrevocable for a period of ninety (90) days after the bid closing date.

8.02 ACCEPTANCE OF OFFER

- A. Contractor reserves the right to accept or reject any or all offers or to waive any technicalities therein.
- B. After acceptance by Contractor, Contractor, will issue to the successful bidder, a written Bid Acceptance.

END OF SECTION

BID FORM FOR SUB-CONTRACT
FOR _____

Bid From: _____

a Corporation organized and existing under the Laws of the State of _____

a Partnership consisting of _____

an Individual trading as _____

The Undersigned, in compliance with the Invitation For Sub-Contract Bids for the construction work of Valley Springs Cottages, Little Rock, Arkansas, having examined all of the Contract Documents and any related documents, and having viewed the site of the proposed work, being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of labor; Hereby propose to furnish labor, equipment, materials, and supplies to perform the work in accordance with said Contract Documents, within the time set forth herein, and at the prices stated below. These prices are to cover all expenses included in performing the work received under the Contract Documents, of which this Proposal is part.

I (We) acknowledge receipt of the following Addenda: (if none issued, leave blank or write "N/A")

Addendum #1 _____ Addendum #2 _____ Addendum #3 _____

Addendum #4 _____ Addendum #5 _____ Addendum #6 _____

The undersigned proposes and agrees to perform the _____ work
(Portion of Work)

in _____ calendar days from the issuance of a Notice To Proceed,

for the combined stipulated sum of: _____

_____ Dollars \$ _____

In submitting this bid it is understood that the right is reserved by said Contractor to reject any or all bids, and it is agreed that this bid shall remain open to acceptance and shall be irrevocable for a period of thirty (30) days after opening thereof.

Dated this: _____ day of _____, 2017.

Signature(s)

By: _____

Title: _____

Business Address

State License No. _____

SEAL:
(If bid is by a Corporation)

**SECTION 00 43 13
BID BOND - AIA DOCUMENT A310-2010**

DOCUMENTS

1.01 UNBOUND IN THIS WRITTEN SPECIFICATION BUT INCLUDED, BY REFERENCE, AS A PART OF THE CONTRACT DOCUMENTS IS:

**THE AMERICAN INSTITUTE OF ARCHITECTS
DOCUMENT NO. A310
BID BOND
2010 EDITION**

END OF SECTION

**SECTION 00 61 13
PERFORMANCE AND PAYMENT BOND - AIA DOCUMENT A312-2007**

DOCUMENTS

1.01 UNBOUND IN THIS WRITTEN SPECIFICATION BUT INCLUDED, BY REFERENCE, AS A PART OF THE CONTRACT DOCUMENTS IS:

**THE AMERICAN INSTITUTE OF ARCHITECTS
DOCUMENT NO. A312
PERFORMANCE AND PAYMENT BOND
2007 EDITION**

END OF SECTION

SECTION 00 72 00

GENERAL CONDITIONS OF THE CONTRACT - AIA DOCUMENT A201-2007

DOCUMENTS

- 1.01 THE GENERAL CONDITIONS APPLICABLE TO THIS CONTRACT ARE ATTACHED FOLLOWING THIS PAGE.**

THE AMERICAN INSTITUTE OF ARCHITECTS

DOCUMENT NO. A201

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

2007 EDITION

SUPPLEMENTARY CONDITIONS

- 2.01 REFER TO DOCUMENT 00 73 00 - SUPPLEMENTAL GENERAL CONDITIONS FOR AMENDMENTS TO THESE GENERAL CONDITIONS.**

END OF SECTION



AIA[®] Document A201[™] – 2007

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

THE OWNER:

(Name, legal status and address)

THE ARCHITECT:

(Name, legal status and address)

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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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User Notes:

(1768632948)

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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.

§ 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

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.

§ 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.

§ 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 that 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.

(Paragraphs deleted)

§ 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.

(Paragraphs deleted)

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§ 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.

§ 4.2.9 The Architect will conduct a review of the Work 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, the Contractor's 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.

§ 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.

Notwithstanding any provision of this Agreement and any of its amendments to the contrary, Architect has no duty to Owner, Contractor, any of their subcontractors, agents, or assigns or to anyone else, to inspect the Work for defects, for lack of quality or for lack of good workmanship. In the event that Architect observes any defects, lack of quality, or lack of good workmanship in the Work while Architect is on site, then Architect will raise the issue with the Owner and Contractor. However, by no means does this provision or the making of such an observation create any duty to inspect for, search out, or find any such defects, lack of quality, or lack of good workmanship. Owner hereby agrees to indemnify and hold harmless, and covenants not to sue, Architect, its owners, employees, contractors, agents, and assigns from any and all claims, demands, costs, expenses, law suits, attorneys fees, liability, judgments, and damages which arise or may arise from any defects, lack of quality or lack of workmanship in the Work or the lack of Architect to observe any defects, lack of quality, or lack of workmanship during any site visits or inspections.

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 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.

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§ 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 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 or 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
- .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

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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.

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.

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§ 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.

§ 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,

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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 that the Work has progressed to the point indicated. Such certification shall be based on the Architect's limited observations at the site as provided by the Amendment to AIA Document B108 and on the data comprising the Contractor's Application for Payment. 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 any inspections beyond the monthly inspection as provided in the Amendment to AIA Document B108, (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;
- .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, 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 review the work 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 review by the Architect to determine Substantial Completion.

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§ 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 review and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such review and, when the Architect finds that final payment is appropriate to make, 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 limited on-site visits and limited inspections, the Work has been completed 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. However, the issuance of a final Certificate for Payment will not be a representation that the Architect has (1) made any inspections beyond the monthly inspection as provided in the Amendment to AIA Document B108, (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.

§ 9.10.2 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.

§ 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

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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 mold, asbestos or polychlorinated biphenyl (PCB), or other toxic or hazardous materials 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.

§ 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 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 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 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.

§ 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.

§ 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 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

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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;
- .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.

§ 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

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- .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.

§ 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.

§ 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 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.

SECTION 00 73 00
SUPPLEMENTAL GENERAL CONDITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. These Supplementary Conditions amend and supplement the General Conditions of The Contract For Construction and other provisions of the Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.
- B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

1.02 SUBSTANTIAL COMPLETIONS

- A. General:
 - 1. Partial Substantial Completions may be issued by building or by floor to allow occupancy of a building, or units, and to aid in tax credit purposes. This will be indicated at the pre-construction meeting, if applicable. Partial substantial completions will not establish the starting date for the Contractor's one year latent defects period.
 - 2. Final Substantial Completion must be issued for the entire project and requires review and approval by Arkansas Development Finance Authority (ADFA). Final Substantial Completion will establish the starting date for the Contractor's one year latent defects period for the entire project.
 - 3. The value of incomplete or defective work items listed on the Architect's Substantial Completion Punchlist shall be determined and included on the Certificate of Substantial Completion. This monetary value shall be escrowed until such time as each respective work item has been completed or corrected to the satisfaction of the Owner, ADFA, and Architect.
- B. Required Documents:
 - 1. Architect's Punchlist Inspection Report.
 - 2. Certificate of Occupancy.
 - 3. Completed AIA Document G704 - Certificate of Substantial Completion.
- C. Scheduling:
 - 1. Scheduling for punchlist inspections and pay request meetings shall coincide to the fullest extent possible for best use of time for all parties involved. The schedule should be followed as presented at the pre-construction meeting. However, in the event the schedule must change, such changes shall be made known and coordinated by the Contractor and Architect with ADFA.

1.03 LATENT DEFECTS WARRANTY

- A. General:
 - 1. The Contractor's warranty against latent defects period is one year from date of issuance of the final Certificate of Substantial Completion (AIA G704) issued for the entire project.
 - 2. Between 9 and 11 months following the date of issuance of the final Certificate of Substantial Completion, a latent defect inspection will be conducted by ADFA, Owner, Contractor, and Architect to identify any deficiencies. Any deficiencies noted will be placed on a punchlist by the Architect.
 - 3. Prior to 12 months following the date of issuance of the final Certificate of Substantial Completion, a follow-up inspection will be conducted by ADFA, Owner, Contractor, and Architect to verify that all deficiencies identified at the previous inspection have been satisfactorily addressed. If no items were noted at the previous inspection, no twelve month inspection will be required.
- B. Required Documents:
 - 1. Architect's Latent Defects Inspection Report
- C. Scheduling:
 - 1. Scheduling for latent defect inspections shall occur, to the fullest extent possible, one (1) month in advance for the best use of time for all parties involved.

1.04 RETAINAGE:

- A. General:

1. Retainage withheld from payments owed to the Contractor during construction shall be in accordance with the construction contract provisions.
2. Where ADFA interim financing is provided, and construction retainage is in the amount of 10%, said retainage may be reduced to 5% (with prior approval) once construction for the entire project reaches 90% completion. This reduction in retainage cannot occur as a result of completion of construction phases, individual building completion, or completion of individual floors of buildings. This reduction in retainage requires prior consent of ADFA, and such consent can only be given if there are no major outstanding issues or no pending Change Orders.

1.05 CHANGE ORDERS:

A. General:

1. Change Orders to the construction contract shall be addressed as construction progresses, rather than being saved until the end of the project.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 00 00
GENERAL REQUIREMENTS

PART 1 - GENERAL REQUIREMENTS - CONTRACT

1.01 SCOPE OF WORK

- A. The work included under these Contract Documents consists of furnishing all items, materials, operations, or methods listed, indicated, or scheduled on the Drawings and/or in these Specifications, including all labor, materials, equipment, transportation, temporary facilities, services, and incidentals, necessary and required for the construction and completion of the project named on the title in accordance with the Contract Documents.

1.02 CONTRACT DOCUMENTS

- A. Contract Specifications: The General Requirements shall apply to every division of these specifications. All specification instructions are directed to the Contractor and the inclusion of any work by mention, note, or itemizations, however brief, implies the Contractor shall provide same, unless specifically directed otherwise. Where a specific Contractor is named, said contractor shall be responsible for and provide work so designated. In specifying an item by manufacturer's name and/or catalog number, such items shall be provided complete with all the standard devices and accessories as indicated in the latest edition of the manufacturer's catalog or brochure published at date of invitation to submit proposals, unless specifically stated otherwise.
- B. Contract Drawings: The Contract Drawings, or Plans, on which the Proposal and Contract are based, are listed on the cover sheet of the Plans.
 - 1. In accordance with AIA Document A201 "General Conditions Of The Contract For Construction", shop drawing submittals provided for review, form no part of the Contract Documents, being for the use of the Contractor, subcontractors, and/or suppliers and manufacturers only.

1.03 GENERAL CONDITIONS

- A. AIA Document A201 "General Conditions Of The Contract For Construction", 2007 edition, hereafter referred to as the "AIA General Conditions", is hereby made a part of the Specifications. Contractor shall consult this document and become thoroughly familiar with its contents before submitting his proposal.
 - 1. Amendments to the AIA General Conditions: The AIA General Conditions are hereby supplemented and amended. Where any article is amended, deleted, or superseded hereby, unaltered provisions of such article shall remain in effect.
 - 2. Article 1 - Contract Documents: Supplement Article 1.1, Definitions, as follows:
 - a. When a word, such as "approved", "proper", "satisfactory", "equal" and "as directed" is used, it implies such reference is to the Architect's specified review and directions.
 - b. "Provide" means furnish and install.
 - 3. Article 3 - Contractor: Supplement Subparagraph 3.5.1, as follows:
 - a. Contractor warrants to Owner and Architect that on receipt of notice from either of them, within the period of one (1) year following date of Substantial Completion, that for defects in materials and/or workmanship which have appeared in the work, the Contractor will promptly correct such defects to the state of condition originally required by the Contract Documents at Contractor's expense.
 - 4. Article 6 - Separate Contracts: Supplement Paragraph 6.2 Mutual Responsibility of Contractors, as follows:
 - a. Contractor shall assume general coordination and direction of the Project. Each subcontractor shall cooperate with other subcontractors on the work and install his work in sequence to facilitate and not delay the installation of such other subcontractors. The Architect is not the coordinator, nor the expeditor of the work of the various contracts.

1.04 SPECIAL PROVISIONS

- A. Insurance:
 - 1. Contractor shall purchase and maintain insurances required by AIA General Conditions, Paragraph 11.1 in the following minimum amounts:
 - a. Comprehensive General Liability \$1,000,000.00 each person and \$1,000,000.00 each occurrence.

- b. Property Damage, \$1,000,000.00 each occurrence, \$1,000,000.00 aggregate.
 - c. Comprehensive Automobile Liability, \$1,000,000.00 each person, \$1,000,000.00 each occurrence, including Property Damage of \$1,000,000.00 each occurrence.
 - 2. Contractor shall require subcontractors to provide and maintain same insurance with same minimum limits.
 - 3. Property Insurance (Builder's Risk) required under AIA General Conditions, Subparagraph 11.4.1, shall be purchased and maintained by the Contractor for the full insurable value of the entire work.
- B. Wage Rate: Based on information received, from the ADFA prevailing wages do not apply to this job and, therefore, are not included.
- C. Housing and Urban Development (HUD) Section 3 Requirements:
- 1. Based on information received, Section 3 Requirements do not apply to this job and, therefore, are not included.
- D. Locations, Lines, and Levels:
- 1. The Owner shall furnish evidence of the locations of property lines, restrictions and a permanent benchmark. Contractor shall establish location of building on property and establish and maintain all other grades, line, levels and bench marks; check and compare all drawings, verifying grades, lines, levels and dimensions indicated thereon, and report all inconsistencies to the Architect and receive his instructions before commencing work.
 - 2. The Contractor shall provide and maintain well-built batter boards at corners and establish and safeguard bench marks in at least two widely separated places and, as work progresses, establish bench marks at each building level and establish exact locations on partitions on rough floors as a guide to trades.
- E. Building Permit:
- 1. The Contractor shall be responsible for obtaining and payment for a Building Permit.
 - 2. The Contractor and/or his subcontractors shall be responsible for obtaining and paying for individual Plumbing, Electrical and any other such permits and/or licenses as required by the local authority(ies).
- F. Contractor shall be responsible for verifying measurements at the building before ordering material or doing work. No extra compensation will be allowed for difference between actual dimensions and measurements indicated on the drawings. Any differences found shall be submitted to the Architect and Owner for consideration before proceeding with the work.
- G. The Geotechnical Report, which follows, is included for reference by the Contractor and other interested parties. Neither the Owner, nor the Architect, will assume any responsibility or liability for any information contained therein, or for assumptions made from said information.
- H. Special Inspections: The Contractor, his subcontractors, and material suppliers shall comply with construction and fabrication provisions and allow all required inspections in accordance with the "Special Inspections" section of the prevailing Building Code(s).
- I. Regulated Substances and Materials: No portion of the Construction Documents call for or require the use of the following regulated substances and Contractor shall not use products containing these regulated substances.:
- 1. Asbestos in any form.
 - 2. Urea-formaldehyde foam insulation.
 - 3. Any other chemical, material or substance the proposed or actual use of which is prohibited by local, State, or Federal regulation or law.

1.05 SPECIAL CONSTRUCTION REQUIREMENTS

- A. The Contractor shall, by site visit prior to bid, determine the extent and nature of work involved in this project based on a visual inspection.
- B. All reasonable attempts have been made to cover the scope of work involved. Should the Contractor discover during the course of construction, repairs, etc., that other conditions exist which might require extra work, he shall immediately call this to the attention of the Architect. Once the Architect, Owner, and Contractor are in agreement on the extent and nature of said extra work, the General Contractor shall within fourteen (14) calendar days provide an estimated cost for extra work. Once extra cost has been reviewed and accepted by Owner and Architect a Change Order shall be processed and signed by all parties. Extra cost work done by

the Contractor without following the aforementioned procedure or without providing the Owner with anticipated costs prior, will result in no payment for said work.

- C. The Contractor shall at all times during the course of construction, and/or repair work protect all existing furnishings, finishes, construction, etc., which are to remain or have been delivered on site. Contractor shall be liable for losses for damage to items of that nature and shall repair to previous original condition or replace as situation dictates.
- D. All fees for disposal are to be paid for by the Contractor. The site shall remain clean at all times from construction and demolition debris.
- E. The Contractor shall fill and level with topsoil all areas of site rutted or cut up during the course of the Contract, then sod or seed as per the Contract Documents.
- F. Existing sidewalks, street curbs, inlets, or other site improvements damaged during the course of the contract, but which previously were scheduled to remain, shall be replaced as necessary.

PART 2 - GENERAL REQUIREMENTS OF WORK

2.01 DRAWINGS

- A. Do not scale Mechanical and Electrical Drawings for dimensions. Accurately lay-out such work from dimensions indicated on Contract Drawings. Consult Architect for interpretations concerning discrepancies or locations of equipment.
- B. Consult all Drawings for miscellaneous items of each trade and provide same as indicated for a complete installation in accordance with manufacturer's product specifications.

2.02 SUBMITTALS

- A. Submittals shall illustrate principal component parts, methods of assembly, mechanical and electrical connections, accessories and relationship to the building components. They shall consist of Product data, material data sheets, samples, and/or shop drawings required for the Architect's review that the correct products, assemblies, and quantities will be installed.
- B. All Submittals shall be reviewed and approved – by stamp and/or signature - by the Contractor prior to submission to the Architect. Submittals received by the Architect and not first approved by the Contractor will be returned without review or processing.
- C. Items generally requiring Submittals include, but are not limited to:
 - 1. Concrete Mix design, materials, and accessories.
 - 2. Fabricated metal items, hangers, ledges, and shapes.
 - 3. Rough Carpentry; Pre-engineered trusses, dimension lumber, and fasteners.
 - 4. Finish Carpentry; trim profiles.
 - 5. Ornamental Simulated Woodwork.
 - 6. Dampproofing and Waterproofing.
 - 7. Thermal Protection.
 - 8. Weather Barriers
 - 9. Roofing Materials and accessories.
 - 10. Siding Materials.
 - 11. Joint Protection.
 - 12. Entry Doors and frames.
 - 13. Wood Doors.
 - 14. Windows.
 - 15. Finish Hardware.
 - 16. Gypsum Board.
 - 17. Resilient Flooring and accessories.
 - 18. Paints and Coatings.
 - 19. Signage.
 - 20. Toilet and Bathroom Accessories.
 - 21. Postal Specialties.
 - 22. Storage Shelving.
 - 23. Residential Appliances.
 - 24. Window Treatments.
 - 25. Residential Casework.
 - 26. Plumbing Equipment, Fixtures, and accessories.
 - 27. HVAC Systems and accessories.

28. Electrical Systems, equipment, and fixtures.
29. Life Safety Systems.
30. Fences and Gates.
31. Site Furnishings.

2.03 SELECTION AND REVIEW OF MATERIALS

- A. Where materials or equipment require the review of the Architect, secure such review before procurement.
- B. Where colors and/or patterns are to be selected by Architect and/or the Owner, request such selection in ample time for procurement.
- C. The aesthetic values of every material and installation, such as shape, proportion, texture, finish and color, will be an important consideration to the Owner and/or Architect, and decisions concerning same shall be final.

2.04 CONTRACTOR'S MEANS AND METHODS

- A. The Architect shall not be responsible for, nor have control over, nor charge of construction means, procedures, methods, techniques, or for safety programs or precautions in conjunction with the project construction. The Contractor shall be solely responsible for these under the Construction Contract.
- B. The Architect shall not be responsible for the Contractor's failure to carry out work in accordance with the Contract Documents. The Architect shall not have control over, nor in any way be responsible for, the Contractor's scheduling, or acts, or omissions of the Contractor, subcontractors, or their agents or employees, or of any other persons performing portions of the work.
- C. The Contractor shall initiate, maintain, and supervise all safety precautions and programs in conjunction with the performance of the Contract, and shall be responsible for same.
- D. The Contractor shall comply with all applicable laws, ordinances, rules, regulations and lawful orders of public authorities dealing with safety of persons or property or their protection from damage, injury, or loss. The Contractor shall also give notices in accordance with the foregoing.
- E. The Contractor shall construct and maintain temporary drainage and pump as necessary to keep site and excavations free from water, remove ice and snow as necessary for safety and proper execution of his work, provide cover and protection for his work from inclement weather and brace all construction to prevent damage from wind.
- F. Keep covered all materials, cavities and holes subject to damage by falling materials or deposits of water, snow or ice.
- G. Hot and Cold Weather protocols, where applicable or dictated by manufacturer's instructions, shall be adhered to.
- H. Transport, handle, store, and erect materials in a manner to keep them free from damage.
- I. Support no runways, ramps, or construction equipment on, or transport over, any surface or assembly subject to displacement, disfigurement, or other damage.
- J. Protect work in place that requires job-finishing, until such finishing has been completed.
- K. Protect work previously placed by suitable coverings during installation of subsequent work. Clean off any foreign materials accidentally deposited on finish surfaces and, where such would stain, corrode or otherwise disfigure, clean immediately with material that will not damage finished work.
- L. Where finished floors in place are subject to ongoing construction damage, cover traffic areas with suitable protective coverings until project acceptance.

2.05 TEMPORARY EQUIPMENT

- A. Contractor shall provide temporary hoists, ladders, scaffolding, shoring, bracing, runways, walks, ramps, and other equipment or construction, required for proper progress of his work and remove same at completion of work.

2.06 APPROPRIATE MATERIALS AND INSTALLATION

- A. Prior to submitting proposal, Contractor, his subcontractors, and material suppliers shall review the Contract Documents and, should any material and/or its installation be indicated or specified

in a manner not approved by the material manufacturer, notify the Architect and receive his instructions. Failing to do so, Contractor shall provide other equivalent materials suitable for the installation as selected by the Architect, or if not discovered until after installation, Contractor shall replace materials with such other equivalent, suitable and selected materials, and in either event, at no added cost to Owner.

- B. All materials shall be new unless otherwise specifically covered by the Contract Documents or approved by the Owner.
- C. Materials or products specified by name of manufacturer, brand or trade name, and/or catalog reference in the Contract Documents, shall be deemed to establish standards of quality and style, and not to be proprietary in nature. Any article or material, which will adequately perform the duties imposed by the general design, will be considered equal, providing it is of equal substance and function.
- D. If Contractor proposes construction methods other than those shown or specified, complete drawings and engineering notes shall accompany the request. Contractor shall follow the Submittal process as outlined, for review by the Architect, Architect's consultants, and/or Owner's consultants.

2.07 RECEIPT AND STORAGE OF MATERIALS

- A. On receipt of materials check for in-transit damage promptly, should it be necessary to replace any damaged materials prior to installation.
- B. Deliver materials and equipment to project site in manufacturer's original packaging. Keep labels intact until final cleaning. Where items are to be job-assembled, label, tag, mark or otherwise properly identify each assembled component part until incorporated in the work.
- C. Store materials in a manner to prevent deterioration, staining, soiling and intrusion of foreign materials. Provide waterproof, well-ventilated enclosures for materials subject to deterioration by dampness. Adequately protect those materials subject to damage by freezing and frost.

2.08 CLOSING-IN WORK

- A. Contractor shall notify his subcontractors, Owner and all contractors and subcontractors under separate contract to the Owner, when he is ready for them to install their portions of the work and see that they comply within a reasonable period of time. Do not enclose nor cover any piping, wiring, ducts, equipment, or other items until proper tests and inspections have been made by Authorities having Jurisdiction, or observed by the Architect.

2.09 WARRANTIES

- A. Prior to being eligible for final payment, Contractor shall deliver to Architect, all Manufacturer's and special warranties specified in the Contract Documents for materials, equipment, and installations. These shall be compiled in a book and must include the name, address and phone number of the installation subcontractor, the name, address and phone number of the supplier and the printed warranty on at each model of each of the following items:
 - 1. Water Heaters.
 - 2. Heating and Air Conditioning systems.
 - 3. Appliances; including, but not limited to: range, range hood, refrigerator, dishwasher, garbage disposal, microwave, and washer and dryer.
 - 4. Siding and Soffit materials.
 - 5. Gutters and Downspouts.
 - 6. Roofing system.
 - 7. Termite control.
 - 8. Fire Alarm System.
- B. The Contractor shall provide a one (1) year warranty (Guarantee) from the date of Final Completion and acceptance by the Owner, during which time he shall make needed repairs and replacements of defective workmanship or materials, or correction of non-conforming work as outlined in paragraph 12.2.2 of the Contract General Conditions.

2.10 TEMPORARY FACILITIES

- A. Field Office: Contractor shall erect and maintain in good condition during progress of work a weatherproof field office building (adequate size trailer also acceptable) for use of General Contractor and Architect's Representative. Provide such building with heat, electric light, telephone and lockable door.

- B. Toilet Facilities: Contractor shall provide temporary, exterior, completely closed latrine. Provide necessary supplies and keep clean at all times.
- C. Electrical Service: Contractor shall arrange and pay for temporary metering electrical service to his Field Office and Project Site sufficient for his needs throughout the construction process. Use of electrical service in buildings is not permitted, unless previously agreed to by the Owner. Provide lights and electrical extensions to locations necessary for proper and safe operations and permit other contractors to use and remove the same at his own expense. The General Contractor shall pay for all temporary electrical service consumed from start of project through Final Closeout.
- D. Water: Contractor may use water from existing hose bibbs or extend lines therefrom at their own expense. Contractor shall pay for and provide a temporary water meter at the connection and shall pay for all water consumed. Contractor is fully responsible for monitoring all water consumption to prevent "wasteful" use and to prevent connection/use from other connection locations.
- E. Heat: Contractor shall provide auxiliary heat necessary to prevent damage from dampness and cold and to provide proper climate conditions as necessary to prohibit damage to installed materials. Contractor shall pay for all fuels (i.e., propane, LP, Natural gas, etc.) and/or electrical service consumed for heating until building is completed.
- F. Telephone: Contractor shall provide temporary telephone for use by all trades and by Architect. Contractor shall pay for all local calls, but shall be reimbursed for long-distance calls by those making same.

PART 3 - PROJECT CLOSE OUT

3.01 GENERAL

- A. Owner may place and install equipment during the progress of the building or occupy portions finished before the entire completion of the work. Such occupancy will not in any way evidence completion or acceptance of any part of the work.
- B. Record Drawings: Maintain a complete set of blue/black-line prints of Contract Drawings, Specifications, and shop drawings for record mark-up purposes throughout the Contract Time. Mark-up drawings and specifications during course of the work to show changes and actual installation conditions, sufficient to form a complete record for Owner's purposes. Give particular attention to work which will be concealed and difficult to measure and record at a later date, and work which may require servicing or replacement during life of project. Require entities marking prints to sign and date each mark-up. Bind prints into manageable sets, with durable paper covers, appropriately labeled.
- C. Maintenance Manuals: Provide 3-ring vinyl-covered binders containing required maintenance manuals, properly identified and indexed. Include operating and maintenance instructions, expanded to cover emergencies, spare parts, warranties, inspection procedures, diagrams, safety, security, and similar appropriate data for each system or equipment item.

3.02 INSPECTION - PREREQUISITES

- A. Comply with the General Conditions and complete the following before requesting Architect's inspection of the work, or designated portion thereof, for substantial completion.
- B. Submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates, and similar required documentation for specific units of work, enabling Owner's un-restricted occupancy and use.
- C. Submit record documentation, maintenance manuals, tools, spare parts, keys, and similar operational items.
- D. Operator Instructions: Require each Installer of systems requiring continued operation/maintenance by Owner's maintenance personnel, to provide on-location instruction to Owner's personnel, sufficient to ensure safe, secure, efficient, non-failing utilization and operation of systems.
- E. Final Cleaning: At closeout time, clean or re-clean entire work to normal level for "first class" maintenance/cleaning of building projects of a similar nature. Remove non-permanent protection and labels, polish glass, clean exposed finishes, touch-up minor finish damage, clean or replace filters of mechanical systems, remove debris and broom-clean non-occupied spaces,

sanitize plumbing/food service facilities, clean light fixtures and replace burned-out/dimmed lamps, sweep and wash paved areas, police yards and grounds, and perform similar cleanup operations needed to produce a “clean” condition as judged by Architect.

3.03 INSPECTION PROCEDURES

- A. Upon receipt of Contractor’s request, Architect will either proceed with inspection or advise Contractor of prerequisites not fulfilled.
- B. Following initial inspection, Architect will either prepare a Certificate of Substantial Completion, or advise Contractor of work which must be performed prior to issuance of said certificate; and repeat inspection when requested and assured that work has been substantially completed. Results of completed initial inspection will form initial “punch-list” for final acceptance.
- C. Re-inspection Procedure: Upon receipt of Contractor’s notice that work has been completed, including punch-list items resulting from earlier inspections, and excepting incomplete items delayed because of acceptable circumstances, Architect will re-inspect work. Upon completion of re-inspection, Architect will either recommend final acceptance and final payment, or advise Contractor of work not completed or obligations not fulfilled as required for final acceptance. If necessary, procedure will be repeated.

END OF SECTION

GEOTECHNICAL ENGINEERING REPORT
VALLEY SPRINGS COTTAGES
PHASE I
LITTLE ROCK, ARKANSAS

Prepared for:

CREASON DEVELOPMENT
1900 East Lark Avenue
Nixa, Missouri 65714

Prepared by:



Springfield, MO
4168 W. Kearney Springfield, MO 65803
Call 417.864.6000 Fax 417.864.6004
www.ppimo.com

PPI PROJECT NUMBER: 247196

November 27, 2017

November 27, 2017

Creason Development
1900 East Lark Lane
Nixa, Missouri 65714

Attn: Ms. Tammi Creason
Email: tammi@creasondevelopment.com

RE: Geotechnical Engineering Report
Valley Springs Cottages
Little Rock, Arkansas
PPI Project Number: 247196

Dear Ms. Creason:

Attached, please find the report summarizing the results of the geotechnical investigation conducted for the above referenced project. We appreciate this opportunity to be of service. If you have any questions, please don't hesitate to contact this office.

PALMERTON & PARRISH, INC.
By:

PALMERTON & PARRISH, INC.
By:



Shane M. Rader, P.E.
Geotechnical Engineer



Brandon R. Parrish, P.E.
Vice-President



Submitted: One (1) Electronic .pdf Copy

SMR/BRP/BRP/jrh

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FIGURE

FIGURE 1 – BORING LOCATION PLAN

APPENDICES

APPENDIX I – BORING LOGS & KEY TO SYMBOLS
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 APPENDIX III – IMPORTANT INFORMATION REGARDING YOUR
 GEOTECHNICAL REPORT

EXECUTIVE SUMMARY

A Geotechnical Investigation was performed at the site planned for Phase I construction of the new Valley Springs Cottages located west of Geyer Springs Road in Little Rock, Arkansas. Based upon information provided by the Client, it is understood that Valley Springs Cottages Phase I will consist of developing forty-four (44) lots which will include single-family structures with associated pavement for roadways and drives. All structures are anticipated to be single-story in height, wood framed and either exhibit a slab-on-grade floor system or crawl space. Foundation and slab loadings are anticipated to be light. Minimal depths of cut and/or fill are anticipated to achieve finish subgrade elevations across the project site.

A total of eleven (11) geotechnical borings were drilled within Lots 1 through 44 of the planned Valley Springs Cottages Development. All borings were discontinued in natural overburden soils at a depth of 10 ft. below the existing ground surface. Important geotechnical considerations for the project are summarized below. However, users of the information contained in the report must review the entire report for specific details pertinent to geotechnical design considerations.

- The project site is currently heavily wooded with dense underbrush and an Owner hired Contractor was used to clear paths for drill-rig access;
- Approximately 0.3 to 0.5 ft. of topsoil was encountered within all borings. Thicker topsoil zones or zones penetrated by root matter will be encountered during site development procedures;
- Shallow natural soils at the project site contain little to no rock/sand content and may undergo loss of shear strength properties upon an increase in soil moisture or when disturbed by heavier construction equipment. **If construction commences during wet weather, undercutting or stabilization of these shallow clays should be anticipated in accordance with Section 7.0 of this report;**

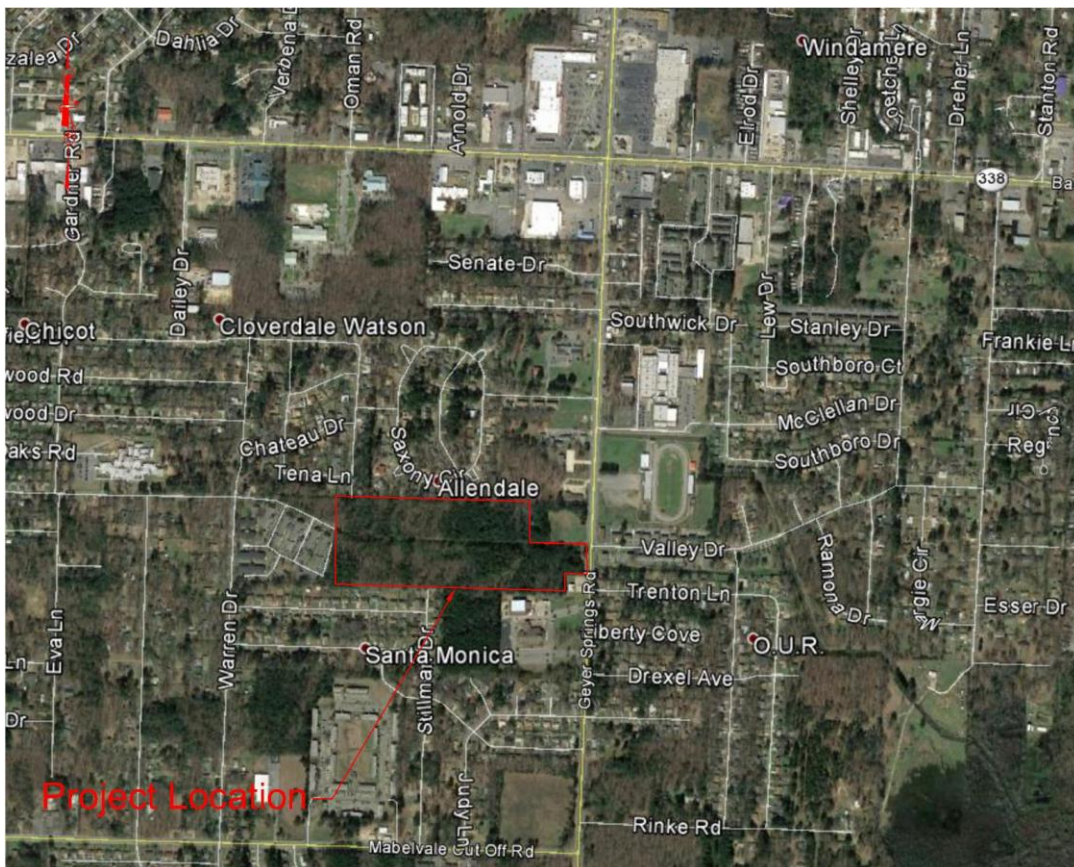
EXECUTIVE SUMMARY (CONTINUED)

- The site is underlain by the Midway Clay. This deposit is a marine clay commonly known in the site area to undergo appreciable shrink/swell related movement;
- **Swell tests were conducted upon relatively undisturbed specimens from Borings 1 and 11 at depths ranging from 3.5 to 8.5 ft. These natural clays swelled 3.4 to 9.8 percent when inundated with water indicating medium to high swell potential. Due to the medium to high potential for shrink/swell of the CL, CL-CH or CH clays, two (2) separate foundation and three (3) floor slab alternates for foundation/floor slab construction have been provided in Sections 8.0 and 10.0, respectively, of this report;**
- The planned new Valley Springs Cottages structures may be supported upon deep or shallow foundations in accordance with Section 8.0 of this report;
- The project site classifies as a Site Class D in accordance with Section 1613 of the 2012 International Building Code (IBC); and
- Palmerton & Parrish, Inc. should be retained for construction observation and construction materials testing. Close monitoring of subgrade preparation work is considered critical to achieve adequate foundation and subgrade performance.

GEOTECHNICAL ENGINEERING REPORT
VALLEY SPRINGS COTTAGES
PHASE I
LITTLE ROCK, ARKANSAS

1.0 INTRODUCTION

This is the report of the Geotechnical Investigation performed at the site planned for construction of the new Valley Springs Cottages located west of Geyer Springs Road in Little Rock, Arkansas. This investigation was authorized by a letter proposal dated October 25, 2017, and signed by Ms. Tammi Creason, representing Creason Development. The approximate site location is shown in the aerial photograph below for reference.



The purpose of the Geotechnical Investigation was to provide information for foundation design and construction planning, and to aid in site development. Palmerton & Parrish Inc.'s (PPI) scope of services included field and laboratory investigation of the subsurface conditions in the vicinity of the proposed project site, engineering analysis of the collected data, development of recommendations for foundation design and construction planning, and preparation of this engineering report.

2.0 PROJECT DESCRIPTION

Item	Description
Site Layout	See Figure 1: Boring Location Plan
Valley Springs Cottages - Phase I	<ul style="list-style-type: none"> Planned to develop Lots 1 thru 44; All structures are anticipated to be single-story in height; Utilize slab-on-grade floor systems or crawl space; and Wood framed.
Anticipated Foundation & Slab Loadings	Light.
Anticipated Grading	Minimal depths of cut and/or fill to provide finish subgrade.
Pavement	New pavement for access roads, entrance drives and driveways is also planned at the project site.

3.0 SITE DESCRIPTION

Item	Description
Physical Location	Located west of the Geyer Springs Road and Valley Drive intersection in Little Rock, Arkansas.
Township/Range/Section	1S/13W/1
Latitude/Longitude (± Center of Project Site)	34.661342° / -93.348651°
Available Historic Aerial Photography	Based upon readily available historic aerial photography, the project site has been undeveloped from 1994 to present. The site is currently heavily wooded with mature trees, as well as dense underbrush.
Current Ground Cover	Brush and leaf covered.
Existing Topography	Gently sloping from the north and south towards the center of the Valley Springs Cottages Development.
Drainage Characteristics	Poor to fair.

4.0 SUBSURFACE INVESTIGATION

Subsurface conditions were investigated through completion of eleven (11) subsurface borings and subsequent laboratory testing.

4.1 Subsurface Borings

Boring locations were selected and staked in the field by PPI using GPS coordinates obtained from a site plan provided by the Design Team. Paths were cleared by others to provide access to planned boring locations. Further, borings were staked using a hand held GPS unit. Approximate boring locations are shown on Figure 1: Boring Location Plan. The Arkansas One-Call System was notified prior to the investigation to assist in locating buried public utilities.

All borings were discontinued in natural overburden soils at depths of 10 ft. below the existing ground surface. Logs of the borings showing descriptions of soil and rock units encountered, as well as results of field and laboratory tests and a “Key to Symbols” are presented in Appendix I.

Borings were drilled November 6 and 7, 2017 using 4.5-inch O.D. continuous flight augers powered by a track-mounted CME-55 drill-rig. Soil samples were collected at 2.5 to 5-ft. centers during drilling. Soil sample types included split spoon samples collected while performing the Standard Penetration Test (SPT) in general accordance with ASTM D1586 and thin walled Shelby tubes pushed hydraulically in advance of drilling in accordance with ASTM D1587. Please refer to Appendix II for general notes regarding boring logs and additional soil sampling information.

4.2 Laboratory Testing

Collected samples were sealed and transported to the laboratory for further evaluation and visual examination. Laboratory soil testing included the following:

- Moisture Content (ASTM D2216);
- Unconfined Compressive Strength (ASTM D2166);
- Atterberg Limits (ASTM D4318);
- Swell Tests (ASTM D4546); and
- Pocket Penetrometers.

Laboratory test results are shown on each boring log in Appendix I and are summarized in the following table.

Boring	Depth (ft.)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Moisture Content (%)	USCS Symbol	Cohesion (psf)	Dry Unit Wt. (pcf)	Percent Swell (%)	Swell Pressure (tsf)
1	6.5 to 8.5	101	24	77	35.5	CH	-	82.8	9.8	7.9
2	3.5 to 5.5	40	15	25	14.2	CL	-	-	-	-
3	8 to 10	-	-	-	32.2	CH	5,572	89.9	-	-
9	3.5 to 5	31	18	13	10.6	CL	-	-	-	-
10	3.5 to 5	29	17	12	8.1	CL	-	-	-	-
10	6 to 8	-	-	-	14.6	CL	11,995	119.6	-	-
11	3.5 to 4.5	31	17	14	9.2	CL	-	116.8	3.4	4.5

5.0 SITE GEOLOGY

The general site is underlain at depth by the Midway Group, part of the Mississippian Embayment. The Midway Group represents a marginal marine depositional environment. Lithology of the Midway Group consists of calcareous shale, arenaceous limestone, calcareous glauconitic sandstone, conglomerate and clay shale. The boundary between overburden soils and comparatively weathered shale or sandstone bedrock is usually gradual, while the boundary between conglomerates and unweathered limestone is usually abrupt.

6.0 GENERAL SITE & SUBSURFACE CONDITIONS

Based upon subsurface conditions encountered within the borings drilled at the project site, generalized subsurface conditions are summarized in the table below. Soil stratification lines on the boring logs indicate approximate boundary lines between different types of soil and rock units based upon observations made during drilling. In-situ transitions between soil and some rock types are typically gradual.

Description	Approx. Depth to Bottom of Stratum	Material Encountered	Moisture	Consistency/ Density
Stratum 1	0.3 to 0.5 ft.	Topsoil – Grass Covered	Dry	Medium Stiff
Stratum 2	3 to 8 ft.	Lean Clay	Dry to Moist	Medium Stiff to Very Stiff
Stratum 3	Boring Completion	Lean to Fat or Fat Clay	Slightly Moist to Moist	Medium Stiff to Very Stiff

6.1 Groundwater

Shallow groundwater was not observed within the borings on the date drilled. Groundwater levels should be expected to fluctuate with changes in site grading, precipitation, and regional groundwater levels. Groundwater may be encountered at shallower depths during wetter periods.

7.0 EARTHWORK

Although specific site grading plans for this project were not provided at the time of this investigation, it is anticipated that minimal depths of cut and/or fill will be required to provide finish subgrade elevations within the planned development. The initial phase of site preparation should include the following:

- Removal of all trees and underbrush from within the site;
- Clearing and grubbing of all vegetative matter. Topsoil stripping on the order of 6 to 8 inches should be anticipated. Thicker topsoil zones or zones penetrated by roots, should be anticipated during site development;
- Topsoil should be stockpiled outside of areas to receive controlled fill and may be reused in lawn and landscape areas only;
- Due to presence of medium to high shrink/swell potential of the in-situ clays at the project site, it is recommended that deep foundations be utilized or footings and floor slabs be undercut sufficient to allow placement of Low Volume Change

(LVC) fill material. The recommendations are further discussed in Sections 8.0 and 10.0 depending upon the foundation alternate selected;

- Pavements should be undercut sufficient to allow placement of at least 2 ft. of LVC fill material; and
- Areas scheduled to receive controlled fill or slab/pavement construction should be proof-rolled and approved in accordance with the following section of this report.

After the initial phase is complete, it is recommended that all building, pavement and undercut bottoms be proof-rolled to assure a stable subgrade. Proof-rolling consists essentially of rolling the ground surface with a loaded tandem axle dump truck or similar heavy rubber tired construction equipment and noting any areas which rut or deflect during rolling. All soft subgrade areas, if any, identified during proof-rolling should be undercut and replaced with compacted fill as outlined below. Proof-rolling, undercutting and replacement should be monitored by a representative of PPI. The depth and areal extent of undercutting soft subgrade areas will be largely dependent upon the time of year and related soil moisture conditions. **If construction is initiated during or immediately following wetter months, the requirement for undercutting soft surficial soils below planned cut depths should be anticipated and reflected in the contract documents. Subgrade improvement may also be accomplished by applying an initial bridge lift of larger size stone (4 to 8 inch top size) compacted using a crawler tractor.** The applicability of undercutting versus use of a bridge lift should be evaluated on a case-by-case basis during construction.

After evaluation by proof-rolling and approval, the subgrade should be scarified to a depth of at least 8 inches, adjusted to within the optimum moisture content ranges and compacted to specified density, provided below (See Section 7.3). This is considered essential to further decrease the potential for shrink/swell. Placement of controlled fill may then proceed.

7.1 Controlled Fill Material Types

Fill Type ¹	USCS Classification	Acceptable Location for Placement
Low Volume Change Engineered Fill ²	Non-Shaley CL, GC or SC (LL _≤ 40)	All locations and elevations ²
On-Site Natural Soils	CL or CL-CH	All locations and elevations ^{3 & 4}
Potential Off-Site Borrow Material	CL, GC, SC or CL-CH	All locations and elevations ^{3 & 4}

1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris and contain maximum rock size of 4 to 6 in. Frozen material should not be used and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to its use.

2. Non-shaley low plasticity cohesive soil or granular soil having a Liquid Limit of 40% or less and contain at least 15% fines passing the No. 200 sieve.

3. CL or CL-CH clays with a Liquid Limit above 40 is considered suitable for use as controlled fill, only if the percentage of rock fragments exceeds 35% or if placed 4 ft. below shallow foundations, building slabs or sidewalk areas adjacent to buildings, and 2 ft. below pavements.

4. **Placement of shale, shaley clays or CH clays at this site as structural fill is prohibited unless the material is pre-approved by the Geotechnical Engineer.**

7.2 Acceptable LVC Fill Material

LVC material is recommended below floor slabs, footings and pavement areas. Potential sources of LVC material are as follows:

- Import aggregate baserock containing a minimum of 15% fines passing the No. 200 sieve from an off-site borrow area;
- On-site shallow lean clay, classifying as non-shaley CL, may be segregated during footing or floor slab undercutting or general earthwork procedures. Sufficient quantity of material may not be present on site based upon the geotechnical borings, as well this process may be very difficult and will require close monitoring of soil materials removed during site development procedures. **If on-site CL clays are used as structural fill, it is considered essential that the moisture content is adjusted in accordance with Section 7.3 and maintained.** Topsoil strippings or material containing organics (root matter) should not be used as LVC material; and
- Chemical stabilization is an alternate to utilize the on-site CL or CL-CH clays generated from undercutting procedures. It is recommended that chemically

stabilized clays be placed in 6 to 9 inch lifts and compacted to specified densities. Use of approximately 6 percent hydrated lime or 12 percent Type C Flyash, by weight, should be anticipated. Lime Kiln Dust (LKD) or Code-L may also be utilized for soil stabilization. With CL or CL-CH clays chemically stabilized, it is considered applicable to place this material at all locations and elevations within the proposed building footprint or pavement/sidewalk areas. **A weather resistant subgrade is also an added benefit of chemical stabilization.**

7.3 Compaction Requirements

Item	Description
Subgrade Scarification Depth	At least 8 inches
Fill Lift Thickness	8-inches (loose)
Compaction Requirements ¹	<ul style="list-style-type: none"> • Non-Structural Areas - 90% Standard Proctor Density (ASTM D-698); or • Structural Areas - 95% Standard Proctor Density (ASTM D-698).
Moisture Content	<ul style="list-style-type: none"> • ± 2% optimum moisture for GC or SC Soil Types; or • 0 to 4% <u>above</u> optimum for CL & CL-CH Soil Types or Chemically Stabilized CL or CL-CH Soil Types.
Recommended Compaction Test Frequency	<ul style="list-style-type: none"> • Building Areas – One (1) test every 2,500 sq. ft.; • Pavement Areas – One (1) test every 5,000 sq. ft.; and • Minimum of three (3) tests per lift.
<p>1. We recommend that engineered fill (including scarified compacted subgrade) be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.</p>	

7.4 Landscaping & Site Drainage

Discharge from roof downspouts should be collected and diverted well away from the building perimeter and incorporated into the design plans. Rapid, efficient runoff away from the building should also be provided. In addition, landscaping requiring frequent watering should be prohibited adjacent to building foundations.

In addition, provisions should be implemented to reduce the potential for large fluctuations in moisture within the subgrade soils adjacent to the structure.

Ponding of surface water immediately adjacent to the structures and pavements can significantly increase subgrade moisture and may result in undesirable subgrade movement. As previously mentioned, careful consideration should be given to the landscaping and drainage elements to be installed at the project site adjacent to building and pavement areas. **Trees and some large bushes can draw significant moisture from the subgrade soils, resulting in shrinkage and subsequent foundation/pavement movement.**

7.5 Earthwork Construction Considerations

Shallow CL, CL-CH or CH clays are present at this site and exhibit medium to high potential for shrink/swell behavior based upon laboratory swell tests. It is recommended that floor slabs, footings and pavements be designed and constructed to bear on LVC fill material or deep foundations. LVC fill material should extend horizontally beyond building pads at least 3 ft. **Once grading and filling operations have been completed, the moisture within the subgrade should be maintained and soils not be allowed to dry and desiccate prior to construction of floor slabs, pavement and footings.** Grading of the site should be performed in such a manner so that ponding of surface water on prepared subgrade or in excavations is avoided. During construction, if the prepared subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be scarified or removed, moisture conditioned and recompacted prior to slab, pavement, or footing construction.

7.6 Excavations

Based upon the subsurface conditions encountered during this investigation, the on-site soils typically classify as Type B in accordance with OSHA regulations. Temporary excavations in soils classifying as Type B with a total height of less than 20 ft. should be cut no steeper than 1H:1V in accordance with OSHA guidelines. **Confirmation of soil classification during construction, as well as construction safety (including shoring, if required) is the responsibility of the Contractor.**

8.0 FOUNDATIONS

Based upon the results of the geotechnical borings and laboratory testing, it is recommended that the new structures for the planned Valley Springs Cottages be supported upon deep foundations bearing in natural overburden soils. This is the preferred method of foundation support to limit shrink/swell related movements. Due to the medium to high swell potential of the clays at the project site, drilled piers should be designed as underreamed shafts or belled piers due to the potential for negative side friction and pier heave caused by swelling clays.

8.1 Drilled Shafts

Drilled shafts should bear in natural overburden soils and extend to a minimum depth of 10 ft. below existing ground surface. The ratio from underream diameter to shaft diameter should not exceed 2. With underream drilled shafts extending a minimum of 10 ft. below existing ground surface, drilled shafts may be designed using an allowable bearing pressure of 4 ksf. This allowable bearing pressure may be utilized for the entire width of the underreamed bottom. Although relatively light foundation loads are anticipated for this structure, it is recommended that drilled shafts have a minimum shaft diameter of 18 inches.

Drilled shafts should be free of all loose and/or soft soils at the time of concrete placement. Concrete placement below more than 2 to 3 inches of water should be placed using a tremie. It is recommended that drilled shafts be examined by a representative of the Geotechnical Engineer to assure a relatively flat pier bottom, a plumb pier shaft and competent natural soils consistent with the recommended bearing pressures, as well as removal of essentially all groundwater prior to concrete placement. In case shallow groundwater or caving soils are encountered, use of temporary casing should be anticipated and should be on-site prior to commencement of drilling.

Further, at least 2 ft. of LVC fill material or alternatively, card board collapsible forms should be utilized to provide a minimum 3-inch void space below grade beams.

8.1.1 Uplift Resistance for Drilled Shafts

For resistance to uplift, side friction may also be applied to the sidewalls, with the exception of the top 1 times the diameter of the drilled shaft or 2.5 ft. whichever is greater and the underreamed height. An allowable side friction of 400 psf may be used for the overburden soils.

8.1.2 Lateral Loadings

It is anticipated that resistance of the foundations to lateral loading and the associated lateral deflection will be evaluated using finite difference computer models based on the horizontal modulus of subgrade reaction (K_h). The following values may be used in the analysis for this site.

Pier Depth	Unit Weight (pcf)	Static K_h (pci)	Cyclic K_h (pci)	Cohesion S_u (ksf)	e_{50}
*0-1 Pier Diameter	Ignore	-	-	-	-
*1 Pier Diameter to 10 ft.	110	500	200	1.5	0.005
*Lateral parameters for the upper 1 pier diameter, or 2.5 ft., whichever is shallower, should be ignored.					

The above values were measured or based upon published correlations with anticipated soil strength and classification tests.

8.2 **Shallow Foundations**

In lieu of deep foundations, a second alternate is to support each structure upon shallow foundations bearing on a minimum of 4 ft. of LVC fill material placed in accordance with Section 7.0 of this report.

If shallow foundations are selected, it is recommended that excavations extend horizontally a minimum of 3 ft. both inside and outside of planned foundations or sufficient width to allow a self-propelled vibratory roller to enter the excavation for fill compaction purposes. With footings over-excavated and bearing on 4 ft. of LVC fill material, footings may be designed in accordance with the following table.

Description	Mat (Spread Footing)	Wall (Continuous Footing)
Net allowable bearing pressure ^{1 & 3}	3,000 psf	2,500 psf
Minimum dimensions	2.5 ft.	1.5 ft.
Recommended bearing depth ²	Below frost depth	
Maximum footing widths	8 ft.	
Minimum embedment below finished grade for frost protection and variation in soil moisture (footings on soil) ⁴	2.5 ft.	
Minimum footing bearing depth below controlled fill surface.	1 ft.	
Allowable passive pressure ⁵	600 psf	
Coefficient of sliding friction	0.4 (controlled fill)	
1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. The recommended pressure considers all unsuitable and/or soft or loose soils, if encountered, are undercut and replaced with tested and <u>approved</u> new engineered fill. Footing excavations should be free of loose and disturbed material, debris, and water when concrete is placed. 2. If minimal grade changes are expected within the building footprint, footings are recommended to be installed upon at least 4 ft. of LVC material placed in accordance with Section 7.0 of this report. PPI should be retained to observe footing excavations prior to the placement of reinforcing steel. 3. Footings should be designed as narrow as possible to increase load upon underlying soils, but should be in accordance with local codes. 4. For perimeter footings and footings beneath unheated areas. 5. Allowable passive pressure value considers a Factor of Safety of about 2. Passive pressure value applies to undisturbed native clay or properly compacted fill. If formed footings are constructed, the space between the formed side of a footing and excavation sidewall should be cleaned of all loose material, debris, and water and backfilled with tested and <u>approved</u> fill compacted to at least 95% of the material's Standard Proctor dry density. Passive resistance should be neglected for the upper 2.5 ft. of the soil below the final adjacent grade due to strength loss from freeze/thaw and shrink/swell. 6. Coefficient of friction value is an ultimate value and does not contain a Factor of Safety.		

8.2.1 Uplift

Resistance of shallow spread footings to uplift (U_p) may be based upon the dead weight of the concrete footing structure (W_c) and the weight of soil backfill contained in an inverted cone or pyramid directly above the footings (W_s). The following parameters may be used in design:

Description	Weights
Weight of Concrete (W_c)	150 pcf
Weight of Soil Resistance (W_s)	100 pcf
Weight for on-site soils placed in accordance with Section 7.0	

The base of the cone or pyramid should be the top of the footing and the pyramid or cone sides should form an angle of 30 degrees with the vertical. Allowable uplift capacity (U_p) should be computed as the lesser of the two (2) equations listed below:

$$U_p = (W_s/2.0) + (W_c/1.25) \quad \text{or} \quad U_p = (W_s + W_c)/1.5$$

9.0 SEISMIC CONSIDERATIONS

Code Used	Site Classification
2012 International Building Code (IBC) ¹	D
1. In general accordance with the 2012 <i>International Building Code</i> , Section 1613	

10.0 FLOOR SLABS

Due to the medium to high shrink/swell potential of the on-site clays, it is recommended that structures be designed and constructed with crawl-spaces. However, crawl spaces may not be desired. If slab-on-grades are selected, below are key considerations for design purposes of the floor slab.

- Due to the medium to high shrink/swell potential of the shallow in-situ clays, it is recommended that floor slabs be designed and constructed to bear on a minimum of 4 ft. of LVC fill material placed in accordance with Section 7.0 of this report. The purpose of the LVC is to limit (but not eliminate) the potential for shrink/swell related slab movement;
- It is also considered permissible for floor slabs to be constructed as a post tensioned slab to provide more resistance to structure cracking related to shrink/swell movement. Post tensioned slabs should be constructed upon at least 4 ft. of LVC fill material;
- If drilled piers are selected for foundation support, floor slabs should bear on a minimum of 4 ft. of LVC fill material as described above for a post tensioned slab or conventional slab-on-grade. The floor slab can also be designed as a structural floor placed upon cardboard forms to provide a minimum 3-inch thick

void under slabs. This approach probably has greater cost, but essentially eliminates the potential for slab movement related to shrink/swell soil behavior;

- **Prior to placement of controlled LVC fill, exposed in-situ clays should be proof-rolled, scarified, moisture content adjusted and recompacted in accordance with Section 7.0 of this report; and**
- **Prior to slab placement, soil moisture should be adjusted and maintained within the parameters specified in Section 7.0 of this report.**

Placement of 4 or more inches of compacted free-draining granular base course below slabs is recommended to limit moisture rise through slabs and to improve slab support, particularly at joints. An impervious moisture barrier consisting of 6-mil plastic sheeting or equivalent should be provided in accordance with the 2012 IBC. Use of a 10-mil vapor barrier is recommended below all slab areas with an intended use sensitive to slab moisture.

11.0 PAVEMENT

Due to the medium to high swell potential of the in-situ clays, new pavements should be designed to bear on 2 ft. of LVC fill material placed in accordance with Section 7.0 of this report. It is anticipated pavements constructed for this project will be construction of either an asphaltic wearing surface over a base or a rigid Portland cement concrete pavement over a granular base. However, it must be emphasized that pavement distress caused by shrink/swell movements are possible even with use of LVC fill material.

11.1 Flexible Pavement

If asphaltic paving is selected, the aggregate base may be a granular compacted crushed gravel/stone with a gradation and quality conforming to the requirements of the Arkansas State Highway and Department of Transportation Department (AHTD), Standard Specification 303. The maximum lift thickness for the granular base is 4 in. Granular base thicknesses in excess of 4 inches should be placed in multiple lifts

with each lift being of approximately equal thickness. The granular base should be compacted to at least 100% of Standard Proctor Compaction (ASTM D-698).

Asphaltic concrete, both base and surface, should conform to the applicable requirements of AHTD Standard Specification 404. Asphaltic concrete should be compacted to 92 to 96% of Maximum Theoretical Gravity (ASTM D-2041). Substitution of an appropriate Superpave Mix Design can be used in place of the bituminous base. All bituminous mix designs should have been prepared or verified within 6 months of the date of placement on the project.

11.2 Rigid Pavement

If rigid concrete paving is selected, a minimum 4-inch thick granular base compacted to 100% of Standard Proctor should be placed on the prepared subgrade. The Portland Cement Concrete (PCC) mix should have a minimum 28-day compressive strength of 4000 pounds per square inch (psi). Concrete should be placed at a low slump (1 to 3 inches) and have an entrained air content of 5 to 7%. If an increased slump is desired, use of Super Plasticizer is recommended.

12.0 CONSTRUCTION OBSERVATION & TESTING

The construction process is an integral design component with respect to the geotechnical aspects of a project. Since geotechnical engineering is influenced by variable depositional and weathering processes and because we sample only a small portion of the soils affecting the performance of the proposed structures, unanticipated or changed conditions can be disclosed during grading. Proper geotechnical observation and testing during construction is imperative to allow the Geotechnical Engineer the opportunity to evaluate assumptions made during the design process. Therefore, we recommend that PPI be kept apprised of design modifications and construction schedule of the proposed project to observe compliance with the design concepts and geotechnical recommendations, and to allow design changes in the event that subsurface conditions or methods of construction differ from those assumed while completing this study. We recommend that during construction all earthwork be

monitored by a representative of PPI, including site preparation, placement of all engineered fill and trench backfill, and all foundation excavations as outlined below.

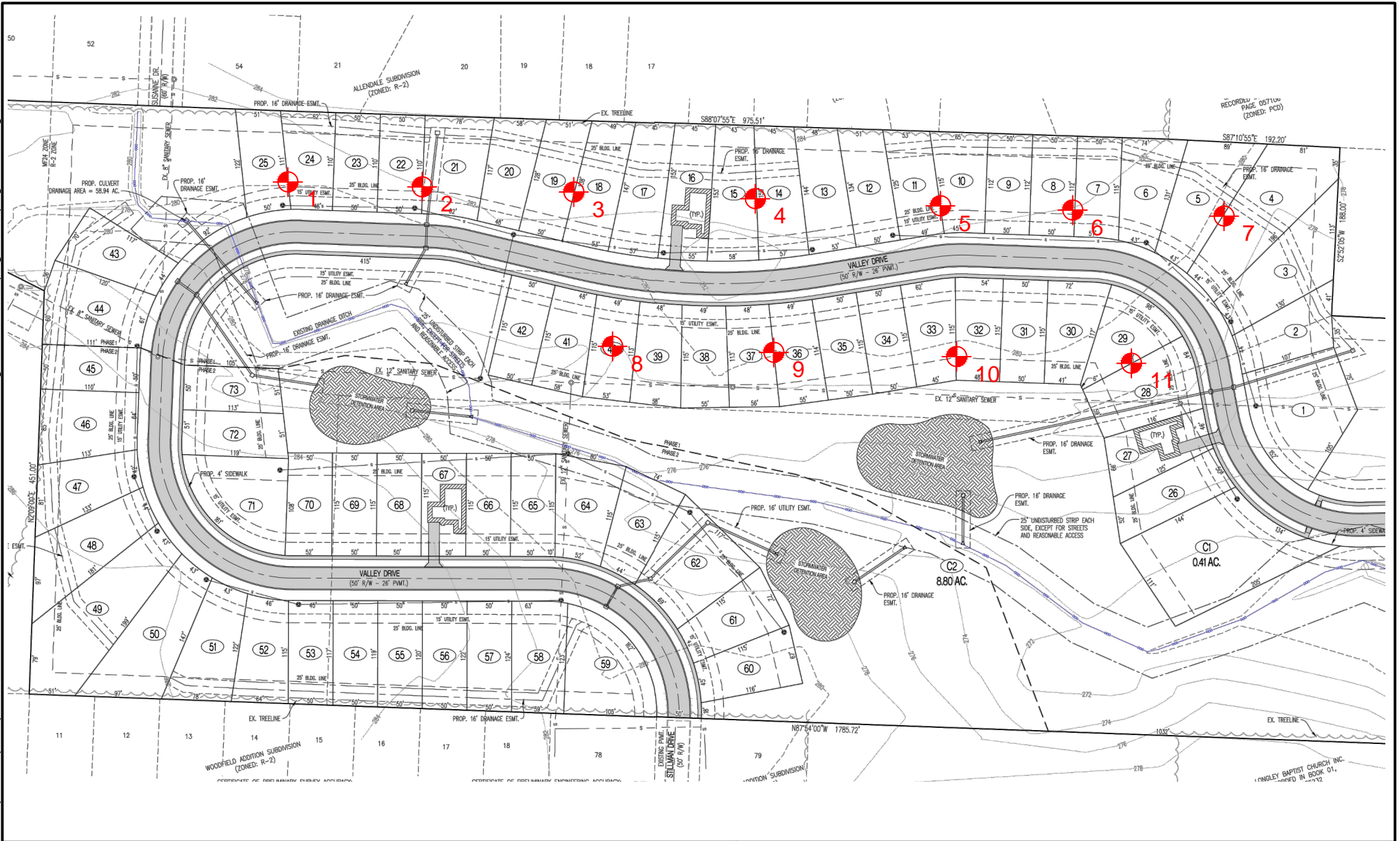
- An experienced Geotechnical Engineer or Engineering Technician of PPI should observe the subgrade throughout the proposed project site immediately following stripping to evaluate the native clay, identify areas requiring additional undercutting, and evaluate the suitability of the exposed surface for fill placement;
- An experienced Engineering Technician of PPI should monitor and test all fill placed within the building and pavement areas to determine whether the type of material, moisture content, and degree of compaction are within recommended limits;
- An experienced Technician or Engineer of PPI should observe and test all footing excavations. Where unsuitable bearing conditions are observed, remedial procedures can be established in the field to avoid construction delays; and
- The condition of the subgrade should be evaluated immediately prior to construction of the building floor slabs to determine whether the moisture content and relative density of the subgrade soils are as recommended.

13.0 REPORT LIMITATIONS


This report has been prepared in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Palmerton & Parrish, Inc. observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Palmerton & Parrish's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgment concerning the significance of the data gathered during the course of this investigation. Other than this, no warranty is implied or intended.

FIGURE

S:_MASTER PROJECT FILE\2017\AR\Creason Dev-247196-Little Rock Housing Dev-Sub\Figures\Figures.dwg



LEGEND

 Boring Location

SCALE
1" = 150'

Project: Little Rock Housing Development
Client: Creason Development

Boring Location Plan

DATE: November 9, 2017

Project Number: 247196



PALMERTON & PARRISH, INC.
GEOTECHNICAL AND MATERIALS ENGINEERS/
MATERIALS TESTING LABORATORIES / ENVIRONMENTAL SERVICES

FIGURE 1

APPENDIX I
BORING LOGS & KEY TO SYMBOLS



4168 W Kearney Street
Springfield, MO 65803
Telephone: 417-864-6000
Fax: 417-864-6004

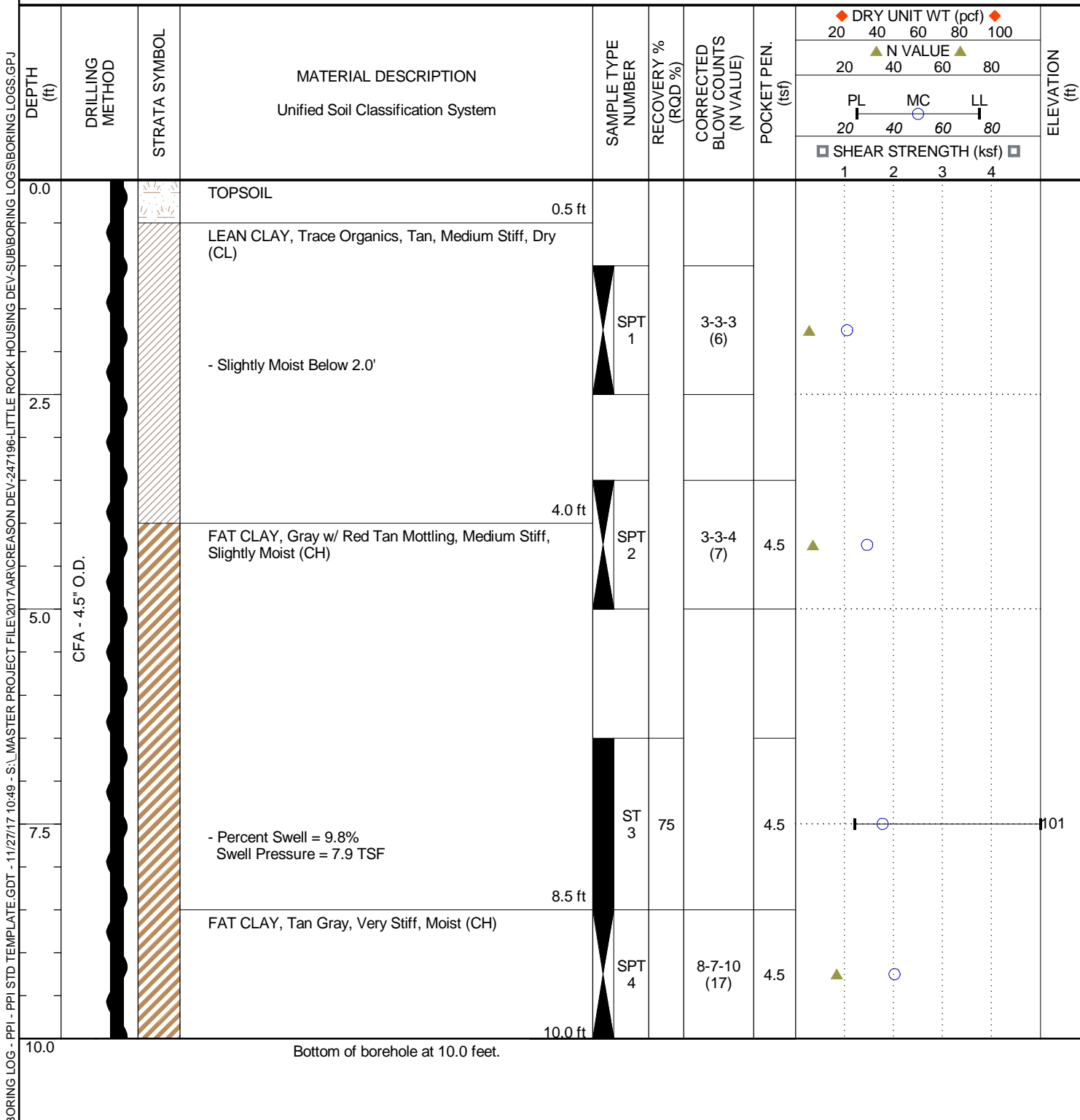
GEOTECHNICAL BORING LOG

BORING NUMBER

1

PAGE 1 OF 1

CLIENT Creason Development PROJECT NAME Village Springs Cottages - Phase I
 PROJECT NO. 247196 PROJECT LOCATION Little Rock, Arkansas
 DATE STARTED 11/7/17 COMPLETED 11/7/17 SURFACE ELEVATION _____ BENCHMARK EL. _____
 DRILLER JS DRILL RIG CME-55LC GROUND WATER LEVELS _____
 HAMMER TYPE Auto AT TIME OF DRILLING None
 LOGGED BY SP CHECKED BY JE AT END OF DRILLING _____
 NOTES _____





4168 W Kearney Street
Springfield, MO 65803
Telephone: 417-864-6000
Fax: 417-864-6004

GEOTECHNICAL BORING LOG

BORING NUMBER

2

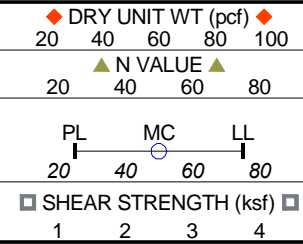
PAGE 1 OF 1

CLIENT Creason Development PROJECT NAME Village Springs Cottages - Phase I
 PROJECT NO. 247196 PROJECT LOCATION Little Rock, Arkansas
 DATE STARTED 11/7/17 COMPLETED 11/7/17 SURFACE ELEVATION _____ BENCHMARK EL. _____
 DRILLER JS DRILL RIG CME-55LC GROUND WATER LEVELS _____
 HAMMER TYPE Auto AT TIME OF DRILLING None
 LOGGED BY SP CHECKED BY JE AT END OF DRILLING _____
 NOTES _____

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)				ELEVATION (ft)
								20	40	60	80	
0.0			TOPSOIL									
0.5			LEAN CLAY, Trace Organics, Tan Gray, Stiff, Dry (CL)	SPT 1		4-7-8 (15)	4.5					
2.5												
5.0				ST 2	100		4.5					
6.0			FAT CLAY, Tan Gray, Very Stiff, Slightly Moist (CH)	SPT 3		4-7-10 (17)	4.5					
7.5												
10.0			- Moist Below 8.0'	SPT 4		4-7-10 (17)	4.5					
10.0			Bottom of borehole at 10.0 feet.									

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 11/27/17 10:49 - S:\MASTER PROJECT FILE\2017\AR\CREASON DEV-247196-LITTLE ROCK HOUSING DEV-SUBBORING LOGS\BORING LOGS.GPJ

CFA - 4.5" O.D.





4168 W Kearney Street
Springfield, MO 65803
Telephone: 417-864-6000
Fax: 417-864-6004

GEOTECHNICAL BORING LOG

BORING NUMBER

3

PAGE 1 OF 1

CLIENT Creason Development PROJECT NAME Village Springs Cottages - Phase I
 PROJECT NO. 247196 PROJECT LOCATION Little Rock, Arkansas
 DATE STARTED 11/7/17 COMPLETED 11/7/17 SURFACE ELEVATION _____ BENCHMARK EL. _____
 DRILLER JS DRILL RIG CME-55LC GROUND WATER LEVELS _____
 HAMMER TYPE Auto AT TIME OF DRILLING None
 LOGGED BY SP CHECKED BY JE AT END OF DRILLING _____
 NOTES _____

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)				ELEVATION (ft)
								20	40	60	80	
0.0			TOPSOIL									
0.5			LEAN CLAY, Gray Tan, Very Stiff, Dry (CL)	SPT 1		10-11-11 (22)	4.5					
2.5			LEAN CLAY, Tan Gray, Very Stiff, Dry (CL)	SPT 2		11-17-18 (35)						
5.0			FAT CLAY, Red/Tan/Gray, Very Stiff, Slightly Moist (CH)	SPT 3		10-11-15 (26)	4.5					
6.5				ST 4	79		4.5					5.57
10.0			Bottom of borehole at 10.0 feet.									

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 11/27/17 10:49 - S:\MASTER PROJECT FILE\2017\AR\CREASON DEV-247196-LITTLE ROCK HOUSING DEV-SUBBORING LOGS\BORING LOGS.GPJ

CFA - 4.5" O.D.



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GEOTECHNICAL BORING LOG

BORING NUMBER

4

PAGE 1 OF 1

CLIENT Creason Development PROJECT NAME Village Springs Cottages - Phase I
 PROJECT NO. 247196 PROJECT LOCATION Little Rock, Arkansas
 DATE STARTED 11/7/17 COMPLETED 11/7/17 SURFACE ELEVATION _____ BENCHMARK EL. _____
 DRILLER JS DRILL RIG CME-55LC GROUND WATER LEVELS _____
 HAMMER TYPE Auto AT TIME OF DRILLING None
 LOGGED BY SP CHECKED BY JE AT END OF DRILLING _____
 NOTES _____

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)				ELEVATION (ft)
								20	40	60	80	
								N VALUE				
								20	40	60	80	
								PL	MC	LL		
								20	40	60	80	
								SHEAR STRENGTH (ksf)				
								1	2	3	4	
0.0			TOPSOIL									
0.5			LEAN CLAY, Gray Tan, Very Stiff, Dry (CL)	ST 1	39		4.5					
2.5				SPT 2		7-11-13 (24)	3.25					
5.0												
6.0			FAT CLAY, Gray w/ Red Tan Mottling, Very Stiff, Slightly Moist (CH)	SPT 3		11-11-11 (22)	3					
7.5												
			- Moist Below 8.0'									
				SPT 4		6-8-13 (21)	4.5					
10.0												

CFA - 4.5" O.D.

Bottom of borehole at 10.0 feet.

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 11/27/17 10:49 - S:\MASTER PROJECT FILE\2017\AR\CREASON DEV-247196-LITTLE ROCK HOUSING DEV-SUBBORING LOGS\BORING LOGS.GPJ



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GEOTECHNICAL BORING LOG

BORING NUMBER

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PAGE 1 OF 1

CLIENT Creason Development PROJECT NAME Village Springs Cottages - Phase I
 PROJECT NO. 247196 PROJECT LOCATION Little Rock, Arkansas
 DATE STARTED 11/7/17 COMPLETED 11/7/17 SURFACE ELEVATION _____ BENCHMARK EL. _____
 DRILLER JS DRILL RIG CME-55LC GROUND WATER LEVELS _____
 HAMMER TYPE Auto AT TIME OF DRILLING None
 LOGGED BY SP CHECKED BY JE AT END OF DRILLING _____
 NOTES _____

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	◆ DRY UNIT WT (pcf) ◆ 20 40 60 80 100 ▲ N VALUE ▲ 20 40 60 80 PL MC LL 20 40 60 80 ■ SHEAR STRENGTH (ksf) ■ 1 2 3 4				ELEVATION (ft)
0.0			TOPSOIL									
			0.5 ft									
			LEAN CLAY, Gray Tan, Very Stiff, Dry (CL)	SPT 1		8-10-11 (21)	4.5					
2.5				ST 2	63		4.5					
5.0												
			6.3 ft									
			FAT CLAY, Red/Tan Gray, Very Stiff, Slightly Moist (CH)	SPT 3		8-11-14 (25)	4.5					
7.5												
				SPT 4		6-11-11 (22)	4.5					
10.0			10.0 ft									
Bottom of borehole at 10.0 feet.												

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CFA - 4.5" O.D.



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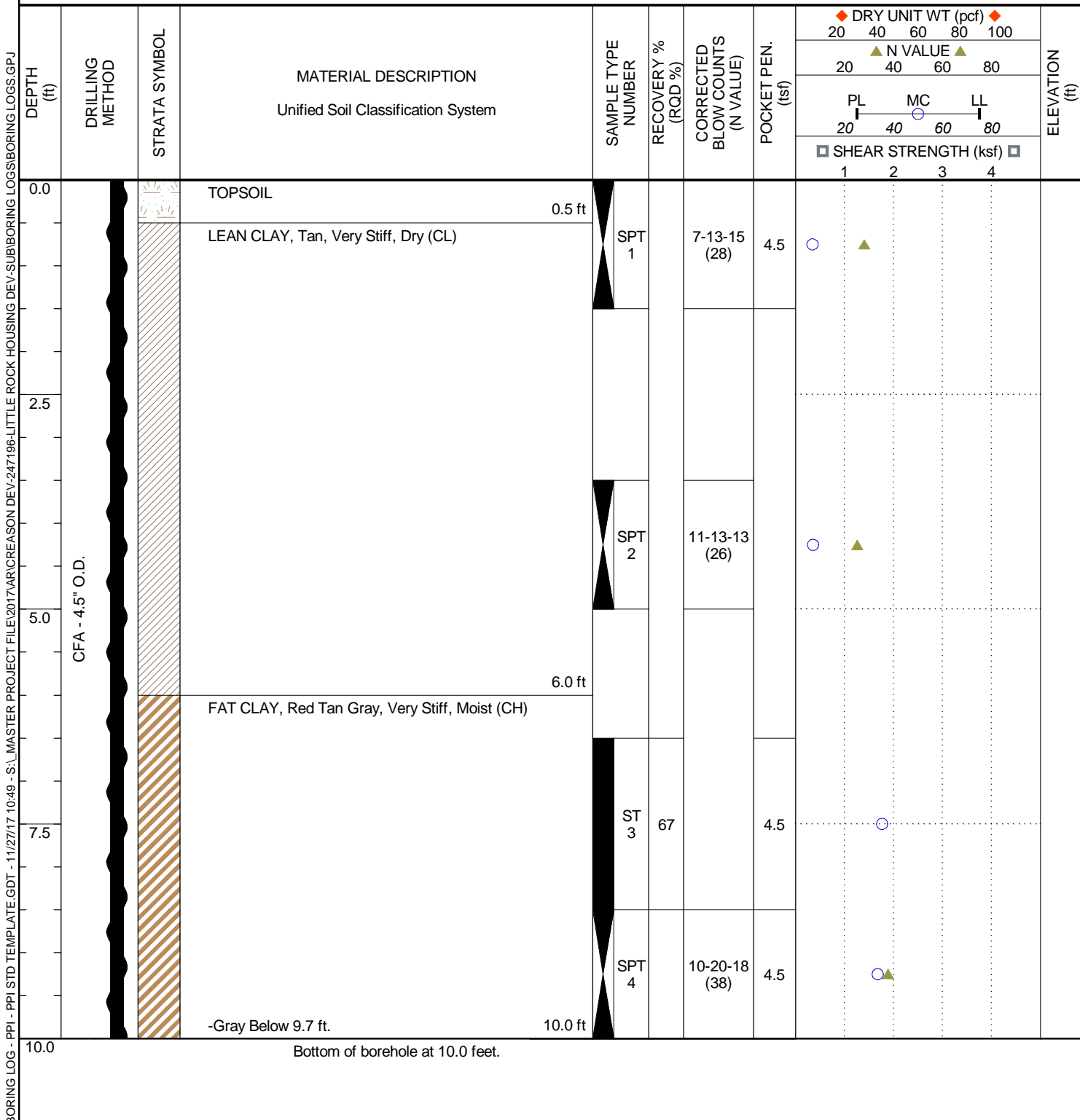
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BORING NUMBER

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PAGE 1 OF 1

CLIENT Creason Development **PROJECT NAME** Village Springs Cottages - Phase I
PROJECT NO. 247196 **PROJECT LOCATION** Little Rock, Arkansas
DATE STARTED 11/7/17 **COMPLETED** 11/7/17 **SURFACE ELEVATION** _____ **BENCHMARK EL.** _____
DRILLER JS **DRILL RIG** CME-55LC **GROUND WATER LEVELS**
HAMMER TYPE Auto **AT TIME OF DRILLING** None
LOGGED BY SP **CHECKED BY** JE **AT END OF DRILLING** _____
NOTES _____





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 DRILLER JS DRILL RIG CME-55LC GROUND WATER LEVELS _____
 HAMMER TYPE Auto AT TIME OF DRILLING None
 LOGGED BY SP CHECKED BY JE AT END OF DRILLING _____
 NOTES _____

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)				ELEVATION (ft)
								20	40	60	80	
0.0			TOPSOIL									
0.5			LEAN CLAY, Tan, Stiff, Dry (CL)	ST 1	100		4.5					
2.5			FAT CLAY, Gray/Red/Tan, Medium Stiff, Slightly Moist (CH)	SPT 2		3-3-4 (7)	4.5					
5.0			- Stiff, Moist Below 6.0'	SPT 3		6-6-6 (12)	4.5					
7.5			- Very Stiff Below 8.0'	SPT 4		10-8-8 (16)	4.25					
10.0			Bottom of borehole at 10.0 feet.									

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CFA - 4.5" O.D.



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 HAMMER TYPE Auto AT TIME OF DRILLING None
 LOGGED BY SP CHECKED BY JE AT END OF DRILLING _____
 NOTES _____

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)				ELEVATION (ft)
								20	40	60	80	
0.0			TOPSOIL									
0.0 - 0.5			0.5 ft									
0.5 - 5.0			LEAN CLAY, Tan, Very Stiff, Dry (CL)	SPT 1		6-8-11 (19)	4.5					
5.0 - 5.5			5.0 ft									
5.5 - 7.5			FAT CLAY, Gray/Tan, Very Stiff, Slightly Moist (CH)	SPT 2		13-17-17 (34)						
7.5 - 8.0												
8.0 - 10.0			- Moist Below 8.0'	SPT 3		7-10-10 (20)	4.5					
10.0				ST 4	67		4.5					

CFA - 4.5" O.D.

Bottom of borehole at 10.0 feet.

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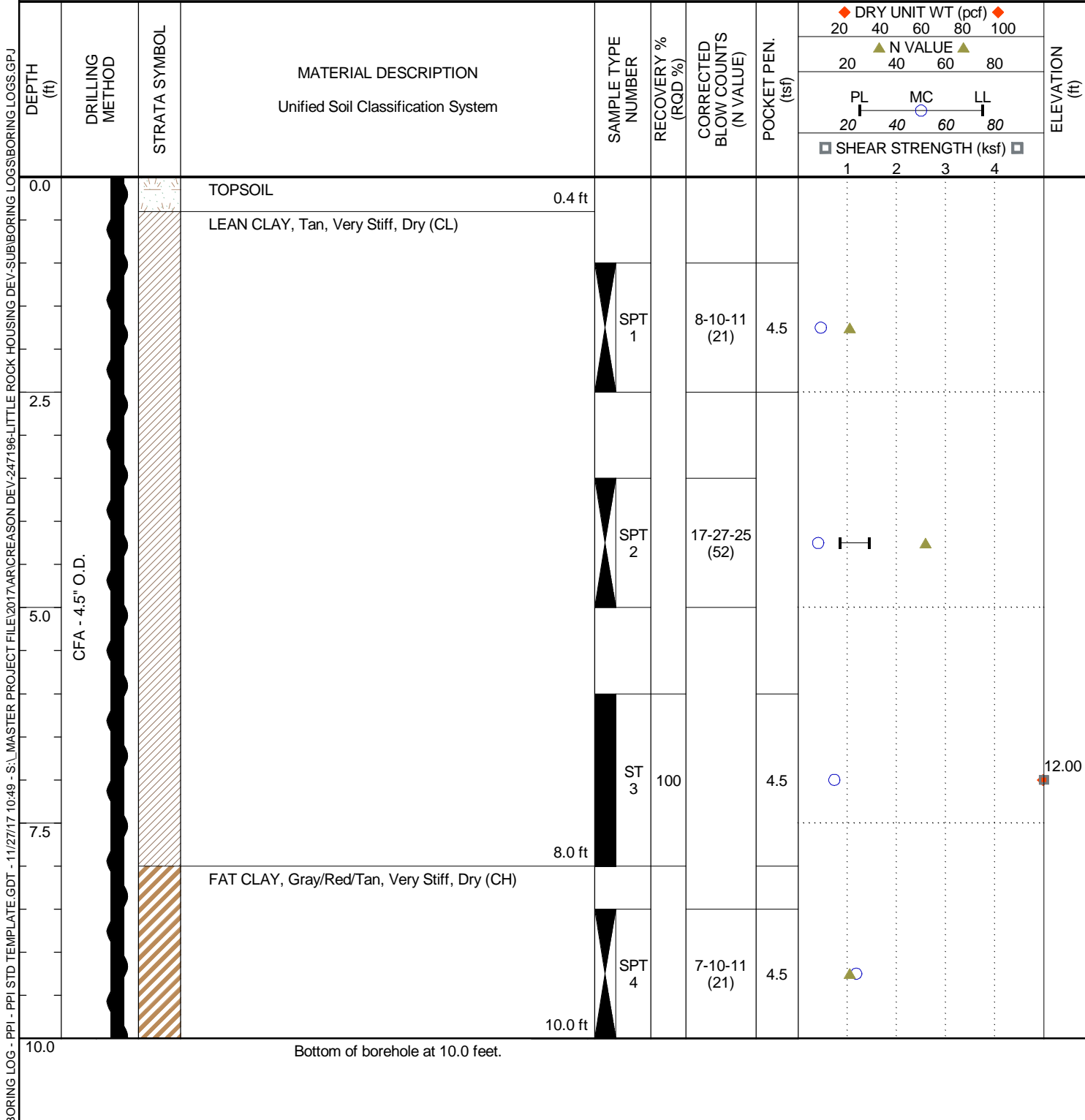
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CLIENT Creason Development PROJECT NAME Village Springs Cottages - Phase I
 PROJECT NO. 247196 PROJECT LOCATION Little Rock, Arkansas
 DATE STARTED 11/6/17 COMPLETED 11/6/17 SURFACE ELEVATION _____ BENCHMARK EL. _____
 DRILLER JS DRILL RIG CME-55LC GROUND WATER LEVELS _____
 HAMMER TYPE Auto AT TIME OF DRILLING None
 LOGGED BY SP CHECKED BY JE AT END OF DRILLING _____
 NOTES _____



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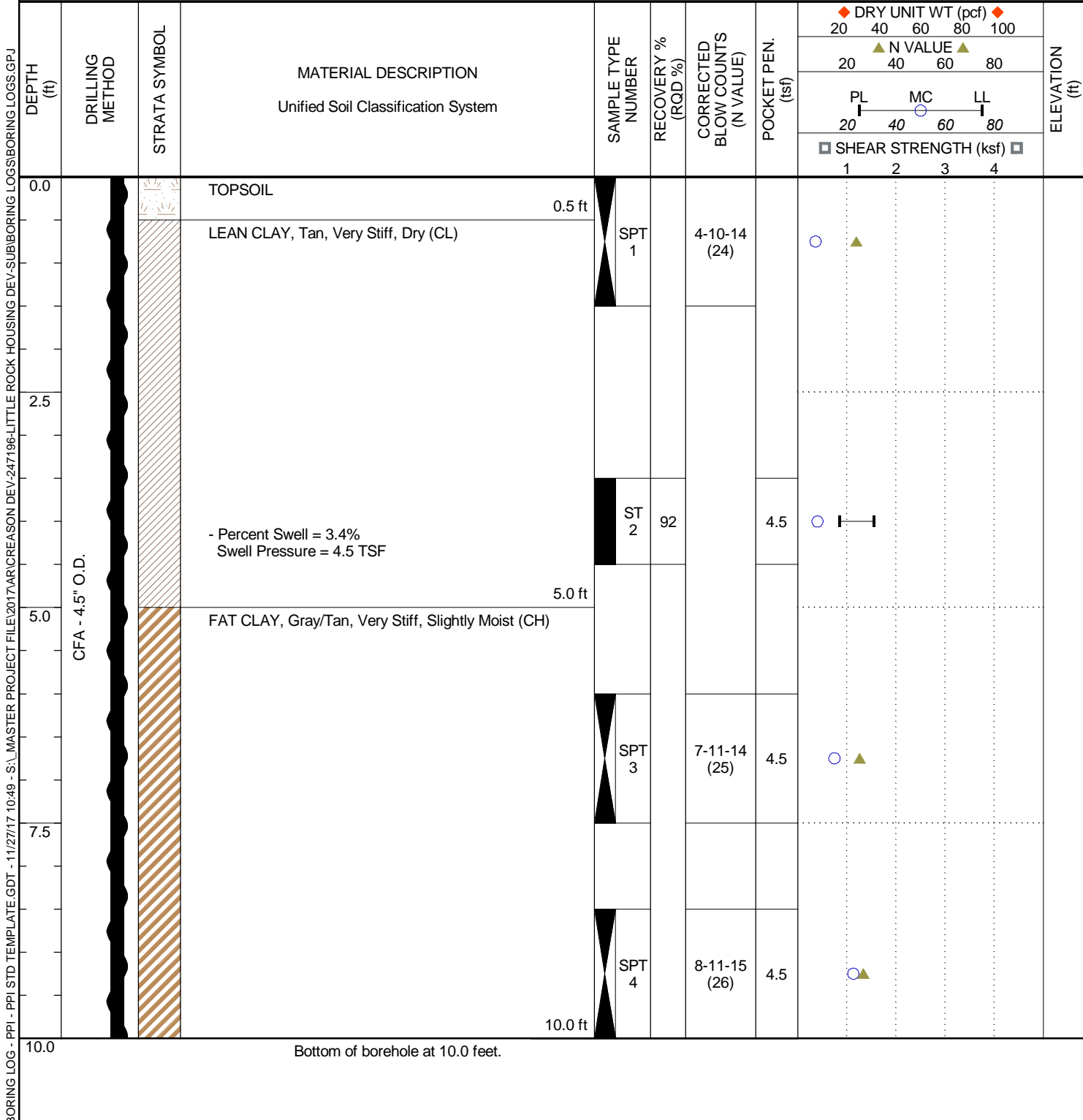
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BORING NUMBER

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CLIENT Creason Development **PROJECT NAME** Village Springs Cottages - Phase I
PROJECT NO. 247196 **PROJECT LOCATION** Little Rock, Arkansas
DATE STARTED 11/6/17 **COMPLETED** 11/6/17 **SURFACE ELEVATION** _____ **BENCHMARK EL.** _____
DRILLER JS **DRILL RIG** CME-55LC **GROUND WATER LEVELS**
HAMMER TYPE Auto **AT TIME OF DRILLING** None
LOGGED BY SP **CHECKED BY** JE **AT END OF DRILLING** _____
NOTES _____





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KEY TO SYMBOLS

CLIENT Creason Development

PROJECT NAME Village Springs Cottages - Phase I

PROJECT NO. 247196

PROJECT LOCATION Little Rock, Arkansas

LITHOLOGIC SYMBOLS (Unified Soil Classification System)



CH: USCS High Plasticity Clay



CL: USCS Low Plasticity Clay



TOPSOIL: Topsoil

SAMPLER SYMBOLS



Standard Penetration Test



Shelby Tube

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
 PI - PLASTIC INDEX (%)
 W - MOISTURE CONTENT (%)
 DD - DRY DENSITY (PCF)
 NP - NON PLASTIC
 -200 - PERCENT PASSING NO. 200 SIEVE
 PP - POCKET PENETROMETER (TSF)

TV - TORVANE
 PID - PHOTOIONIZATION DETECTOR
 UC - UNCONFINED COMPRESSION
 ppm - PARTS PER MILLION
 Water Level at Time Drilling, or as Shown
 Water Level at End of Drilling, or as Shown
 Water Level After 24 Hours, or as Shown

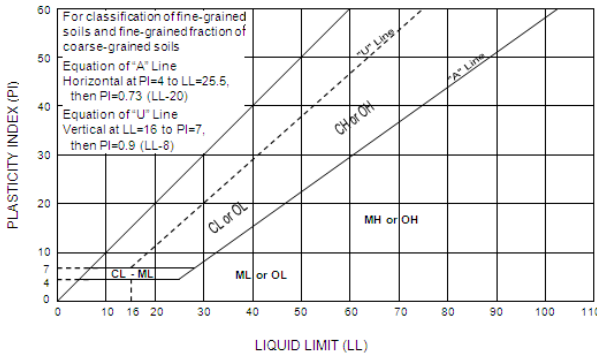
APPENDIX II
GENERAL NOTES

GENERAL NOTES

SOIL PROPERTIES & DESCRIPTIONS

COHESIVE SOILS

Consistency	Unconfined Compressive Strength (Qu)	Pocket Penetrometer Strength	N-Value
	(psf)	(tsf)	(blows/ft)
Very Soft	<500	<0.25	0-1
Soft	500-1000	0.25-0.50	2-4
Medium Stiff	1001-2000	0.50-1.00	5-8
Stiff	2001-4000	1.00-2.00	9-15
Very Stiff	4001-8000	2.00-4.00	16-30
Hard	>8000	>4.00	31-60
Very Hard			>60



Group Symbol	Group Name
CL	Lean Clay
ML	Silt
OL	Organic Clay or Silt
CH	Fat Clay
MH	Elastic Silt
OH	Organic Clay or Silt
PT	Peat
CL-CH	Lean to Fat Clay

Plasticity		Moisture	
Description	Liquid Limit (LL)	Descriptive Term	Guide
Lean	<45%	Dry	No indication of water
Lean to Fat	45-49%	Moist	Indication of water
Fat	≥50%	Wet	Visible water

Fine Grained Soil Subclassification	Percent (by weight) of Total Sample
Terms: SILT, LEAN CLAY, FAT CLAY, ELASTIC SILT Sandy, gravelly, abundant cobbles, abundant boulders with sand, with gravel, with cobbles, with boulders scattered sand, scattered gravel, scattered cobbles, scattered boulders a trace sand, a trace gravel, a few cobbles, a few boulders	PRIMARY CONSTITUENT >30-50] >15-30] – secondary coarse grained constituents 5-15] <5]
The relationship of clay and silt constituents is based on plasticity and normally determined by performing index tests. Refined classifications are based on Atterberg Limits tests and the Plasticity Chart.	

NON-COHESIVE (GRANULAR) SOILS

RELATIVE DENSITY	N-VALUE
Very Loose	0-4
Loose	5-10
Medium Dense	11-24
Dense	25-50
Very Dense	≥51

MOISTURE CONDITION	
Descriptive Term	Guide
Dry	No indication of water
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table.

**GRAIN SIZE IDENTIFICATION		
Name	Size Limits	Familiar Example
Boulder	12 in. or more	Larger than basketball
Cobbles	3 in. to 12 in.	Grapefruit
Coarse Gravel	¾-in. to 3 in.	Orange or lemon
Fine Gravel	No. 4 sieve to ¾-in.	Grape or pea
Coarse Sand	No. 10 sieve to No. 4 sieve	Rock salt
Medium Sand	No. 40 sieve to No. 10 sieve	Sugar, table salt
Fine Sand*	No. 200 sieve to No. 40 sieve	Powdered sugar
Fines	Less than No. 200 sieve	

*Particles finer than fine sand cannot be discerned with the naked eye at a distance of 8 in.

Coarse Grained Soil Subclassification	Percent (by weight) of Total Sample
Terms: GRAVEL, SAND, COBBLES, BOULDERS Sandy, gravelly, abundant cobbles, abundant boulders with gravel, with sand, with cobbles, with boulders scattered gravel, scattered sand, scattered cobbles, scattered boulders a trace gravel, a trace sand, a few cobbles, a few boulders	PRIMARY CONSTITUENT >30-50] >15-30] – secondary coarse grained constituents 5-15] <5]
Silty (MH & ML)*, clayey (CL & CH)* (with silt, with clay)* (trace silt, trace clay)*	<15] 5-15] – secondary fine grained constituents <5]
*Index tests and/or plasticity tests are performed to determine whether the term "silt" or "clay" is used.	

*Modified after Ref. ASTM D2487-93 & D2488-93

**Modified after Ref. Oregon DOT 1987 & FHWA 1997

***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

GENERAL NOTES

BEDROCK PROPERTIES & DESCRIPTIONS

ROCK QUALITY DESIGNATION (RQD)	
Description of Rock Quality	*RQD (%)
Very Poor	< 25
Poor	25-50
Fair	50-75
Good	75-90
Excellent	90-100

*RQD is defined as the total length of sound core pieces 4 in. or greater in length, expressed as a percentage of the total length cored. RQD provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.

SCALE OF RELATIVE ROCK HARDNESS		
Term	Field Identification	Approx. Unconfined Compressive Strength (tsf)
Extremely Soft	Can be indented by thumbnail	2.6-10
Very Soft	Can be peeled by pocket knife	10-50
Soft	Can be peeled with difficulty by pocket knife	50-260
Medium Hard	Can be grooved 2 mm deep by firm pressure of knife	260-520
Moderately Hard	Requires one hammer blow to fracture	520-1040
Hard	Can be scratched with knife or pick only with difficulty	1040-2610
Very Hard	Cannot be scratched by knife or sharp pick	>2610

DEGREE OF WEATHERING	
Slightly Weathered	Rock generally fresh, joints stained and discoloration extends into rock up to 25mm (1 in), open joints may contain clay, core rings under hammer impact.
Weathered	Rock mass is decomposed 50% or less, significant portions of rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
Highly Weathered	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

GRAIN SIZE (TYPICALLY FOR SEDIMENTARY ROCKS)		
Description	Diameter (mm)	Field Identification
Very Coarse Grained	>4.76	
Coarse Grained	2.0-4.76	Individual grains can easily be distinguished by eye.
Medium Grained	0.42-2.0	Individual grains can be distinguished by eye.
Fine Grained	0.074-0.42	Individual grains can be distinguished by eye with difficulty.
Very Fine Grained	<0.074	Individual grains cannot be distinguished by unaided eye.

VOIDS	
Pit	Voids barely seen with naked eye to 6mm (¼-in)
Vug	Voids 6 to 50mm (¼ to 2 in) in diameter
Cavity	50 to 6000mm (2 to 24 in) in diameter
Cave	>600mm

BEDDING THICKNESS	
Very Thick Bedded	> 3' thick
Thick Bedded	1' to 3' thick
Medium Bedded	4" to 1' thick
Thin Bedded	1¼" to 4" thick
Very Thin Bedded	½" to 1¼" thick
Thickly Laminated	⅛" to ½" thick
Thinly Laminated	⅛" or less (paper thin)

DRILLING NOTES

Drilling and Sampling Symbols

NQ – Rock Core (2-in. diameter)	CFA – Continuous Flight (Solid Stem) Auger	WB – Wash Bore or Mud Rotary
HQ – Rock Core (3 in. diameter)	SS – Split Spoon Sampler	TP – Test-Pit
HSA – Hollow Stem Auger	ST – Shelby Tube	HA – Hand Auger

Soil Sample Types

Shelby Tube Samples: Relatively undisturbed soil samples were obtained from the borings using thin wall (Shelby) tube samplers pushed hydraulically into the soil in advance of drilling. This sampling, which is considered to be undisturbed, was performed in accordance with the requirements of ASTM D 1587. This type of sample is considered best for the testing of "in-situ" soil properties such as natural density and strength characteristics. The use of this sampling method is basically restricted to soil containing little to no chert fragments and to softer shale deposits.

Split Spoon Samples: The Standard Penetration Test is conducted in conjunction with the split-barrel sampling procedure. The "N" value corresponds to the number of blows required to drive the last 1 foot of an 18-in. long, 2-in. O.D. split-barrel sampler with a 140 lb. hammer falling a distance of 30 in. The Standard Penetration Test is carried out according to ASTM D-1586.

Water Level Measurements

Water levels indicated on the boring logs are levels measured in the borings at the times indicated. In permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils, shallow groundwater may indicate a perched condition. Caution is merited when interpreting short-term water level readings from open bore holes. Accurate water levels are best determined from piezometers.

Automatic Hammer

Palmerton and Parrish's CME's are equipped with automatic hammers. The conventional method used to obtain disturbed soil samples used a safety hammer operated by company personnel with a cat head and rope. However, use of an automatic hammer allows a greater mechanical efficiency to be achieved in the field while performing a Standard Penetration resistance test based upon automatic hammer efficiencies calibrated using dynamic testing techniques.

*Modified after Ref. ASTM D2487-93 & D2488-93

**Modified after Ref. Oregon DOT 1987 & FHWA 1997

***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

APPENDIX III

IMPORTANT INFORMATION REGARDING YOUR GEOTECHNICAL REPORT

Important Information about Your Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you — should apply the report for any purpose or project except the one originally contemplated.*

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,

- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that

have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely on Your ASFE-Member Geotechnical Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.



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SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Paper Document submittal.
- C. Electronic document submittal.
- D. Preconstruction meeting.
- E. Site mobilization meeting.
- F. Progress meetings.
- G. Submittals for review, information, and project closeout.
- H. Requests for Interpretation (RFI) procedures.
- I. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 00 72 00 - 20 12 007: Dates for applications for payment.
- B. Section 01 35 63 - Energy Star Requirements: Reporting related to energy efficiency certification.
- C. Section 01 35 64 - Sustainable Construction Requirements: Reporting related to sustainability certification project procedures.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Conform to requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DOCUMENT SUBMITTAL - GENERAL

- A. Submittals shall be reviewed by the Architect within ten (10) business days from receipt and shall be returned to the Contractor for action or distribution.
 - 1. All Submittals shall be reviewed and approved – by stamp and/or signature - by the Contractor prior to submission to the Architect. Submittals received by the Architect and not approved by the Contractor will be returned without review or processing.
 - 2. Submittals that require review by the Architect's or Owner's Consultants shall be forwarded to the Consultant upon receipt by the Architect. The Consultant shall then have ten (10) business days from receipt of submittal to review and return to the Architect, whereupon the Architect shall forward the reviewed submittal to the Contractor. The Contractor shall take into account the additional time associated with this process when scheduling.
 - 3. Besides submittals for review, information, and closeout, this procedure applies to requests for information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.

3.02 PAPER DOCUMENT SUBMITTAL

- A. Submit a minimum of five (5) copies of each submittal for the Architect's review and use in distribution to the Owner. Where the submittal will require review by the Architect's or Owner's Consultants, submit seven (7) copies of each submittal. The Architect shall return a minimum of three (3) copies upon completion of review process.

3.03 ELECTRONIC DOCUMENT SUBMITTAL

- A. All documents transmitted for purposes of administration of the contract may be in electronic (PDF) format and transmitted via e-mail.
- B. All electronic Submittals shall be sent to the Architect from the Contractor – electronic submittals from sub-contractors will not be accepted.

- C. All electronic submittals shall have the stamp and/or signature of approval by the Contractor indicating product or equipment submitted has been reviewed for compliance with Contract Documents.
- D. All electronic submittals shall be in 8-1/2 x 11 inches (Letter) format. No other page/paper size submittals will be accepted.
- E. Each electronic Submittal shall be no larger than 20 megabytes file size. Submittals with multiple PDF files that exceed this limit must be submitted in separate, smaller parts.
- F. All electronic Submittals shall be reviewed and returned in (PDF) format; no hard copies shall be provided. The General Contractor shall be responsible for any necessary reproduction and distribution of the reviewed electronic submittal to his sub-contractors.
- G. Electronic document requirements do not apply to samples or color selection charts.
- H. The Architect is not responsible for any delays in the review process due to:
 - 1. Misdirected or lost emails.
 - 2. Corrupted files, or files that otherwise, can not be opened.
 - 3. Non-legible or incomplete scans.
 - 4. Technical issues or difficulties with email servers outside of the Architect's office.
 - 5. Technical issues, difficulties, or outages of the Internet that occur outside of the Architect's office.

3.04 PRECONSTRUCTION MEETING

- A. Architect or ADFA may elect to schedule a meeting prior to start of construction.
- B. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect.
 - 4. Special consultants.
 - 5. Contractor's superintendent.
 - 6. Major subcontractors.
- C. Agenda:
 - 1. Use of premises by Owner and Contractor.
 - 2. Owner's requirements and partial occupancy prior to completion.
 - 3. Review of list of Subcontractors, list of Products, schedule of values, and progress schedule.
 - 4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 5. Survey and building layout.
 - 6. Security and housekeeping procedures.
 - 7. Schedules.
 - 8. Application for payment procedures.
 - 9. Procedures for testing.
 - 10. Procedures for maintaining record documents.
- D. Record minutes and distribute copies within five business days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.05 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect.
 - 4. Contractor's superintendent.
 - 5. Major subcontractors.
- C. Agenda:
 - 1. Review of work progress.
 - 2. Field observations, problems, and decisions.

3. Identification of problems that impede, or will impede, planned progress.
 4. Review of submittals schedule and status of submittals.
 5. Maintenance of progress schedule.
 6. Corrective measures to regain projected schedules.
 7. Planned progress during succeeding work period.
 8. Maintenance of quality and work standards.
 9. Effect of proposed changes on progress schedule and coordination.
 10. Other business relating to work.
- D. Record minutes and distribute copies within five working days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.06 REQUESTS FOR INTERPRETATION (RFI)

- A. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
- C. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
- D. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- E. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
- F. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

3.07 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below .

3.08 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
1. Design data.
 2. Sustainability certification related submittals and reports.
 3. Certificates.
 4. Test reports.
 5. Inspection reports.
 6. Manufacturer's instructions.
 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

3.09 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.

- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Bonds.
 - 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

3.10 SUBMITTAL PROCEDURES

- A. General Requirements:
 - 1. Use a separate transmittal for each item.
 - 2. Transmit using approved form.
 - 3. Sequentially identify each item. For revised submittals use original number and a sequential alphabetical suffix.
 - 4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 - 5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
 - 6. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - 7. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
 - 8. Provide space for Contractor and Architect review stamps.
 - 9. When revised for resubmission, identify all changes made since previous submission.
 - 10. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
 - 11. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
 - 12. Submittals not requested will be recognized, and will be returned "Not Reviewed",
- B. Product Data Procedures:
 - 1. Submit only information required by individual specification sections.
 - 2. Collect required information into a single submittal.
 - 3. Submit concurrently with related shop drawing submittal.
 - 4. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
 - 1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related work.
 - 2. Do not reproduce the Contract Documents to create shop drawings.
 - 3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Samples Procedures:
 - 1. Transmit related items together as single package.
 - 2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
 - 3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.

3.11 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and accept, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt, but will take no other action.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.
- D. Architect's and consultants' actions on items submitted for review:
1. Authorizing purchasing, fabrication, delivery, and installation:
 - a. "No Exceptions Taken", or language with same legal meaning.
 - b. "Exceptions Noted", or language with same legal meaning.
 - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
 2. Not Authorizing fabrication, delivery, and installation:
 - a. "Revise and Resubmit".
 - 1) Resubmit revised item, with review notations acknowledged and incorporated.
 - b. "Rejected".
 - 1) Submit item complying with requirements of Contract Documents.
- E. Architect's and consultants' actions on items submitted for information:
1. Items for which no action was taken:
 - a. "No Action Taken" - to notify the Contractor that the submittal has been received for record only.

END OF SECTION

SECTION 01 35 64
SUSTAINABLE CONSTRUCTION REQUIREMENTS

PART 1 GENERAL

1.01 PROJECT GOALS

- A. This project has been designed to the LEED - Silver level for new construction.
- B. The project is to be constructed per the attached LEED Checklist.
- C. The Contractor is not responsible for the application for certification, nor for determination of methods of achieving sustainable design, unless specifically so noted.
- D. The consultant has conducted a 90 percent progress Design Review and provided a pre-construction check list that follows this section.
 - 1. Architect has indicated mandatory and point-valued, or other specific items in the Construction Documents relevant to the sustainable design goals, however these items are not necessarily all-inclusive.
 - 2. Where conflicts occur between these items and the consultant's checklist, the more restrictive requirement shall govern.
- E. Contractor shall familiarize himself with the relevant requirements of this checklist and the Contract Documents, and provide the necessary information and instruction to all subcontractors and installers.

1.02 OBSERVATION OF WORK

- A. During construction, the Architect is contracted to be on-site on a monthly basis to view the construction progress and note such. It is the Architect's responsibility to conduct inspections related to the sustainable construction checklist items.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. New Product Documentation: For each new product indicated by either the consultant's checklist or the Contract Document, submit the Product Data sheets, with evidence of compliance attached.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PROCEDURES

- A. Submit sustainable design documentation to Architect, unless otherwise indicated.
- B. Following construction the building 'Owners Manual', and 'Resident Training Requirements' specified in the LEED checklist are to be coordinated with the Owner and the Contractor.

END OF SECTION

SECTION 01 61 16
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for Indoor-Emissions-Restricted products.
- B. Requirements for VOC-Content-Restricted products.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

1.03 DEFINITIONS

- A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Interior paints and coatings.
 - 2. Interior adhesives and sealants, including flooring adhesives.
 - 3. Flooring.
 - 4. Composite wood.
 - 5. Products making up wall and ceiling assemblies.
 - 6. Thermal and acoustical insulation.
- B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Exterior and interior paints and coatings.
 - 2. Exterior and interior adhesives and sealants, including flooring adhesives.
 - 3. Wet-applied roofing and waterproofing.
- C. Interior of Building: Anywhere inside the exterior weather barrier.
- D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.
- F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
 - 1. Concrete.
 - 2. Clay brick.
 - 3. Metals that are plated, anodized, or powder-coated.
 - 4. Glass.
 - 5. Ceramics.
 - 6. Solid wood flooring that is unfinished and untreated.

1.04 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005 (Reapproved 2013).
- C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers; California Department of Public Health; v1.1, 2010.
- D. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products; California Air Resources Board; current edition.
- E. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2007.
- F. CHPS (HPPD) - High Performance Products Database; Current Edition at www.chps.net/.
- G. CRI (GLP) - Green Label Plus Testing Program - Certified Products; www.carpet-rug.org; current edition.
- H. SCAQMD 1113 - South Coast Air Quality Management District Rule No.1113; current edition.

- I. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.
- J. SCS (CPD) - SCS Certified Products; current listings at www.scscertified.com.
- K. UL (GGG) - GREENGUARD Gold Certified Products; current listings at <http://http://productguide.ulenvironment.com/QuickSearch.aspx>.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.
- C. Sustainable Design Reporting: Submit evidence of compliance along with Material Content Form.
- D. Installer Certifications Regarding Prohibited Content: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of his products, or 2) that such products used comply with these requirements.

1.06 QUALITY ASSURANCE

- A. Indoor Emissions Standard and Test Method: CAL (CDPH SM), using New Single-Family Residence exposure scenario and the allowable concentrations specified in the method, and range of total VOC's after 14 days.
 - 1. Wet-Applied Products: State amount applied in mass per surface area.
 - 2. Paints and Coatings: Test tinted products, not just tinting bases.
 - 3. Evidence of Compliance: Acceptable types of evidence are the following;
 - a. Current UL (GGG) certification.
 - b. Current SCS (CPD) Floorscore certification.
 - c. Current SCS (CPD) Indoor Advantage Gold certification.
 - d. Current listing in CHPS (HPPD) as a low-emitting product.
 - e. Current CRI (GLP) certification.
 - f. Test report showing compliance and stating exposure scenario used.
 - 4. Product data submittal showing VOC content is NOT acceptable evidence.
 - 5. Manufacturer's certification without test report by independent agency is NOT acceptable evidence.
- B. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed in accordance with requirements.
 - b. Certification by manufacturer that product complies with requirements.
- C. Composite Wood Emissions Standard: CARB (ATCM) for ultra-low emitting formaldehyde (ULEF) resins.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current SCS "No Added Formaldehyde (NAF)" certification; www.scscertified.com.
 - b. Report of laboratory testing performed in accordance with requirements.
 - c. Published product data showing compliance with requirements.
- D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.
- B. Indoor-Emissions-Restricted Products: Comply with Indoor Emissions Standard and Test Method, except for:
 - 1. Composite Wood, Wood Fiber, and Wood Chip Products: Comply with Composite Wood Emissions Standard or contain no added formaldehyde resins.
 - 2. Inherently Non-Emitting Materials.

- C. VOC-Content-Restricted Products: VOC content not greater than required by the following:
 - 1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
 - 2. Joint Sealants: SCAQMD 1168 Rule.
 - 3. Paints and Coatings: Each color; most stringent of the following:
 - a. 40 CFR 59, Subpart D.
 - b. SCAQMD 1113 Rule.
 - c. CARB (SCM).
 - 4. Wet-Applied Roofing and Waterproofing: Comply with requirements for paints and coatings.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.
- B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Floors and slabs on grade.
- C. Concrete foundation walls and footings.
- D. Concrete reinforcement.
- E. Joint devices associated with concrete work.
- F. Miscellaneous concrete elements, including equipment pads, thrust blocks, and manholes and structures.
- G. Concrete curing.

1.02 RELATED REQUIREMENTS

- A. Section 03 52 10 - Lightweight Concrete Floor Fill.
- B. Section 07 92 00 - Joint Sealants: Products and installation for sealants for saw cut joints and isolation joints in slabs.
- C. Section 31 31 16 - Termite Control: Termite resistant vapor barrier sheet.
- D. Section 32 13 13 - Concrete Paving: Sidewalks, curbs and gutters.

1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- C. ACI 302.1R - Guide for Concrete Floor and Slab Construction; 2004 (Errata 2007).
- D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.
- E. ACI 305R - Hot Weather Concreting; 2010.
- F. ACI 306R - Cold Weather Concreting; 2010.
- G. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).
- H. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).
- I. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.
- J. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009 (Reapproved 2015).
- K. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- L. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016.
- M. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2016b.
- N. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2016a.
- O. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2015a.
- P. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.
- Q. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.
- R. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- S. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.

- T. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2016.
- U. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.
- V. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.
- W. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete; 2011.
- X. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
- Y. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).
- Z. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars; 2015.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix Design: Submit proposed concrete mix design.
 - 1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
 - 2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
 - 3. Indicate amounts of mix water to be withheld for later addition at Project site.
- D. Samples: Submit samples of underslab vapor retarder to be used.
- E. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.
- D. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- E. Manufacturer Qualifications: Company specializing in manufacturing ready-mix concrete as specified in this section with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
 - 2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 3. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
 - 2. Finish: Galvanized in accordance with ASTM A767/A767M, Class I, unless otherwise indicated.

- B. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.
 - 1. Form: Flat Sheets.
 - 2. WWR Style: 6x6 - W10xW10, unless noted otherwise.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 - 3. Provide stainless steel or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
 - 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C 33.
 - 1. Acquire aggregates for entire project from same source.
 - 2. Nominal Maximum Aggregate Size: 3/4 inch.
 - 3. Combined Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve.
- C. Fly Ash: ASTM C618, Class C or F.
- D. Water: Clean and not detrimental to concrete.

2.04 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Air Entrainment Admixture: ASTM C260/C260M.
- C. Accelerating Admixture: ASTM C494/C494M Type C.
- D. Retarding Admixture: ASTM C494/C494M Type B.
- E. Water Reducing Admixture: ASTM C494/C494M Type A.

2.05 ACCESSORY MATERIALS

- A. Termite-Resistant Vapor Barrier Sheet: As specified in Section 31 31 16 - Termite Control.

2.06 BONDING AND JOINTING PRODUCTS

- A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.
- B. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
 - 1. Material: ASTM D1751, cellulose fiber.
 - 2. Material: ASTM D1752 cork (Type II).
- C. Dowel Sleeves: Plastic sleeve for smooth, round, steel load-transfer dowels.

2.07 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
- B. Curing and Sealing Compound, Moisture Emission Reducing: Liquid, membrane-forming, clear sealer, for application to newly placed concrete; capable of providing adequate bond for flooring adhesives, initially and over the long term; with sufficient moisture vapor impermeability to prevent deterioration of flooring adhesives due to moisture emission.
 - 1. Use this product to cure and seal all slabs to receive adhesively applied flooring or roofing.
 - 2. Comply with ASTM C309 and ASTM C1315 Type I Class A.
 - 3. VOC Content: Less than 100 g/L.
 - 4. Solids Content: 25 percent, minimum.
 - 5. Manufacturers:
 - a. MasterKure CC 160 WB (formerly Kure-N-Seal) as manufactured by BASF Corp.
 - b. Or approved equal.

- C. Curing and Sealing Compound, Low Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.
 - 1. Vehicle: Water-based.
 - 2. VOC Content: OTC compliant.
- D. Moisture-Retaining Sheet: ASTM C171.
 - 1. Polyethylene film, clear, minimum nominal thickness of 0.0040 inch.
 - 2. White-burlap-polyethylene sheet, weighing not less than 10 ounces per linear yard, 40 inches wide.
- E. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- D. Normal Weight Concrete (Footing and unexposed foundation walls):
 - 1. Compressive Strength (Footings), when tested in accordance with ASTM C39/C39M at 28 days: 3,000 pounds per square inch.
 - 2. Compressive Strength (Foundation Walls), when tested in accordance with ASTM C39/C39M at 28 days: 3,500 pounds per square inch.
 - 3. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
 - 4. Maximum Slump: 4 inches, +/- 1 inch as delivered in field.
 - 5. Maximum Slump with High-Range Water Reducing admixture: 8 inches after addition of admixture.
 - 6. Maximum Aggregate Size: 3/4 inch.
- E. Normal Weight Concrete (Exposed foundation walls):
 - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
 - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
 - 3. Maximum Slump: 4 inches, +/- 1 inch as delivered in field.
 - 4. Maximum Slump with High-Range Water Reducing admixture: 8 inches after addition of admixture.
 - 5. Maximum Aggregate Size: 3/4 inch.
- F. Interior Concrete Slabs:
 - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
 - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
 - 3. Cement Content: Minimum 550 lb per cubic yard.
 - 4. Maximum Slump: 4 inches.
- G. Patios, Porches, Steps, and other Flatwork:
 - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
 - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
 - 3. Total Air Content: 3 percent, determined in accordance with ASTM C173/C173M.
 - 4. Maximum Slump: 4 inches.

2.09 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in accordance with bonding agent manufacturer's instructions.
 - 1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
 - 2. Use latex bonding agent only for non-load-bearing applications.
- E. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
 - 1. Granular Fill Over Vapor Retarder: Cover vapor retarder with compactible granular fill as indicated on the drawings. Do not use sand.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.
- B. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- C. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
- D. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Notify Architect not less than 24 hours prior to commencement of placement operations.
- D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- E. Ensure reinforcement, inserts, and embedded parts will not be disturbed during concrete placement.
- F. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
- G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

- A. Locate joints as indicated on the drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Maximum Variation of Surface Flatness:
 - 1. Exposed Concrete Floors: 1/4 inch in 10 feet.
 - 2. Under Seamless Resilient Flooring: 1/4 inch in 10 feet.

3. Under Carpeting: 1/4 inch in 10 feet.
- B. Correct the slab surface if tolerances are less than specified.
- C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
 1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
 2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include quarry tile, ceramic tile, and Portland cement terrazzo with full bed setting system.
 2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, and thin set ceramic tile.
 3. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.

3.08 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 1. Normal concrete: Not less than 7 days.
 2. High early strength concrete: Not less than 4 days.
- C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- D. Surfaces Not in Contact with Forms:
 1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
 2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by saturated burlap.
 - a. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
 3. Final Curing: Begin after initial curing but before surface is dry.
 - a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.
 - b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.09 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control inspections and tests.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

- D. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.
- E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.
- G. Slab Testing: Cooperate with manufacturer of specified moisture vapor reduction admixture (MVRA) to allow access for sampling and testing concrete for compliance with warranty requirements.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.11 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 04 05 11
MORTAR AND MASONRY GROUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mortar for masonry.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Installation of mortar.

1.03 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2013.
- B. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
- C. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
- D. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2015.
- E. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2015a.
- F. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
- G. ASTM C1072 - Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2013.
- H. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2016.
- I. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry; 2015.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.06 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

- A. Use only factory premixed packaged dry materials for mortar and grout, with addition of water only at project site.
 - 1. Exception: If a specified mix design is not available in a premixed dry package, provide equivalent mix design using standard non-premixed materials.
- B. Mortar Mix Designs: ASTM C270, Property Specification.
 - 1. Masonry below grade and in contact with earth: Type M. 2,500 psi strength at 28 days.
 - 2. Exterior Masonry Veneer: Type S. 1,800 psi strength at 28 days.

2.02 MATERIALS

- A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Type: As required for location.
 - 2. Color: Mineral pigments added as required to produce approved color sample.

- B. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
 - 1. Color(s): As selected by Architect from manufacturer's full range.
- C. Water: Clean and potable.
- D. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.
 - 1. Acceptable product: W.R Grace: Dry Block/Dry Brick.
 - 2. Acceptable product: Spec Mix: IWR Mortar.
 - 3. Acceptable product: ACM Chemistries: Rain Bloc.

2.03 MORTAR MIXING

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio; mix in accordance with manufacturer's instructions, uniform in coloration.
- D. Do not use anti-freeze compounds to lower the freezing point of mortar.
- E. If water is lost by evaporation, re-temper only within two hours of mixing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install mortar to requirements of section(s) in which masonry is specified.

3.02 FIELD QUALITY CONTROL

- A. Test and evaluate mortar in accordance with ASTM C780 procedures.
 - 1. Test with same frequency as specified for masonry units.
- B. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1314, and for flexural bond strength in accordance with ASTM C1072 or ASTM E518/E518M; perform tests and evaluate results as specified in individual masonry sections.

END OF SECTION

SECTION 04 20 00

UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clay Facing Brick.
- B. Reinforcement and Anchorage.
- C. Flashings.
- D. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 04 05 11 - Mortar and Masonry Grout.
- B. Section 05 50 00 - Metal Fabrications: Loose steel lintels.
- C. Section 06 10 00 - Rough Carpentry: Brick veneer over wood framing.
- D. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- B. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2016.
- C. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2005.
- D. BIA Technical Notes No. 18A - Accommodating Expansion of Brickwork; 2006.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units and masonry accessories.
- C. Samples: Submit four samples of facing brick units to illustrate color, texture, and extremes of color range.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials such as mud, grease, or other debris.
 - 1. Veneer Brick: Inspect bricks upon delivery at site and immediately inform manufacturer or supplier of any observed defects.
 - 2. Protect bagged materials and brick siding units from rain and groundwater by covering and storing on pallets or other means.
 - 3. Carefully stack and store all flashings and metal trim to prevent creasing, twisting, or other damage.

PART 2 PRODUCTS

2.01 BRICK UNITS

- A. Manufacturers:
 - 1. Belden Brick: www.beldenbrick.com.
 - 2. Boral Bricks, Inc: www.boralbricks.com.
 - 3. Endicott Clay Products Co: www.endicott.com.
 - 4. Sioux City Brick and Tile Co: www.siouxcitybrick.com.
- B. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
 - 1. Color and texture: Williamsburg Hampton.
 - 2. Actual size: 3-1/8 inches x 2-13/16 inches x 8-5/8 inches.

2.02 MORTAR MATERIALS

- A. Mortar and Grout: As specified in Section 04 05 11.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Wall Ties: Corrugated formed sheet metal, 7/8 inch wide by 0.03 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.

2.04 THROUGH-WALL FLASHINGS

- A. Rubberized Asphalt Flashing: Self-adhering polymer modified asphalt sheet; 40 mils (0.040 inch) minimum total thickness; with cross laminated polyethylene top and bottom surfaces.
 - 1. Water Absorption: ASTM D570 - max. 0.1% by weight.
 - 2. Water Vapor Transmission: ASTM E96 - less than 0.05 perms.
 - 3. Puncture Resistance: ASTM E154 - 80 pounds.
- B. Factory-Fabricated Flashing Corners and Ends: by flashing manufacturer.
- C. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.
- D. Surface Conditioner: Water-based latex liquid for substrate preparation prior to installation of flashing membrane, as recommended by flashing manufacturer.
 - 1. Application temperature: 25 degrees (F) or above.
 - 2. Freezing Point: 14 degrees (F).
 - 3. VOC Content: Not to exceed 125 g/L.

2.05 ACCESSORIES

- A. Preformed Control Joints: Neoprene material. Provide with corner and tee accessories, fused joints.
- B. Joint Filler: Closed cell polyethylene; oversized 50 percent to joint width; self expanding, by maximum lengths available
- C. Cavity Mortar Control: Semi-rigid polyethylene, nylon, or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
 - 1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
 - a. It shall not be reactive to PVC, polyethylene, polystyrene, copper, lead, rubberized asphalt, or stainless steel and shall not degrade or decompose over the life of the building.
 - b. It shall not support the growth of mold or fungus.
 - c. Manufacturers:
 - 1) Advanced Building Products Inc; Mortar Break: www.advancedflashing.com/sle.
 - 2) Mortar Net Solutions; Mortar Net: www.mortarnet.com.
 - 3) Or approved equal.
- D. Nailing Strips: Softwood lumber, preservative treated for moisture resistance, dovetail shape, sized to masonry joints.
- E. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.
- F. Cavity Vents:
 - 1. Type: Polypropylene, 'honeycomb'.
 - a. Size: 3/8 inch x 3-1/2 inch x height of brick.
 - b. Testing: ASTM D2240, D790B, D638, D1238B
 - c. Color:
 - 2. Manufacturers:
 - a. Mortar Net Solutions; Cell Vent: www.mortarnet.com.
 - b. Or approved equal..
- G. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
 - 1. Manufacturers:
 - a. PROSOCO Inc.; SureKlean No. 600: www.prosoco.com
 - b. Or approved equal.

- H. Penetrating Water Repellent: Penetrating, water-based silicone water repellent for concrete and masonry.
 - 1. Manufacturers:
 - a. PROSOCO Inc.; Sure Klean Weather Seal Siloxane: www.prosoco.com
 - b. Or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

3.04 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Brick Units:
 - 1. Bond: Running.
 - 2. Coursing: Five units and five mortar joints to equal 16 inches vertical dimension.
 - 3. Mortar Joints: 3/8 inch Concave/Rodded.

3.05 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 CELL VENTS

- A. Install cell vents in veneer walls at 16 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.
 - 1. Omit cell vents above through-wall flashing where located below grade.

3.07 CAVITY MORTAR CONTROL

- A. Match product size to cavity width; cavity shall be no more than 1/4 inch wider than mortar control material for cavities up to 2 inches in width.
 - 1. For cavities larger than 2 inches; place rigid insulation, of sufficient height to extend a min. of 6 inches above the top of the mortar control material, against the the outside face of the

- inner wythe. Insulation shall be of sufficient thickness to reduce any gap to less than 1/4 inch.
2. Multiple thicknesses of the mortar net may be installed to match cavity widths instead.
 - a. Inspection, preparation and installation procedure for multiple thicknesses is the same as for single thickness.
 - b. When installing multiple thicknesses, align the dovetail sections with each other.
- B. Inspect for, and repair, any holes in flashing immediately prior to installing mortar control material.
 - C. Clean flashing and cell vent holes so they are free of mortar droppings and debris immediately prior to installing mortar net.
 - D. For most walls, install one continuous row of the mortar control material at base of wall and over all wall openings directly on flashing.
 - E. To prevent mortar bridging between the outer wythe and inner wall, install flashing extending from the bottom of the mortar control material to at least 6 inches above the top of the material.
 - F. Lay the first 1 or 2 courses of brick at flashing level, then install the mortar control material continuously by placing it against the inside of the cavity.
 - G. Compress the mortar control material horizontally so it can be forced into cavities slightly smaller than its nominal thickness without affecting mortar net or wall performance.
 1. When forcing mortar control material into a cavity, ensure that mortar has set sufficiently to resist out pressure from product.
 - H. Install mortar control material so as to avoid contact with wall ties/anchors. Where installation requires contact with wall ties, conduit, or other materials that bridge or intrude into cavity between inner and outer walls, cut material neatly to fit.

3.08 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 24 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.
 1. Wall ties shall extend into the veneer a minimum of 1-1/2 inches, with not less than 5/8 inch mortar or grout cover to outside face.

3.09 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up at least 8 inches, minimum, to form watertight pan at non-masonry construction.
 2. Remove or cover protrusions or sharp edges that could puncture flashings.
 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Install flashing to dry surfaces at air and surface temperatures 25° F and above in accordance with manufacturer's written installation instructions at locations indicated on the Drawings.
- C. Precut pieces of flashing to easily handled lengths for each location.
 1. Remove silicone-coated release paper and position flashing carefully before placing in against the surface.
 2. When properly positioned, place against surface by pressing firmly into place by hand roller. Fully adhere flashing to substrate to prevent water from migrating under flashing.
 3. Overlap adjacent pieces 2 inches and roll all seams with a steel hand roller.
 4. Trim bottom edge 1/2 inch back from exposed face of the wall. Flashing shall not be permanently exposed to sunlight.
 5. At heads, sills and all flashing terminations turn up ends a minimum of 2 inches and make careful folds to form an end dam, with seams sealed, or use pre-formed end dams, with seams sealed.
 6. Apply a bead or trowel coat of mastic along flashing top edge, seams, cuts and penetrations.
- D. Do not allow the rubberized asphalt surface of the flashing membrane to come in contact with polysulfide sealants, creosote, uncured coal tar products or EPDM.

- E. Do not expose flashing membrane to sunlight for more than thirty days prior to enclosure.
- F. When required by dusty or dirty site conditions or by surfaces having irregular or rough texture, apply surface conditioner by spray, brush or roller at the rate recommended by manufacturer, prior to flashing installation.
 - 1. Allow surface to dry completely before flashing installation.

3.10 LINTELS

- A. Install loose steel lintels over masonry openings where indicated on the Drawings, or as required.
- B. Maintain minimum 8 inch bearing on each side of opening.

3.11 CONTROL AND EXPANSION JOINTS

- A. Comply with the provisions of BIA Technical Notes No. 18A except where exceeded by the requirements of the Contract Documents.
- B. Vertical expansion joints shall be located/installed as shown on the Drawings and/or in accordance with the following:
 - 1. For brickwork without openings, space expansion joints no more than 25 feet o.c.
 - 2. For brickwork with multiple openings (doors, windows, etc.) consider symmetrical placement of expansion joints and spacing of expansion joints no more than 20 feet o.c.
 - 3. Expansion joints shall be located/installed:
 - a. At or near corners.
 - b. At offsets or setbacks.
 - c. At wall intersections.
 - d. At changes in wall height.
- C. Horizontal expansion joints shall be located immediately below shelf angles. A minimum of 1/4 inch space for compressible material is required below shelf angle.
- D. Do not continue horizontal joint reinforcement through control or expansion joints.
- E. Form expansion joint as detailed on the Drawings, or in accordance with BIA Technical Notes No. 18A.
- F. Uniformly install rod at level recommended by sealant manufacturer (minimum – depth of joint after backer rod is installed is one half the width).

3.12 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- E. Maximum Variation of Mortar Joint Thickness: 1/8 inch in 3 ft.

3.13 CUTTING AND FITTING

- A. Cut and fit for pipes, conduit, and sleeves. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.14 CLEANING - GENERAL

- A. Clean work upon completion of each days work.
- B. Remove excess mortar, droppings, and mortar smears.
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with cleaning solution.
- E. Keep walls clean daily during installation using brushes as harsh cleaning methods after walls have been erected may mar the surface of the masonry.
 - 1. Do not allow excess mortar lumps or smears to harden on the finished surfaces.
- F. Use non-metallic tools in cleaning operations.

3.15 PROTECTION

- A. A. Protect finished Work from damage from construction activities.
 - 1. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

3.16 CLEANING - FINAL

- A. Clean the completed walls with masonry cleaner, strictly following the manufacturer's instructions including thorough rinsing.
- B. Do not use acid or abrasives for general cleaning of the finished surfaces.
 - 1. ONLY for stubborn mortar stains or smears, a 15:1 solution of water and a concentrated, general-purpose acidic cleaner may be used as long as the walls are thoroughly wetted before applying the cleaning solution and thoroughly rinsed with clean water immediately after washing.
- C. Failure to strictly follow these and manufacturer's instructions that results in permanent damage to the finished face and requires repair and/or replacement of material will be the responsibility of and at the cost of the Contractor.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel and aluminum items, including:
 - 1. Bollards.
 - 2. Lintels and angles.
 - 3. Joist hangers and structural connectors.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 09 91 13 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- E. ASTM B85/85M - Standard Specification for Aluminum-Alloy Die Castings; 2014.
- F. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- G. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- J. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.
- K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (Errata 2016).
- L. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- M. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- N. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product data: Submit manufacturer's data on products showing compliance with specified requirements and installation instructions.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.

- D. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
- B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.
- C. Aluminum-Alloy Die Castings: ASTM B85/B85M.
- D. Bolts, Nuts, and Washers: Stainless steel.

2.03 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
- B. Joist Hangers: Strap anchors, fabricated with sheet steel, 14 gage, 0.078 inch minimum base metal thickness; galvanized finish.
- C. Ledge Angles, Shelf Angles, and Channels Not Attached to Structural Framing: For support of masonry; galvanized finish.
- D. Lintels: As detailed; galvanized finish conforming to ASTM.

2.05 FINISHES - STEEL

- A. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete and items to be imbedded in masonry.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 FINISHES - ALUMINUM

- A. Exterior Aluminum Surfaces: pigmented organic coating.
- B. Pigmented Organic Coating System: AAMA 2603 polyester or acrylic baked enamel finish; color as indicated.

2.07 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.

- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.
- D. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural dimension lumber framing.
- B. Non-structural dimension lumber framing.
- C. Rough opening framing for doors and windows.
- D. Sheathing.
- E. Underlayment.
- F. Roofing nailers.
- G. Preservative treated wood materials.
- H. Fire retardant treated wood materials.
- I. Miscellaneous framing and sheathing.
- J. Communications and electrical room mounting boards.
- K. Concealed wood blocking, nailers, and supports.
- L. Miscellaneous wood nailers, furring, and grounds.
- M. Exterior trim and sub trim.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Setting anchors in concrete.
- B. Section 03 54 00 - Cast Underlayment.
- C. Section 05 50 00 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.
- D. Section 06 17 53 - Shop-Fabricated Wood Trusses.
- E. Section 06 20 00 - Finish Carpentry: Exterior vinyl or wood trim.
- F. Section 07 25 00 - Weather Barriers: Water-resistive barrier over sheathing.
- G. Section 07 46 46 - Fiber Cement Siding.
- H. Section 07 62 00 - Sheet Metal Flashing and Trim: Sill flashings.
- I. Section 10 44 00 - Fire Protection Specialties. Blocking for recessed fire extinguisher cabinets.

1.03 REFERENCE STANDARDS

- A. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- F. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.
- G. ICC-ES AC308 - Acceptance Criteria for Termite Physical Barrier Systems; 2014 (editorially revised 2017).
- H. PS 1 - Structural Plywood; 2009.
- I. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.
- J. PS 20 - American Softwood Lumber Standard; 2010.
- K. SPIB (GR) - Grading Rules; 2014.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
 - 1. Grade mark and trademark of association having jurisdiction shall appear on each piece of material

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
 - 1. At time of delivery to job site all lumber specified as kiln-dried material shall have a moisture content not in excess of 15% for Southern Pine KD.
 - 2. All remaining lumber shall be kiln-dried material and shall have moisture content not in excess of 19%.
 - 3. Specified moisture contents shall be maintained until project is enclosed.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Spruce-Pine-Fir (South), unless otherwise indicated.
 - 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Roof sheathing: Provide Fire Rated roof sheathing where indicated on Drawings or required per Code/shown Fire Rated Assembly.
- C. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER

- A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: Kiln-dry or MC15.
- D. Stud Framing (2 by 2 through 2 by 6):
 - 1. Grade: No. 3 or Stud.
- E. Plates (2 by 4 through 2 by 6)
 - 1. Grade: No. 2 for 2 by 6's, No. 3 for 2 by 4's.
- F. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):
 - 1. Grade: No. 2.
- G. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 3 or Utility Grade.
 - 2. Boards: Standard or No. 3.

2.03 TIMBERS FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry (23 percent maximum).
- C. Beams and Posts 5 inches and over in thickness:
 - 1. Species: Any allowed under referenced grading rules.
 - 2. Grade: No. 1.

2.04 CONSTRUCTION PANELS

- A. Roof Sheathing: Oriented strand board structural wood panel, PS 2, with factory laminated metallic foil radiant barrier.
 - 1. Sheathing Panel:

- a. Grade: Sheathing.
- b. Size: 4 feet wide by 8 feet long.
- c. Performance Category: 7/16 PERF CAT.
- 2. Integral Roofing Radiant Barrier: Aluminum.
- 3. Seam Tape: Manufacturer's standard pressure-sensitive, self-adhering, cold-applied seam tape consisting of polyolefin film with acrylic adhesive.
- 4. Manufacturers:
 - a. Louisiana Pacific; Techshield: www.lpcorp.com.
 - b. Georgia Pacific; Thermostat: www.buildgp.com.
 - c. Weyerhaeuser; RBS: www.weyerhaeuser.com
- B. Wall Sheathing: 7/16 inch Oriented strand board wood structural panel; PS 2.
 - 1. Grade: Structural 1 Sheathing.
 - 2. Bond Classification: Exposure 1.
 - 3. Span Rating: 24/16.
 - 4. Edges: Square.
- C. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood; 1/2 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.05 ACCESSORIES

- A. General: Provide metal hangers, connectors, and framing anchors of size and type recommended for intended use by manufacturer, and as specified, including seismic structural considerations.
 - 1. Manufacturers:
 - a. Cleaveland Steel Specialty Co.: www.clevelandsteel.com
 - b. KC Metals Products Inc.: www.kcmetals.com
 - c. Simpson Strong-tie Company Inc.: www.strongtie.com
 - d. SEMCO Southeastern Metals Inc.: www.semetals.com
 - e. USP Structural Connectors / MiTek USA Inc.: www.uspconnectors.com
- B. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
- C. Die-Stamped Connectors and Plywood clips: Hot dipped galvanized steel, sized to suit framing conditions.
 - 1. Plywood clips: 18 gage, 0.050 inch min.
 - 2. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.
- D. Joist Hangers: Hot dipped galvanized steel, 14 gage, 0.078 inch min. or sized to suit framing conditions.
 - 1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.
- E. Post Base: Hot dipped galvanized steel, 12 gage, 0.109 inch min., with 1 inch standoff.
 - 1. Attach wood post to base with (2) 1/2 inch dia. through-bolts, galvanized, equal to or better than ASTM Standard A307, Grade A.
 - 2. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.
- F. Termite-Resistant Sill Plate Barrier: Self-adhesive, film-backed barrier with release sheet; adheres to concrete substrates and blocks termite access.
 - 1. Thickness: 68 mils (0.068 inch).
 - 2. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
- G. Sill Flashing: As specified in Section 07 62 00.
- H. Water-Resistive Barrier: As specified in Section 07 25 00.

2.06 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Preservative Treatment:
 - 1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber exposed to weather.
 - c. Treat lumber in contact with masonry or concrete.
 - d. Treat lumber less than 18 inches above grade.
 - e. Treat lumber in other locations as indicated.
 - 2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
 - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 - b. Treat plywood in contact with masonry or concrete.
 - c. Treat plywood less than 18 inches above grade.
 - d. Treat plywood in other locations as indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.
- B. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.
- C. All rough framing installations shall be in accordance with Architectural Drawings and/or respective code requirements whichever is most restrictive.
- D. Install rough carpentry work to comply with "Manual of House Framing" by National Forest Products Association (N.F.P.A.) and with recommendations of American Plywood Association (APA), unless otherwise indicated.
 - 1. For sheathing, underlayment and other products not covered in above standards, comply with recommendations of manufacturer of product involved for use intended.

3.03 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes.
- E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- F. Provide bridging at framing in excess of 8 feet span at mid-span. Fit solid blocking at ends of members.
- G. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- E. Provide the following specific non-structural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Handrails.
 - 3. Grab bars.
 - 4. Towel and bath accessories.
 - 5. Wall-mounted door stops.
 - 6. Wall paneling and trim.
 - 7. Joints of rigid wall coverings that occur between studs.

3.05 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

3.06 INSTALLATION OF CONSTRUCTION PANELS

- A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
 - 1. At long edges use sheathing clips where joints occur between roof framing members.
 - 2. Nail panels to framing; staples are not permitted.
- B. Wall Sheathing: Secure with long dimension parallel to wall studs, with ends over firm bearing, using nails or screws.
 - 1. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.
- C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Install adjacent boards without gaps.
 - 3. Size and Location: As indicated on drawings.

3.07 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

3.08 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.09 CLEANING

- A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 17 53
SHOP-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated wood trusses for roof framing.
- B. Bridging, bracing, and anchorage.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Installation requirements for miscellaneous framing.
- B. Section 06 10 00 - Rough Carpentry: Material requirements for blocking, bridging, plates, and miscellaneous framing.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. TPI 1 - National Design Standard for Metal-Plate-Connected Wood Truss Construction; 2007 and errata.
- C. TPI BCSI 1 - Building Component Safety Information Booklet: The Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses; 2011.
- D. TPI DSB-89 - Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses; 1989.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on plate connectors, bearing plates, and metal bracing components.
- C. Shop Drawings: Show truss configurations, sizes, spacing, size and type of plate connectors, cambers, framed openings, bearing and anchor details, and bridging and bracing.
 - 1. Provide 6 copies of clearly legible shop drawings stamped or sealed by design engineer licensed in the State in which the Project is located.
 - 2. Truss design shall be submitted and reviewed prior to fabrication.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design by or under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- B. Fabricator Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handle and erect trusses in accordance with TPI BCSI 1.
- B. Store trusses in vertical position resting on bearing ends.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Truss Plate Connectors:
 - 1. Alpine Engineered Products, Inc: www.alpeng.com.
 - 2. MiTek Industries, Inc: www.mii.com.
 - 3. Truswal Systems: www.truswal.com.
 - 4. Or approved equal.

2.02 TRUSSES

- A. Wood Trusses: Designed and fabricated in accordance with TPI 1 and TPI DSB-89 to achieve structural requirements indicated.
 - 1. Connectors: Steel plate.
 - 2. Design Roof Live and Dead Load: 50 lbs/sq ft.

3. Roof Deflection: 1/240, maximum.
4. Decay Resistance: Provide factory preservative pressure treated wood.

2.03 MATERIALS

- A. Lumber:
 1. Moisture Content: Between 7 and 9 percent.
 2. Lumber fabricated from old growth timber is not permitted.
 3. Provide sustainably harvested lumber, certified or labeled as specified in Section 01 60 00.
- B. Steel Connectors: Hot-dipped galvanized steel sheet, ASTM A653/A653M Structural Steel (SS) Grade 33/230, with G90/Z275 coating; die stamped with integral teeth; thickness as required.
- C. Truss Bridging: Type, size and spacing recommended by truss manufacturer.

2.04 ACCESSORIES

- A. Wood Blocking, Bridging, Plates, and Miscellaneous Framing: As specified in Section 06 10 00.
- B. Fasteners: Hot-dip galvanized steel, type to suit application.
- C. Bearing Plates: Hot-dip galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that supports and openings are ready to receive trusses.

3.02 PREPARATION

- A. Coordinate placement of bearing items.

3.03 ERECTION

- A. Install trusses in accordance with manufacturer's instructions and TPI DSB-89 and TPI BCSI 1.
- B. Set members level and plumb, in correct position.
- C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure plumb, and in true alignment until completion of erection and installation of permanent bracing.
- D. Do not field cut or alter structural members without approval of Design Engineer.
- E. Install permanent bridging and bracing.
- F. Install headers and supports to frame openings required.
- G. Frame openings between trusses with lumber in accordance with Section 06 10 00.
- H. Coordinate placement of decking with work of this section.
- I. After erection, touch-up primed surfaces with primer consistent with shop coat.

3.04 TOLERANCES

- A. Framing Members: 1/4 inch maximum, from true position.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Wood casings and moldings.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 06 66 00 - Ornamental Simulated Woodwork: Installation of PVC trim specified in that section.
- C. Section 08 14 16 - Wood Doors.
- D. Section 09 30 00 - Tiling: Coordination of installation.
- E. Section 09 65 00 - Resilient Flooring.
- F. Section 09 68 16 - Sheet Carpeting.
- G. Section 09 91 13 - Exterior Painting: Painting and finishing of finish carpentry items.
- H. Section 09 91 23 - Interior Painting: Painting and finishing of finish carpentry items.
- I. Section 12 35 30 - Residential Casework: Installation of moldings and trim at cabinets.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2009.
- D. NHLA G-101 - Rules for the Measurement & Inspection of Hardwood & Cypress; 2011.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
- C. Samples: Submit two samples of wood trim 6 inch long.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.
- B. Store flat, on level area, to prevent warping.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Interior Finish Carpentry Items (Dwelling Units):
 - 1. Manufacturers: Acceptable millwork manufacturers of casings, molding and trim.
 - a. Woodgrain Millwork; www.woodgrain.com.
 - b. Trimco Millwork; www.trimcomillwork.com.
 - c. Metrie Inc.; www.metrei.com
 - 2. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine, solid or finger jointed; primed for paint finish, in profiles as scheduled below:
 - a. Doors and Window Trim: To match; Woodgrain Millwork, WM 356 - 11/16 inch x 2-1/4 inch Colonial Wood Casing.
 - b. Baseboard Trim: To match; Woodgrain Millwork, WM 623 - 9/16 inch x 3-1/4 inch Colonial Wood Base.
 - c. Window Sill: Furniture grade Clear White Pine, 1 inch x 4 inch nominal, back primed with eased edges.
 - 1) Skirt under sill: Same as window casing specified above.
 - 3. Kitchen and Bath Cabinets:

- a. Crown Mold: Install at all upper/wall cabinets; Oak, finish stain grade, to match; Woodgrain Millwork, WM 49.
 - b. Base Trim: Install trim between cabinet base and floor; 3/4 inch quarter round, to match; Woodgrain Millwork, WM 105.
 - c. All joints mitered.
 - d. Stain: To match cabinets.
- B. Interior Finish Carpentry Items (Community Building):
- 1. Manufacturers: Acceptable millwork manufacturers of casings, molding and trim.
 - a. Woodgrain Millwork; www.woodgrain.com.
 - b. Trimco Millwork; www.trimcomillwork.com.
 - c. Metrie Inc.; www.metrie.com
 - 2. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine, solid or finger jointed; primed for paint finish, in profiles as scheduled below:
 - a. Doors and Window Trim: Woodgrain Millwork WM 356 - 11/16 inch x 2-1/4 inch Colonial Wood Casing.
 - b. Baseboard Trim: Woodgrain Millwork, WM 623 - 9/16 inch x 3-1/4 inch Colonial Wood Base.
 - c. Window Sill: Furniture grade, 1 inch x 4 inch nominal, back primed with eased edges.
 - 1) Skirt under sill: Same as window casing specified above.

2.02 LUMBER MATERIALS

- A. Softwood Lumber: Clear White Pine species, plain sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

2.03 ACCESSORIES

- A. Lumber for Shimming, Blocking, and Bracing: Softwood lumber of indicated species.
- B. Primer: As specified in Section 09 90 00.
- C. Wood Filler: Solvent base, tinted to match surface finish color.

2.04 FABRICATION

- A. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

- A. Set and secure materials and components in place, plumb and level.
- B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.03 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 91 13 and 09 91 23.

3.04 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

SECTION 06 63 00
VINYL RAILINGS AND HANDRAILS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior PVC railing systems and handrails.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Attachment of railings systems.
- B. Section 07 46 46 - Fiber Cement Siding: Attachment of railing systems.

1.03 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- B. ASTM D4216 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) and Related PVC and Chlorinated Poly(Vinyl Chloride) (CPVC) Building Products Compounds; 2013.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- D. ASTM F964 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Exterior Profiles Used for Fencing and Railing; 2013.
- E. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: For each product specified and supplied provide component materials, dimensions, profiles, and installation details.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- D. Certificate: Certify that products of this section meet or exceed the specified requirements for guardrails of all relevant codes.
- E. Delegated Design Data: Provide design analysis, signed and sealed by a Professional Engineer licensed in the State in which the Project is located.
- F. Evaluation Service Reports: Show compliance with specified requirements.
- G. Specimen Warranty.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in original packaging under cover and elevated above grade.
 - 1. Do not store packaging materials in direct sunlight to prevent heat buildup.
- B. Store materials flat with spacers between bundles to provide air circulation.

1.07 FIELD CONDITIONS

- A. Ambient Conditions: Proceed with installation of railings and handrails only when existing and projected weather conditions are within manufacturer's recommendations.

1.08 WARRANTY

- A. Provide Limited Lifetime Manufacturer Warranty for all products specified in this section.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Intex Millwork Solutions LLC; Liberty system: www.intexmillwork.com.
- B. AZEK Building Products; Trademark Railing: www.azek.com.
- C. Enduris Inc.; Nantucket (Series 100): www.enduris.com.
- D. Amerimax /Yardcrafters; Pro Deck Low Profile Classic: www.amerimax.com.

- E. Kroy Building Products/PlyGem; Standard Rail: www.plygem.com
- F. Or approved equal.

2.02 DESCRIPTION

- A. Railing System: Cellular PVC: ASTM D4216 Extruded, expanded PVC with a small-cell microstructure, recommended for exterior use, made from UV- and heat-stabilized, rigid material.
 - 1. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 - 2. Top Rail: Standard Railing; 2 inch high by 3-1/2 inch wide extruded rigid cellular PVC contoured rail profile conforming to ASTM F964.
 - 3. Bottom Rail: Standard Railing; 2 inch high by 3-1/2 inch wide extruded rigid cellular PVC contoured rail profile conforming to ASTM F964.
 - 4. Reinforcing Insert: Aluminum, 6063-T5 extruded 'c'-section. Reinforcing used in top and bottom rail profile.
 - 5. Balusters: 1-1/2 inch square, extruded rigid cellular PVC,
 - 6. Newel Post Wrap: 4 inch by 4 inch by 42 inch high.
 - 7. Newel Post Cap and Trim: Classic cap and base trim.
 - 8. Support Block: Manufacturer's standard
 - 9. Connections: Manufacturer's Standard hardware.
 - 10. Color: To be selected by Architect from standard range.

2.03 ACCESSORIES

- A. Fasteners: 18-8 Stainless Steel; as provided by the manufacturer with each railing system.
- B. Adhesive for Cellular PVC:
 - 1. Extreme Adhesives Inc.; PVC TrimWelder: www.pvctrimwelder.com.
 - 2. T.Christy Enterprises; Red Hot White Vinyl Adhesive: www.tchristy.com
 - 3. Or approved equal.
- C. Sealants: Type as recommended by manufacturer and complying with ASTM C834 and applicable requirements in Section 07 92 00 - Joint Sealants.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine substrates for compliance with requirements for installation.
- B. Examine PVC materials before installation. Reject materials that are damaged or display manufacturing defects.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protection of In-Place Conditions: Protect all adjacent construction from damage during installation of products specified by this section.
- B. Surface Preparation: Remove any projections, dirt, or foreign substances that may affect installation.

3.03 INSTALLATION

- A. General: Do not use materials that are unsound or warped.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install in accordance with manufacturer's instructions.
- C. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Scribe and cut PVC components to fit adjoining work.
 - 2. Coordinate PVC components with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.04 ADJUSTING

- A. Adjust joinery for uniform appearance.
 - 1. Replace PVC components that are damaged or do not comply with requirements.

3.05 CLEANING

- A. Clean all exposed and semi-exposed PVC surfaces.

3.06 PROTECTION

- A. Protect installed products from damage due to weather and from subsequent construction operations.
 - 1. Replace PVC components that are damaged or do not comply with requirements.

END OF SECTION

SECTION 06 66 00
ORNAMENTAL SIMULATED WOODWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Simulated Wood Shutters.
- B. Simulated Wood Louvers.
- C. Exterior Simulated Wood Trim
- D. Porch Column Covers.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Installation on products specified in this section.
- B. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- C. Section 06 20 00 - Finish Carpentry: Installation of exterior trim specified in this section.
- D. Section 07 46 46 - Fiber Cement Siding
- E. Section 07 92 00 - Joint Sealants.

1.03 REFERENCE STANDARDS

- A. ASTM D1435 - Standard Practice for Outdoor Weathering of Plastics.
- B. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 2016.
- C. ASTM D2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics; 2016.
- D. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).
- E. ASTM D648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position; 2016.
- F. ASTM D6864 - Standard Specification for Color and Appearance Retention of Solid Colored Plastic Siding Products
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, configurations, and material characteristics.
- C. Shop Drawings: Submit detailed drawings showing location, profiles and product components, including but not limited to anchorage requirements, accessories and provisions for achieving desired finishes.
- D. Samples: Submit two color samples to Architect & Owner for selection.
- E. Certificate: Certify that products of this section meet or exceed specified requirements.
- F. Manufacturer's Qualification Statement.
- G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than 10 years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened packaging, with labels clearly identifying product name and manufacturer.
- B. Store products in manufacturer's unopened packaging, under cover and elevated above grade.

- C. Store products on flat level surface to prevent warping.
- D. Protect products from damage due to related construction activities

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results.
 - 1. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Allow at least 24 hours for materials to adapt to conditions at project site prior to installation.

1.08 WARRANTY

- A. Upon completion of work, provide a written Manufacturer's Limited Lifetime Warranty for products installed under this section to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Shutters:
 - 1. MidAmerica Components: www.midamericacomponents.com.
 - 2. East Iowa Plastics; WeatherBest: www.eastiowaplastics.com.
 - 3. Or approved equal.
- B. Gable Louvers:
 - 1. MidAmerica Components: www.midamericacomponents.com
 - 2. Fypon LLC: www.fypon.com
 - 3. Or approved equal.
- C. Casings and Moldings:
 - 1. Azek Building Products; www.azek.com.
 - 2. Fypon; www.fypon.com.
 - 3. Royal Building Products; www.royalbuildingproducts.com.
 - 4. Or approved equal.
- D. Column Wraps:
 - 1. Elite Trimworks Inc.: www.elitetrimworks.com
 - 2. Versatex Building Products LLC; Classic Series: www.versatex.com
 - 3. HB&G Building Products Inc.; PermaWrap Series: www.hbgcolumns.com
 - 4. Or Approved Equal.

2.02 SIMULATED WOOD PRODUCTS

- A. Shutters:
 - 1. Injection molded, UV stabilized, polypropylene copolymer with molded-through color.
 - a. Style: Louvered.
 - b. Width: 15 inch.
 - c. Length: As indicated on the Drawings
 - d. Color: To be selected by Architect/Owner from manufacturer's standard line.
 - 2. Finished surfaces shall be free from cracks, pits, chips, voids, depressions, bumps, ridges waves, scratches, discoloration or other defacements.
- B. Gable Louvers:
 - 1. Molded polyurethane foam with factory-applied UV resistant primer suitable for field applied paint finish.
 - a. Style: As indicated on the Drawings.
 - b. Size: As indicated on the Drawings.
 - c. Color: To be selected by Owner from manufacturer's standard line.
 - 2. Finished surfaces shall be free from cracks, pits, chips, voids, depressions, bumps, ridges waves, scratches, discoloration or other defacements.
- C. Cellular PVC Casings and Moldings (Exterior):
 - 1. Door and Window Casings and Moldings : Molded Cellular PVC; suitable for paint finish, in profiles scheduled below:
 - a. Style: To match Azek Brick mould, 1-1/2 inch x 2 inch.
 - b. Finish: Factory primed ready for field applied paint finish.

- D. Cellular PVC Column Wraps:
 - 1. Premanufactured multi-piece, molded cellular PVC column cover, base and capital; UV stabilized, suitable for paint finish.
 - a. Style: To be selected by Owner from manufacturer's standard line.
 - b. Size: As indicated or required to accommodate structural wood post.

2.03 MATERIALS

- A. Cellular PVC, Extruded, expanded PVC; UV-resistant, heat-stabilized, and rigid material.
 - 1. Density: 31 pounds per cubic foot, minimum.
 - 2. Surface Burning Characteristics: Flame spread index of 75 maximum, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 - 3. Deflection/Warping: ASTM D648, Not less than 130 deg F.
 - 4. Water Absorption: ASTM D570, less than 0.2 percent.
- B. Polypropylene, Molded high-density, UV stabilized.
 - 1. Density: 4 pounds per cubic foot, minimum.
 - 2. Surface Burning Characteristics: Flame spread index of 75 maximum, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 - 3. Compressive Strength: Minimum 300 pounds per sq. inch.

2.04 ACCESSORIES

- A. Fasteners:
 - 1. Manufacturer's standard concealed fasteners, galvanized steel.
 - 2. Screws; Manufacturer's standard corrosion resistant steel.
- B. Adhesive:
 - 1. PVC plastic adhesive acceptable to manufacturer.
- C. Sealant (Urethane foam products):
 - 1. Urethane-based adhesive acceptable to manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions:
 - 1. Prior to the start of installation, inspect all preceding work to ensure that there are no conditions which will cause an unsatisfactory installation of work.
 - 2. Notify Architect in writing of any unacceptable conditions that would adversely affect installation or subsequent performance of these products.
 - 3. Do not install any work until unsatisfactory conditions are corrected.
 - 4. Commencement of work will imply acceptance of substrate.

3.02 PREPARATION

- A. Protection of In-Place Conditions: Protect adjacent surfaces and work to prevent damage during installation.
- B. Surface Preparation:
 - 1. Clean surfaces thoroughly prior to installation.
 - 2. Prepare surface using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.04 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Offset From True Alignment and plumb: 1/4 inch.

3.05 FIELD QUALITY CONTROL

- A. After installation, check all work for flaws and defects.
- B. Repair all defective work.

1. Remove and replace all damaged components that cannot be successfully repaired as determined by Architect.

3.06 CLEANING

- A. Remove all protection materials.
- B. Clean all surfaces following manufacturer's recommendations prior to final project completion. Do not use harsh cleaning materials or methods that would damage finish.
- C. Dispose properly of all debris generated by this work, protection materials and cleaning materials.

3.07 PROTECTION

- A. Protect items installed under this section from subsequent construction operations.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Batt insulation in exterior wall, floor/ceiling, and interior wall construction.
- B. Foam insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.
- C. Fiberglass, Foam, or equal sill sealer insulation beneath bottom plate of all exterior walls in contact with concrete.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete slabs and foundations.
- B. Section 06 10 00 - Rough Carpentry: Supporting construction for batt insulation.
- C. Section 07 21 26 - Blown Insulation: Blown-in, gravity-held fibrous insulation for installation in attic spaces.
- D. Section 07 25 00 - Weather Barriers: Separate air barrier and vapor retarder materials.
- E. Section 07 92 00 - Joint Sealants.
- F. Section 09 21 16 - Gypsum Board Assemblies: Insulation inside walls and partitions.

1.03 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2016.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- C. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- E. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2016.
- F. RESNET - Residential Home Energy Standards

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.05 QUALITY ASSURANCE

- A. Formaldehyde Content: Contractor shall ensure that all products installed are certified Formaldehyde-Free by the manufacturer.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed on proposed products.
 - b. Published product data showing compliance with requirements.

1.06 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation in Wood Framed Walls: Batt insulation with no vapor retarder.
- B. Insulation in Wood Framed Floor/Ceiling Structure: Batt insulation with no vapor retarder.

2.02 BATT INSULATION MATERIALS

- A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.
 - 1. Where batt insulation is indicated at horizontal fire-rated assemblies, only the insulation type specified in the approved assembly may be used.
- B. Where batt insulation is indicated at walls and ceiling (Attic), blown cellulose may be used, at Contractor's option. Refer to Section 07 21 26 - Blown Insulation.
 - 1. Where batt insulation is indicated at horizontal fire-rated assemblies, only the insulation specified in the approved assembly may be used.
- C. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 - 1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 2. Thermal Resistance at exterior walls: R-value of 19 minimum.
 - 3. Thermal Resistance over top plate of exterior walls: R-value of 19 minimum.
 - 4. Thickness at interior walls and floor/ceiling: 3-1/2 inch for sound attenuation.
 - 5. Facing: Unfaced.
- D. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
 - 1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 - 2. Thermal Resistance: R-value of that specified for fiberglass.
 - 3. Manufacturers:
 - a. Johns Manville; TempControl: www.jm.com/sle.
 - b. Thermafiber, Inc; UltraBatt: www.thermafiber.com.
 - c. ROXUL, Inc; COMFORTBATT: www.roxul.com/#sle.
 - d. Or approved equal.

2.03 FOAM INSULATION

- A. Single component polyurethane, low pressure foam sealant complying with ASTM E2178 for exterior wall penetrations.
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 50 or less, when tested in accordance with ASTM E84.
 - 3. R-value; 1 inch of material at 72 degrees F: 4.7, minimum.
 - 4. Minimum Density: 1.0 pounds per cubic foot.
 - 5. Manufacturers:
 - a. Dow Chemical Co.; Great Stuff: www.greatstuff.dow.com.
 - b. FOMO Products Inc.; Handi Foam: www.fomo.com/handifoam.
 - c. Touch 'n Seal Inc.; All Seasons: www.touch-n-seal.com.
- B. Single component polyurethane, low pressure, low pressure build, foam sealant complying with ASTM E2178 for windows and doors.
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 50 or less, when tested in accordance with ASTM E84.
 - 3. R-value; 1 inch of material at 72 degrees F: 4.7, minimum.
 - 4. Minimum Density: 1.10 pounds per cubic foot.
 - 5. Manufacturers:
 - a. Dow Chemical Co.; Great Stuff Window & Door: www.greatstuff.dow.com.
 - b. FOMO Products Inc.; Handi Foam Window & Door: www.fomo.com/handifoam.
 - c. Touch 'n Seal Inc.; No Warp: www.touch-n-seal.com.

2.04 ACCESSORIES

- A. Sheet Weather Barrier: Specified in Section 07 25 00.
- B. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.
- C. Insulation shall be installed in accordance with North America Insulation Manufacturer's Association (NAIMA) RESNET Grade 1 requirements.

3.02 BATT INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in exterior wall and ceiling spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Staple or nail facing flanges in place at maximum 6 inches on center.
 - 1. Kraft-faced batt insulation in stud cavities of exterior walls.
 - 2. Tape seal butt ends, lapped flanges, and tears or cuts in facing.
- F. At wood framing, install kraft-faced batt insulation continuous over top plate of exterior framing.
- G. Coordinate work of this section with construction of air barrier seal specified in Section 07 25 00.

3.03 FOAM INSULATION

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install expandable foam sealant to ensure continuity of building insulation envelope/thermal barrier.
- C. Extra care shall be taken with installation of expandable foam sealant to prevent damage to surrounding work and installed items.
 - 1. Do not overfill gaps.

3.04 FIELD QUALITY CONTROL

- A. Insulation Certification - Contractor shall post in the attic of each building (near the attic access) Certification of Insulation Type, "R" value, conformance to applicable Federal Specifications, plus the date of installation and the name of the installer.
- B. Installer shall install measuring "tape" for each 300 SF of attic area, stapled to side of truss webbing.

3.05 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 21 26
BLOWN INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Attic: Loose insulation pneumatically placed .

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 07 21 00 - Thermal Insulation.

1.03 REFERENCE STANDARDS

- A. ASTM C739 - Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation; 2011.
- B. ASTM C764 - Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation; 2011.
- C. ASTM C1015 - Standard Practice for Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation; 2006 (Reapproved 2011).

1.04 SYSTEM DESCRIPTION

- A. Materials of This Section: Provide continuity of thermal barrier at building enclosure elements, in conjunction with Section 07 21 00.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and limitations.
- C. Certificates: Certify that products of this section meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Formaldehyde Content: Contractor shall ensure that all products installed are certified Formaldehyde-Free by the manufacturer.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed on proposed products.
 - b. Published product data showing compliance with requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Blown Insulation:
 - 1. CertainTeed Corporation: www.certainteed.com.
 - 2. GreenFiber: www.greenfiber.com.
 - 3. Johns Manville: www.jm.com.
 - 4. Or approved equal.

2.02 MATERIALS

- A. Loose Fill Insulation: ASTM C764, mineral wool fiber type, bulk for pneumatic placement.
 - 1. Total Thermal Resistance at Ceiling (Attic): R-value of 50 (deg F hr sq ft)/Btu.
- B. Loose Fill Insulation: ASTM C739, cellulose fiber type, bulk for pneumatic placement.
 - 1. Total Thermal Resistance at Ceiling (Attic): R-value of 50 (deg F hr sq ft)/Btu.
- C. Ventilation Baffles: Formed cardboard.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation are dry and ready to receive insulation.
- B. Verify that light fixtures have thermal cut-out device to restrict over-heating in soffit or ceiling spaces.
- C. Verify spaces are unobstructed to allow placement of insulation.

3.02 INSTALLATION

- A. Install insulation and ventilation baffle in accordance with ASTM C1015 and manufacturer's instructions.

- B. Place insulation pneumatically to completely fill rafter spaces.
- C. Place insulation against baffles. Do not impede natural attic ventilation to soffit.
- D. Completely fill intended spaces. Leave no gaps or voids.
- E. Place continuous batt insulation cover over top plate of exterior walls; R-value as indicated on the Drawings.

3.03 CLEANING

- A. Remove loose insulation residue.

END OF SECTION

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Vapor retarder under concrete slabs on grade.
- B. Section 06 10 00 - Rough Carpentry: Water-resistive barrier under exterior cladding.
- C. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

1.03 DEFINITIONS

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.

1.04 REFERENCE STANDARDS

- A. AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test; 2014.
- B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2015a.
- C. ASTM E1677 - Standard Specification for an Air Barrier (AB) Material or System for Low-Rise Framed Building Walls; 2011.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- F. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics.
- C. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.
- D. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

1.06 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

- A. Air Barrier/Secondary Moisture Barrier:
 - 1. On outside surface of sheathing of exterior walls use air barrier/secondary moisture barrier sheet, mechanically fastened type.

2.02 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

- A. Air Barrier Sheet, Mechanically Fastened:
 - 1. Air Permeance: 0.004 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178 and or ASTM E1677 (Type1).
 - 2. Water Vapor Permeance: 43 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant procedure).

3. Water Penetration Resistance: Withstand a water head of 21 inches, minimum, for minimum of 5 hours, when tested in accordance with AATCC Test Method 127.
4. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 180 days weather exposure.
5. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84.
6. Seam and Perimeter Tape: Polyethylene self adhering type, mesh reinforced, 2 inches wide, compatible with sheet material; unless otherwise specified.
7. Products:
 - a. DuPont Building Innovations; Tyvek Home Wrap with FlexWrap NF, StraightFlash, StraightFlash VF, Tyvek Wrap Caps, and Tyvek Tape: www.dupont.com.
 - b. Kingspan Insulation LLC; GreenGuard HPW Building Wrap with GreenGuard Butyl Flashing and GreenGuard SuperStretch Flashing: www.trustgreenguard.com.
 - c. National Shelter Products, Inc; DRYLine HP with Dryline Sheathing Tape, ATX Flashing, and ATX Flex Flashing: www.drylinewrap.com.

2.03 ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
- B. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.
- C. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Mechanically Fastened Sheets - On Exterior:
 1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
 2. Overlap seams as recommended by manufacturer but at least 6 inches.
 3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.
 4. Attach to framed construction with fasteners extending through sheathing into framing. Space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.
 5. For applications specified to be air tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
 6. Where stud framing rests on concrete or masonry, extend lower edge of sheet at least 4 inches below bottom of framing and seal to foundation with sealant.
 7. Install air barrier and vapor retarder UNDER jamb flashings.
 8. Install head flashings under weather barrier.
 9. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.
- D. Openings and Penetrations in Exterior Weather Barriers:
 1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.

2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches wide; do not seal sill flange.
3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.
- B. Protect installed weather barrier from any and all damage prior to installation of exterior cladding or veneers.
 1. Any and all rips, tears and/or punctures shall be repaired in accordance with manufacturer's written repair instructions.
 2. If damaged building wrap is not repairable, then follow manufacturer's written instructions for partial removal and "patching" of building wrap to maintain integrity of building wrap membrane.

END OF SECTION

SECTION 07 31 13
ASPHALT SHINGLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection and valley protection.
- C. Associated metal flashings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Roof sheathing.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim.
- C. Section 07 71 23 - Manufactured Gutters and Downspouts.
- D. Section 23 00 00 - Heating, Ventilating, and Air-Conditioning: Mechanical work projecting through roof.

1.03 REFERENCE STANDARDS

- A. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.
- B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2015a.
- C. ASTM D3161/D3161M - Standard Test Method for Wind-Resistance of Steep Slope Roofing Products (Fan-Induced Method); 2016.
- D. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules; 2010a.
- E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).
- F. Miami (APD) - Approved Products Directory; Miami-Dade County; database at www.miamidade.gov/building/pc-search_app.asp.
- G. NRCA (RM) - The NRCA Roofing Manual; 2017.
- H. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating material characteristics.
- C. Manufacturer's Installation Instructions: Indicate installation criteria and procedures.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Products are Required to Comply with Fire Resistance Criteria: UL (DIR) listed and labeled.

1.06 FIELD CONDITIONS

- A. Do not install shingles or eave protection membrane when surface temperatures are below 45 degrees F.

1.07 WARRANTY

- A. Provide manufacturer's standard, transferable warranty:
 - 1. Materials: Warrant shingles for 30 Years against defect or deterioration that results in leaks under normal weather and use conditions.
 - 2. Installation: Warrant total roof system, including underlayments, flashings, and other roof components for 2 years against water penetration.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Asphalt Shingles:
 - 1. Tamko; Heritage: www.tamko.com.
 - 2. CertainTeed: www.certainteed.com.
 - 3. GAF; Timberline American Harvest: www.gaf.com/sle.
 - 4. Owens Corning Corp: www.owenscorning.com.
 - 5. Or approved equal.

2.02 ASPHALT SHINGLES

- A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462/D3462M.
 - 1. Fire Resistance: Class A.
 - 2. Wind Resistance: Class F, when tested in accordance with ASTM D3161/D3161M.
 - 3. Warranted Wind Speed: Not less than tested wind resistance.
 - 4. Miami-Dade County approved.
 - 5. Fungal/Algae Resistant.
 - 6. Self-sealing type.
 - 7. Style: Laminated overlay.
 - 8. Basis of Design: Tamko 'Heritage'.

2.03 SHEET MATERIALS

- A. Underlayment: Asphalt-saturated organic roofing felt, unperforated, complying with ASTM D226/D226M, Type I ("No.15").
- B. Flexible Flashing: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
 - 1. Manufacturers:
 - a. GAF; StormGuard: www.gaf.com/sle.
 - b. GCP Applied Technologies; Grace Ultra: www.gcpat.com.
 - c. Owens Corning Corp; WeatherLock Flex: www.owenscorning.com.

2.04 ACCESSORIES

- A. Nails: Standard round wire shingle type, of hot-dipped zinc coated steel, 10 wire gauge, 0.1019 inch shank diameter, 3/8 inch head diameter, of sufficient length to penetrate through roof sheathing or 3/4 inch into roof sheathing or decking.
- B. Coil Nails: Standard round wire shingle type, barbed shank, of electro-galvanized steel, 11 - 12 wire gage, 0.125 - 0.109 inch shank diameter, 3/8 inch head diameter, of sufficient length to penetrate through roof sheathing or 3/4 inch into roof sheathing or decking.
- C. Plastic Cement: ASTM D4586/D4586M, asphalt roof cement.
- D. Ridge Vents: Plastic, corrugated with vent openings that do not permit direct water or weather entry; flanged to receive shingles; Vent-Sure manufactured by Owens Corning.
 - 1. Free Vent Area (net): 12.5 square inches per linear foot.
 - 2. Size: 5/8 inch high x 11-1/4 inch wide.
- E. Roof Vents: Aluminum construction with nailing flange and insect screen; equal to Model SP-8 manufactured by Air Vent Inc.
 - 1. Free Vent Area (net): 70 square inches.
 - 2. Size: 96 inches long x 2-1/2 inches wide.
 - 3. Color: Color as selected by Owner/Architect.

2.05 METAL FLASHINGS

- A. Metal Flashings: Provide prefinished aluminum sheet metal eave edge and gable edge. Pre-formed edge strips, furnished in 10 foot lengths minimum, color as selected by Owner/Architect.
 - 1. Profile: Equal to Amerimax profile # FHA
 - 2. Manufacturers:
 - a. Amerimax: www.amerimax.com

- b. Or approved equal.
- B. Aluminum Sheet Metal: Prefinished, Fascia and Gable board cladding, 24 gauge, 0.0201 inch minimum thickness; paint coating, color as selected by Owner/Architect.
 - 1. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
 - 2. Hem exposed edges of flashings minimum 1/4 inch on underside.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.
- B. Verify that deck is of sufficient thickness to accept fasteners.
- C. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- D. Verify roof openings are correctly framed.
- E. Verify deck surfaces are dry, free of ridges, warps, or voids.

3.02 PREPARATION

- A. Seal roof deck joints wider than 1/16 inch as recommended by shingle manufacturer.
- B. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.
- C. Broom clean deck surfaces before installing underlayment or eave protection.
- D. Install eave edge and gable edge flashings tight with fascia boards. Weather lap joints 2 inches and seal with plastic cement. Secure flange with nails spaced 8 inches on center.

3.03 INSTALLATION - EAVE PROTECTION MEMBRANE

- A. Install eave protection membrane from eave edge to minimum 3 ft up-slope beyond exterior face of exterior wall.
- B. Install eave protection membrane in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.

3.04 INSTALLATION - UNDERLAYMENT

- A. Underlayment At Roof Slopes Greater Than 4:12: Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches. Stagger end laps of each consecutive layer. Nail in place through metal disks at 12 inches on center. Weather lap minimum 4 inches over eave protection.
- B. Items projecting through or mounted on roof: Weather lap and seal watertight with plastic cement.

3.05 INSTALLATION - VALLEY PROTECTION

- A. Install one ply of flexible flashing, minimum 72 inches wide, centered over valleys.
- B. Install flexible flashing in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- C. Weather lap joints minimum 4 inches.

3.06 INSTALLATION - METAL FLASHING AND ACCESSORIES

- A. Install flashings in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
- C. Secure in place with nails at 8 inches on center. Conceal fastenings.
- D. Items Projecting Through or Mounted on Roofing: Flash and seal weather tight with plastic cement.
- E. At sidewall roof lines (where a sloped roof intersects a vertical wall surface) "kickout flashing" shall be installed in accordance with the siding manufacturer written Installation Requirements

3.07 INSTALLATION - VENTS

- A. Ridge vent openings and ridge vent material shall not be located less than 24 inches from end of ridge.

- B. Roof vents shall be located on the rear-facing slope of roof, within 24 inches of the ridge. Installation to be evenly spaced across the width of attic areas contained between rated partitions.

3.08 INSTALLATION - SHINGLES

- A. Installation shall not begin until all penetrating work is complete, all flashing membranes, and all metal flashings that extend under shingles are satisfactorily installed.
- B. Install shingles in accordance with manufacturer's instructions manufacturer's instructions and NRCA (RM) applicable requirements.
 - 1. Fasten individual shingles using 2 nails per shingle, or as required by code, whichever is greater.
 - 2. Fasten strip shingles using 4 nails per strip, or as required by code, whichever is greater.
- C. Place shingles in straight coursing pattern with 5 inch weather exposure to produce double thickness over full roof area. Provide double course of shingles at eaves.
- D. Project first course of shingles 1/2 inch beyond fascia boards.
- E. Extend shingles 1/2 inch beyond face of gable edge metal trim.
- F. Extend shingles on one slope across valley and fasten. Trim shingles from other slope 2 inches from valley center line to achieve closed cut valley, concealing the valley protection.
- G. Cap hips and ridges with pre-formed ridge and hip shingles, maintaining 5 inch weather exposure. Place to avoid exposed nails.
- H. Complete installation to provide weather tight service.

END OF SECTION

SECTION 07 46 46
FIBER CEMENT SIDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wood-fiber Cement siding.
- B. Aluminum Soffits and Trim.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Siding substrate, openings, and penetrations.
- B. Section 07 25 00 - Weather Barriers: Weather barrier under siding.
- C. Section 07 62 00 - Sheet Metal Flashing and Trim: Product requirements for metal flashings and trim associated with fiber cement siding for placement by this section.
- D. Section 07 92 00 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.
- E. Section 09 91 13 - Exterior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
- B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- C. ASTM C1186 - Standard Specification for Flat Fiber Cement Sheets; 2008 (Reapproved 2012).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Manufacturer's requirements for related materials to be installed by others.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods, including nail patterns.
- C. Warranty: Submit copy of manufacturer's warranty, made out in Owner's name, showing that it has been registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products under waterproof cover and elevated above grade, on a flat surface.

PART 2 PRODUCTS

2.01 SIDING

- A. Lap Siding: Individual horizontal boards made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186 Type A Grade II; with machined edges, for nail attachment.
 - 1. Style: Standard lap style.
 - 2. Texture: Simulated cedar grain.
 - 3. Length: 12 ft, nominal.
 - 4. Width (Height): 9-1/2 inches.
 - 5. Thickness: 7/16 inch, nominal.
 - 6. Finish: Factory applied primer.
 - 7. Warranty: 50 year limited; transferable.
 - 8. Lap Siding Manufacturers:
 - a. Allura, a division of Plycem USA, Inc: www.allurausa.com.
 - b. James Hardie Building Products, Inc: www.jameshardie.com.
 - c. Nichiha USA, Inc: www.nichiha.com.
 - d. Or approved equal.

- B. Panel Siding: Vertically oriented panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186 Type A Grade II; with machined edges, for nail attachment.
 - 1. Style: Board and Batten.
 - 2. Texture: Simulated cedar grain.
 - 3. Length (Height): 96 inches, nominal.
 - 4. Width: 48 inches.
 - 5. Thickness: 5/16 inch, nominal.
 - 6. Finish: Factory applied primer.
 - 7. Warranty: 50 year limited; transferable.
 - 8. Panel Siding Manufacturers:
 - a. Allura, a division of Plycem USA, Inc: www.allurausa.com.
 - b. James Hardie Building Products, Inc: www.jameshardie.com.
 - c. Nichiha USA, Inc: www.nichiha.com.
 - d. Or approved equal.
- C. Alluminum Soffit: Prefinished Aluminum complying with ASTM B209 ; 2-coat fluoropolymer polyester coating, AAMA 2604, thermally cured.
 - 1. Profile: 16 inch Quad-4, 3/8 inch depth; Fully-vented.
 - 2. Thickness: 26 gauge, (0.016 inch).
 - 3. Net Free Vent Area: 9 sq. in. per linear foot, minimum.
 - 4. Finish: Smooth.
 - 5. Color: As selected from manufacturer's full range of available colors.
 - 6. Accessories: 'J'-channel; starter strip; associated trim.
 - 7. Manufacturers:
 - a. Napco (a PlyGem Inc. company): www.napcoproducts.com.
 - b. Alside Inc.: www.alside.com.
 - c. Fabral Inc.: www.fabral.com.
 - d. Or approved equal.

2.02 ACCESSORIES

- A. Trim: Same material and texture as siding.
- B. Fasteners: Galvanized or corrosion resistant; length as required to penetrate minimum 1-1/4 inch.
- C. Flashing: Galvanized steel as specified in Section 07 62 00.
- D. Sealant: Elastomeric, polyurethane or silyl-terminated polyether/polyurethane, and capable of being painted.
- E. Finish Paint: Latex house paint acceptable to siding manufacturer; primer recommended by paint manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate and clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- B. Verify that weather barrier has been installed over substrate completely and correctly.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Install sheet metal flashing:
 - 1. Above door and window trim and casings.
 - 2. Above masonry or manufactured stone veneer termination.
 - 3. Above horizontal trim in field of siding.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations.

1. Read warranty and comply with all terms necessary to maintain warranty coverage.
 2. Use trim details indicated on drawings.
 3. Touch up all field cut edges before installing.
 4. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into studs.
- C. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- D. Joints in Vertical Siding: Install Z-flashing in horizontal joints between successive courses of vertical siding.
- E. Do not install siding less than 12 inches from surface of ground nor closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.
- F. Attach soffits securely to framing, not sheathing, with horizontal components true to level, providing a weather resistant installation.
1. Provide trim and associated hardware as required for surface-mounted and/or recessed installation of exterior lights at soffit panels.
 2. Provide vent area shown on drawings.
- G. After installation, seal all joints except lap joints of lap siding. Seal around all penetrations. Paint all exposed cut edges.
- H. Finish Painting: Specified in Section 09 91 13.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, and other items as required..
- B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Metal flashings embedded in masonry.
- B. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work.
- C. Section 07 31 13 - Asphalt Shingles: Flashings associated with shingle roofing.
- D. Section 07 46 46 - Fiber Cement Siding: Flashings associated with siding installation.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014a.
- C. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a.
- D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).
- E. CDA A4050 - Copper in Architecture - Handbook; current edition.
- F. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gauge, (0.0239 inch) thick base metal.

2.02 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.03 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Underlayment: ASTM D2178/D2178M, glass fiber roofing felt.
- C. Primer: Zinc chromate type.
- D. Concealed Sealants: Non-curing butyl sealant.

- E. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- F. Plastic Cement: ASTM D4586/D4586M, Type I.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrates are ready to receive work.
- B. Verify that water-resistive barrier has been installed over substrate completely and correctly.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.

END OF SECTION

SECTION 07 71 23
MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pre-finished aluminum gutters and downspouts.
- B. Precast concrete splash blocks.

1.02 RELATED REQUIREMENTS

- A. Section 07 31 13 - Asphalt Shingles
- B. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.03 REFERENCE STANDARDS

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.
- B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on prefabricated components.
- C. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.
- D. Samples: Submit two samples, 6 inch long illustrating component design, finish, color, and configuration.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
- B. Prevent contact with materials that could cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pre-Finished Aluminum Sheet: ASTM B209 (ASTM B209M); 0.027 inch thick.
 - 1. Finish: Plain, shop pre-coated with acrylic coating.
 - 2. Color: As selected from manufacturer's standard colors.

2.02 COMPONENTS

- A. Gutters: 5 inch K-style profile.
- B. Downspouts: 3 inch x 4 inch Rectangular profile (2 inch x 3 inch minimum).
- C. Anchors and Supports: Profiled to suit gutters and downspouts.
 - 1. Gutter Supports: Straps.
 - 2. Downspout Supports: Straps.
- D. Fasteners: Same material and finish as gutters and downspouts, with soft neoprene washers.

2.03 ACCESSORIES

- A. Splash Blocks: Precast concrete type, size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.
 - 1. Manufacturer: Equal to Midwest Manufacturing.
 - 2. Model No: 1794467.

2.04 FABRICATION

- A. Form gutters and downspouts of profiles and size indicated.
- B. Fabricate with required connection pieces.

- C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; seal watertight.

2.05 FINISHES

- A. Acrylic polyester coating: Baked enamel system conforming to AAMA 2603.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

- A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Slope gutters 1/8 inch per foot, 2 percent minimum.
- D. Set splash blocks under downspouts.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.
- B. ITS (DIR) - Directory of Listed Products; current edition.
- C. FM (AG) - FM Approval Guide; current edition.
- D. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- E. UL (FRD) - Fire Resistance Directory; current edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- C. Sustainable Design Submittal: Submit VOC content documentation for all non-preformed materials.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Certificate from authority having jurisdiction indicating approval of materials used.
- F. Installer Qualification: Submit qualification statements for installing mechanics.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD) will be considered as constituting an acceptable test report.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Trained by manufacturer.

1.06 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
 - 1. 3M Fire Protection Products; Fire Barrier: www.3m.com/firestop.
 - 2. A/D Fire Protection Systems Inc; A/D Fire Barrier: www.adfire.com.
 - 3. Dow Corning; Fire Stop: www.dowcorning.com
 - 4. Hilti, Inc; FS-ONE, FS-ONE MAX: www.us.hilti.com/#sle.
 - 5. RectorSeal Corporation; FlameSafe: www.flamesafe.rectorseal.com
 - 6. Specified Technologies Inc; SpecSeal: www.stifirestop.com/#sle.
 - 7. Or approved equal..

2.02 MATERIALS

- A. Firestopping: Any material meeting requirements.

- B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. The following listed UL Fire Rated Penetration Systems are provided for the Contractor's use in selecting the appropriate system for field conditions and F Rating of penetrated assemblies.
 - 1. Contractor is not limited to using only these fire rated systems.
 - 2. Contractor shall provide proper documentation upon request of the Owner/Architect or Authorities having jurisdiction over project.
- B. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
 - 1. Temperature Rise: For horizontal rated assemblies (Floor/Ceiling), provide systems that have been tested to show T Rating equal to required F Rating.
 - a. Systems contained and located within the cavity of a wall, T Rating is not required.
 - 2. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.
- C. Additional related information is provided on MEP Drawings.

2.04 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

- A. Penetrations By:
 - 1. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 1 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 1 Hour Construction: UL System W-L-1001; 3M CP 25 WB.
 - c. 1 Hour Construction: UL System W-L-1312; RectorSeal FlameSafe Silicone NS.
 - d. 1 Hour Construction: UL System W-L-1222; STI SpecSeal LCI sealant.
 - e. 1 Hour Construction: UL System W-L-1066; A/D Fire Protection FireBarrier Silicone.
 - 2. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
 - a. 1 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop.
 - b. 1 Hour Construction: UL System W-L-1038; RectorSeal FSP 1100 Putty.
 - c. 1 Hour Construction: UL System W-L-2167; RectorSeal FlameSafe Wrap Strip.
 - d. 1 Hour Construction: UL System W-L-2048; STI SpecSeal BLU or RED.
 - e. 1 Hour Construction: UL System W-L-2155; A/D Fire Protection FireBarrier Collar.
 - 3. Electrical Cables Not In Conduit:
 - a. 1 Hour Construction: UL System W-L-3065; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.
 - b. 1 Hour Construction: UL System W-L-3076; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
 - c. 1 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.

2.05 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use any system that is listed by UL (FRD) and tested in accordance with ASTM E814 with F Rating equal to fire rating of penetrated assembly and T Rating Equal to F Rating and in compliance with other specified requirements.
 - a. Systems penetrating a horizontal fire rated assembly, where contained and located within the cavity of a wall, do not require a T Rating.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Install labeling required by code.

3.04 FIELD QUALITY CONTROL

- A. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Sealants required for through-penetrations.
- B. Section 04 20 01 - Masonry Veneer: Sealants required for through-penetrations.
- C. Section 06 10 00 - Rough Carpentry: Sealing joints between built-up framing members.
- D. Section 06 66 00 - Ornamental Simulated Woodwork: Sealants required in conjunction with exterior trim items.
- E. Section 07 25 00 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
- F. Section 08 71 00 - Door Hardware: Setting exterior door thresholds in sealant.
- G. Section 09 21 16 - Gypsum Board Assemblies: Sealants required for through-penetrations.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014a.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- D. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002 (Reapproved 2013).
- E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
 - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

1.05 WARRANTY

- A. Correct defective work within a one year period after Date of Substantial Completion.
- B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
 - 1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 2. Dow Corning Corporation: www.dowcorning.com/construction/sle.

3. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com/sle.
4. Pecora Corporation: www.pecora.com.
5. Sika Corporation: www.usa-sika.com/#sle.
6. Or approved equal.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials including, but not limited to:
 - 1) flashing and adjacent building materials.
 - 2) Sleeves or pipes penetrating exterior walls.
 - 3) Sleeves or pipes penetrating masonry or concrete walls.
 - d. Openings below ledge angles in masonry.
 - e. Lap joints in and penetrations through weather barriers.
 - f. Exterior Siding:
 - 1) Engineered Wood siding and soffits
 - 2) Fiber-Cement Siding.
 - 3) Vinyl siding and soffits.
 - g. Other joints indicated below.
 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Gypsum board to wood or masonry.
 - c. Metal to gypsum board, wood, or masonry.
 - d. Perimeter of plumbing fixtures, shower surrounds, drains, or piping.
 - e. Perimeter of counter tops and vanity tops
 - f. Other joints indicated below.
 3. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - c. Joints where installation of sealant is specified in another section.
 4. Additional Locations: In addition to locations listed or shown on the Drawings to receive continuous sealant materials, a continuous bead of sealant, appropriate to construction materials and locations, shall be provided/installed at:
 - a. Horizontal joint between bottom of wood sill plate and top of foundation wall or slab on grade.
 - b. Horizontal joint(s) between double/triple top plates.
 - c. Vertical joint(s) between double/triple studs in general framing and at door/window rough openings.
 - d. Stud cavities blocked at change in ceiling heights.
 - e. Penetrations through top and bottom plates.
 - f. Seam(s) in band joists.
 - g. Gaps in exterior wall sheathing.
 - h. Penetrations in exterior wall sheathing.
 - i. Penetrations in gypsum board of insulated exterior walls.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, Dow Corning 795 Silicone or equal, unless otherwise indicated.
- C. Interior Joints: Use non-sag silicone sealant, Dow Corning 732 Silicone or equal, unless otherwise indicated.
1. [] Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
- D. Interior Wet Areas: Bathrooms, restrooms, kitchens, and food service areas; fixtures in wet areas include plumbing fixtures, countertops, and cabinets.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.04 NONSAG JOINT SEALANTS

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 - 2. Color: To be selected by Architect from manufacturer's standard range.
 - 3. Cure Type: Single-component, neutral moisture curing.
- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 - 1. Color: White.

2.05 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
 - 2. Open Cell: 40 to 50 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- D. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

H. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 CLEANING

- A. Remove excess sealant and caulking materials and smears from adjacent surfaces as work progresses.
- B. Repair joints which have shrunk, sagged, run or have thin spots.

END OF SECTION

SECTION 08 11 20
STEEL ENTRY DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulated steel entry doors and wood frames.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry.
- B. Section 06 20 00 - Finish Carpentry.
- C. Section 07 25 00 - Weather Barriers: Perimeter air and vapor seal between clad wood door frame and adjacent construction.
- D. Section 07 46 46 - Fiber Cement Siding.
- E. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- F. Section 08 71 00 - Door Hardware.
- G. Section 09 91 13 - Exterior Painting.

1.03 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.
- B. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
- C. ASTM A924/A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process; 2016a.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- E. ASTM D610 - Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces.
- F. ASTM D714 - Standard Test Method for Evaluating Degree of Blistering of Paints; 2002 (Reapproved 2009).
- G. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- H. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- I. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference; 2000 (Reapproved 2016).
- J. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007 (Reapproved 2016).
- K. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2014.
- L. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014.
- M. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014.
- N. NFRC 400 - Procedure for Determining Fenestration Product Air Leakage.
- O. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate door skin material and gauge, core materials and construction, and installation procedures.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

1. Include conformance and testing data for Fire-Rated doors.
- D. Performance Validation: Submit certified label or test report on products as indicated under performance requirements to validate product compliance.
- E. Manufacturer's Installation Instructions: Indicate special installation instructions.
- F. Specimen warranty.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging. Do not store in damp or wet areas, or in areas of direct sunlight.

1.07 WARRANTY

- A. Provide manufacturer's standard limited warranty for 3 years.
 1. Include coverage for warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Exterior Insulated Steel Entry Doors:
 1. Therma Tru; Traditions Series: www.thermatru.com.
 2. Taylor Entrance Systems; Edgewood: www.taylordoor.com.
 3. Bayer Built Inc; Select Steel Series: www.bayerbuilt.com.
 4. Or Approved Equal.

2.02 COMPONENTS

- A. Steel Entry Doors: Insulated steel door entry systems; prehung in wood frames.
 1. Thickness: 1-3/4 inches, unless otherwise indicated.
 2. Exterior Skin: 24 gauge (0.022 inch), tension leveled cold rolled steel, zinc coated, factory primed.
 3. Interior Frame: Kiln-dried pine or engineered lumber; door bottom edge: moisture/decay resistant composite.
 4. Core: Foamed-in-place, CFC-free, polyurethane foam bonded to exterior skin; density 1.9 pcf minimum.
 - a. U-Factor: 0.18 maximum.
 5. Reinforcement: Solid wood blocking in full area of passage and deadbolt locksets.
 - a. Provide continuous blocking for top 8 inches of door for installation of automatic closer device where scheduled.
 6. Finish: Factory primed; ready for field painting.
- B. Dwelling Unit Entry Doors; Traditions Series:
 1. Configuration: Single door.
- C. Community Building Entry Doors; Traditions Series:
 1. Configuration: Single door.
 2. Glazing: As indicated on drawings.
- D. Laundry Room Entry Door; Traditions Series:
 1. Configuration: Single door.
 2. Glazing: As indicated on drawings.
- E. Frames: Provided and assembled by third party fabricators to manufacturer's specifications.
 1. Frame: Milled from 5/4 kiln-dried white pine, finger-jointed composite at bottom of frame, profiled 1/2 inch stops, and factory-clad with prefinished metal or vinyl. Provide 6 degree sill gain prep.
 2. Frame Depth: 4-9/16 inch, minimum.

3. Gaskets: Factory installed Jacketed thermoset closed-cell foam, press-fit in kerfs at jamb stops in frames.
 4. Hardware preparation: Frames shall be mortised, reinforced, drilled and tapped at the factory to receive hardware as specified in the hardware schedule.
 5. Install frame reinforcing plate to strike side as specified in Section 08 71 00 - Door Hardware
- F. Thresholds: Low profile complying with ANSI or USAF Accessibility requirements. Refer to Section 08 71 00 - Door Hardware
1. Inswing: Aluminum with Thermal Break.
 2. Outswing: Aluminum with Thermal Break.
 - a. Outswing threshold may have a 1/4 inch vertical rise (against which door swings) and a 1/4 inch sloping rise (1:2 max. slope), with a total height of 1/2 inch maximum.
 3. Finish: Mill finish.
- G. Glazing: Double glazed, clear, Low-E coated, argon gas filled, fully tempered, with glass thicknesses as recommended by manufacturer for specified wind conditions.
1. Fully Tempered Glass: ASTM C1048, Kind FT - Fully Tempered.
 2. Outboard Lite: As selected by Architect from manufacturer's standard line.
 3. Inboard Lite: Clear glass.
 4. Air Space: 1/4 inch.
 5. Apply protective polyolefin removable film to No. 1 and No. 4 insulating glass surfaces.
- H. Glazing Stops: Rolled steel channel shape, mitered corners; prepared for countersink style screws.
1. Apply silicone glazing sealant to exterior glazing stops as recommended by manufacturer.
- I. Grilles:
1. Simulated Divided Lites: Permanent exterior and interior grills, style and color as selected by Architect from manufacturer's standard line.
- J. Weatherstripping: Jacketed thermoset closed-cell foam, press-fit in kerfs at jamb stops in frames.
- K. Door Sweeps: Extruded thermoplastic elastomer, finned and chambered design, press-fit into bottom edge of doors.
- L. Door Hardware: As specified in Section 08 71 00.

2.03 PERFORMANCE REQUIREMENTS

- A. Water Penetration Resistance: No uncontrolled leakage on interior face when tested in accordance with ASTM E547 at differential pressure of 15 percent of Performance Grade (PG).
- B. Air Leakage: Maximum of 0.30 cu ft/minute/sq ft at 1.57 psf differential pressure, when tested in accordance with ASTM E283.
- C. Thermal Transmittance: U-factor of 0.25, maximum, that includes window glazing, door and frame system based on average window size required for project and determined in accordance with NFRC 100.
- D. Forced Entry Resistance (FER): Tested to comply with ASTM F476 requirements having at least Grade 10 performance for each required swinging door assembly.

2.04 FABRICATION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores constructed with stiles and rails:
 1. Provide solid blocks at lock edge for hardware reinforcement.
 2. Provide solid blocking for other thru-bolted hardware where scheduled.
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- E. Provide edge clearances in accordance with the quality standard specified.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Install exterior doors in accordance with ASTM E2112.
 - 1. Thresholds shall be installed and sealed securely, level and without discernable movement, to underlayment below.
- C. Assemble multiple units before installation in accordance with manufacturer's installation guidelines.
- D. Use machine tools to cut or drill for hardware.
- E. Coordinate installation with seal of perimeter air and vapor barrier materials as specified in Section 07 25 00.
- F. Coordinate installation of doors with installation of integral frames and hardware.
- G. Coordinate installation of glazing.

3.03 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

3.05 CLEANING

- A. Remove protective material from factory finished surfaces.
- B. Clean units using cleaning material and methods in accordance with door manufacturer's written recommendations.

3.06 PROTECTION

- A. Protect installed work from damage due to subsequent construction activity on the site.
- B. Protect unit surfaces from masonry cleaning solution that could damage insulating glass panels, aluminum or wood finishing, and hardware.

END OF SECTION

SECTION 08 14 16

WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pre-hung, molded panel doors.
- B. Hinged, molded panel, paired, closet doors.

1.02 RELATED REQUIREMENTS

- A. Section 06 20 00 - Finish Carpentry: Trim casings.
- B. Section 08 71 00 - Door Hardware.
- C. Section 09 91 23 - Interior Painting: Field finishing of doors.

1.03 REFERENCE STANDARDS

- A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory priming, and other details.
- D. Manufacturer's Installation Instructions: Indicate special installation instructions.
- E. Warranty, executed in Owner's name.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.06 WARRANTY

- A. Interior Doors: Provide manufacturer's warranty for one year.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Molded Panel Doors
 - 1. Masonite International Corp.: www.masonite.com.
 - 2. Baird Brothers Sawmill Inc.: www.bairdbrothers.com.
 - 3. Jeld-Wen Inc.: www.jeldwen.com.
 - 4. Or approved Equal.

2.02 DOORS

- A. Doors: Refer to drawings for locations and additional requirements.
 - 1. Quality Standard: Economy Grade, Standard Duty performance, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.
- B. Interior Doors: 1-3/8 inches thick unless otherwise indicated; molded panel construction.
 - 1. Style: 2-Panel
 - 2. Hardboard facing for field opaque finish.

2.03 DOOR AND PANEL CORES

- A. Hollow Core Doors: Type - Standard (FSHC); plies and faces as indicated above.

2.04 DOOR FACINGS

- A. Hardboard Facing for Opaque Finish: ANSI A135.4, Class 2 - Standard, Molded Panel hardboard, 1/8 inch thick.
- B. Facing Adhesive: Type I - waterproof.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with wood or MDF stiles and rails:
 - 1. Provide solid blocks at lock edge for hardware reinforcement.
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
 - 1. Mortise doors for 3-1/2 inch standard duty radius hinges.
 - 2. Face bore(s) for cylindrical lock, where scheduled, are to be 2-1/8" diameter at 2-3/8 inch backset.
- D. Vertical door edges to be beveled lock strike side and meeting rails.
- E. Factory fit and hang doors to frames constructed for the opening dimensions identified on the Drawings, with edge clearances in accordance with specified quality standard.
 - 1. Provide 3/8 inch clearance at bottom unless additional cut-off is indicated.

2.06 FRAMES

- A. Jambs: Wood jambs shall be fabricated as a flat jamb with applied stops, or a one piece jamb with milled stops, solid or finger-jointed white pine. Factory primed, white.
- B. Hinges: Mortise jamb for 3-1/2 inch, standard duty radius hinges.
 - 1. 3 standard weight radius mortise hinges are required on doors 7'0" height or smaller.
- C. Strike: Jamb to be machined for a full lip cylindrical strike plate.
 - 1. Double door units shall include preparations for ball catch located at the top of door on both door panels designed to strike into the head jamb.

2.07 FACTORY FINISHING

- A. Factory prime door faces, stiles, and rails with manufacturer's standard water based latex primer; white.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Use machine tools to cut or drill for hardware.
- C. Coordinate installation of doors with installation of frames and hardware.

END OF SECTION

SECTION 08 36 13
SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead sectional doors, electrically operated.
- B. Operating hardware, tracks, and supports.
- C. Electrical controls.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Rough wood framing for door opening.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- C. Section 26 20 00 - Electrical Service and Distribution: Electrical connection for operator motor.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- C. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; 2011.
- D. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Show component construction, anchorage method, and hardware.
- C. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- D. Operation Data: Include normal operation, troubleshooting, and adjusting.
- E. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 WARRANTY

- A. Warranty: Include coverage for electric motor and transmission.
- B. Provide five year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sectional Overhead Doors:
 - 1. Clopay Building Products; Value Plus Series, Classic Collection: www.clopaydoor.com/sle.
 - 2. Overhead Door Corp.; Series 183, Traditional Collection: www.overheaddoor.com
 - 3. Wayne-Dalton, a Division of Overhead Door Corporation; Model 8124 Classic series: www.wayne-dalton.com.
 - 4. Or Approved Equal.

2.02 STEEL DOOR COMPONENTS

- A. Steel Doors: embossed panel; standard lift operating style with track and hardware; complying with DASMA 102, Residential application.
 - 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
 - 2. Door Nominal Thickness: 1-3/4 inches thick.

3. Exterior Finish: Factory finished with polyester baked enamel; color as selected from manufacturers standard line.
 4. Interior Finish: Factory finished with polyester baked enamel; white.
 5. Operation: Electric.
- B. Door Panels: Hot-dipped steel construction; outer steel sheet of 24 gauge, 0.0239 inch minimum thickness, embossed profile; inner steel sheet of 27 gauge, 0.0164 inch minimum thickness, flat profile; core reinforcement sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; expanded polystyrene (EPS) insulation.

2.03 DOOR COMPONENTS

- A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, sectional; galvanized steel mounting brackets 1/8 inch thick.
- B. Hinge and Roller Assemblies: Manufacturer's standard hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.
- C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
- D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- E. Head Weatherstripping: EPDM rubber seal, one piece full length.
- F. Jamb Weatherstripping: EPDM rubber seal, one piece full length.
- G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- H. Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle.
- I. Lock Cylinders: Keyed differently.
- J. Decorative Exterior Trim: Style as indicated on drawings.

2.04 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Insulation: Foamed-in-place polyurethane, bonded to facing.

2.05 ELECTRICAL OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by a testing agency acceptable to authorities having jurisdiction.
- B. Electrical Characteristics:
 1. 1/2 hp; transit speed of between 9 to 12 inches per second.
 2. 120 volts, single phase, 60 Hz.
- C. Safety Edge: At bottom of door panel, full width; pneumatic sensitized type, wired to stop door upon striking object; hollow neoprene covered to provide weatherstrip seal.
- D. Control Station: Standard single button momentary type control for each electric operator.
 1. 24 volt circuit.
 2. Surface mounted.
 3. Locate at inside door jamb.
- E. Hand Held Transmitter: Digital control, resettable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

- A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.
- B. Apply primer to wood frame.

3.03 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 1/16 inch.
- B. Maximum Variation from Level: 1/16 inch.
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.

3.06 CLEANING

- A. Clean doors and frames and glazing.
- B. Remove temporary labels and visible markings.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 53 13

VINYL WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vinyl-framed, factory-glazed windows.
- B. Operating hardware.
- C. Insect screens.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry.
- B. Section 07 21 00 - Thermal Insulation: Continuity of thermal barrier.
- C. Section 07 25 00 - Weather Barriers: Sealing frames to weather barrier installed on adjacent construction.
- D. Section 07 46 46 - Fiber Cement Siding.
- E. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

1.03 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.
- B. AAMA 701/702 - Combined Voluntary Specifications for Pile Weatherstrip and Replaceable Fenestration Weatherseals; 2011.
- C. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- D. ASTM E1423 - Standard Practice for Determining the Steady State Thermal Transmittance of Fenestration Systems; 2014.
- E. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007 (Reapproved 2016).
- F. ASTM F2090-13 - Standard Specification for Window Fall Prevention Devices With Emergency Escape (Egress) Release Mechanisms; 2013.
- G. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact; 2014.
- H. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, anchors, fasteners, glass, and internal drainage.
- C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, and installation requirements.
- D. Manufacturer's Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
 - 1. Evidence of AAMA Certification.
 - 2. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.
- F. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.
- G. Egress Units Compliance: Certify that bedroom window unit's net opening size and dimensions meet or exceed current minimum code requirements for use as a means of emergency egress.

- H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.
- B. Jig, brace, and box the window frame assemblies for transport to minimize flexing of members or joints.

1.07 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and after installation of sealants.

1.08 WARRANTY

- A. Provide five year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same. Include coverage for degradation of color finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Vinyl Windows:
 1. Silver Line by Andersen; V1 - 2900 Series: www.silverlinewindows.com/sle.
 2. Jeld-Wen Inc.; Builders Vinyl Series: www.jeldwen.com.
 3. Milgard Manufacturing; StyleLine Series: www.milgard.com.
 4. Alliance Window Systems; Windgate Series: www.alliancewindows.com

2.02 DESCRIPTION

- A. Vinyl Windows: Factory fabricated frame and sash members of extruded, hollow, ultra-violet-resistant, polyvinyl chloride (PVC) with integral color; with factory-installed glazing, hardware, related flashings, anchorage and attachment devices.
 1. Configuration: As indicated on drawings.
 - a. Product Type: FW - Fixed window and H - Hung window, vertically sliding; Single Hung.
 - b. Egress Units: Window units installed in dwelling unit bedrooms shall meet or exceed minimum requirements for classification as emergency egress units per the currently adopted edition of the building code.
 2. Color: White.
 3. Size to fit openings with minimum clearance around perimeter of assembly providing necessary space for perimeter seals.
 4. Operable Units: Double weatherstripped.
 5. Framing Members: Fusion welded corners and joints, with internal reinforcement where required for structural rigidity; concealed fasteners.
 6. System Internal Drainage: Drain to exterior side by means of weep drainage network any water entering joints, condensation within glazing channel, or other migrating moisture within system.
 7. Glazing Stops, Trim, Flashings, and Accessory Pieces: Formed of rigid PVC, fitting tightly into frame assembly.
 8. Mounting Flange: Integral to frame assembly, providing weather stop at entire perimeter of frame.
 9. Insect Screens: Tight fitting for operating sash location.
- B. Performance Requirements: Provide products that comply with the following:
 1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
 - a. Performance Class (PC): LC.
 - b. Performance Grade (PG): 25, with minimum design pressure (DP) of 25.06 psf.

2. Thermal Transmittance: U-factor of 0.35, maximum, that includes window glazing and frame system based on average window size required for project and determined in accordance with AAMA 1503, ASTM E1423, or NFRC 100.
 3. Solar Heat Gain Coefficient (SHGC): SHGC value of 0.30 maximum.
 4. Visible Light Transmittance: value of 0.52 minimum.
 5. Forced Entry Resistance (FER): Tested to comply with ASTM F588 requirements having at least Grade 20 performance for each required window assembly.
- C. Energy Star Rating: Provide windows eligible for Energy Star Rating.

2.03 COMPONENTS

- A. Glazing: Insulated double pane, annealed glass, clear, low-E coated, argon filled, with glass thicknesses as recommended by manufacturer for specified wind conditions.
 1. Provide tempered glass where required by Code for hazardous locations.
- B. Frame Depth: 2-11/16 inch minimum.
- C. Divided Lite Grid: Installed between panes of insulating glass, 5/8 inch wide flat metal bars, color to match frame and sash.
 1. Pattern: Manufacturer's standard layout.
- D. Insect Screens: Aluminum, extruded or roll-formed frame with mitered and reinforced corners; apply screen mesh taut to frame; secure to window with hardware to allow easy removal.
 1. Hardware: Manufacturer's standard; quantity as required per screen.
 2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.
 3. Frame Finish: Manufacturer's standard, color to match window frame and sash color.
- E. Operable Sash Weatherstripping: High density polypropylene pile; permanently resilient, profiled to maintain weather seal in accordance with AAMA 701/702.
- F. Fasteners: Galvanized steel.
- G. Accessories: Provide related flashings, anchorage and attachment devices as necessary for full assembly.
- H. Glazing Sealant: Manufacturer's standard, tested, sealant; factory installed.
- I. Sealants for Setting Window Sill Pan Flashing: Provide silicone sealant; in compliance with ASTM E2112 installation practices.

2.04 HARDWARE

- A. Vertical Sliding Sash: Concealed, heavy duty block and tackle balancers, provide two for each sash and jamb.
- B. Sash lock: Lever handle and keeper with cam lock, provide at least one for each operating sash.
- C. Window Opening Control Devices: ASTM F2090-13 opening control devices that limit opening size to less than 4 inches maximum with release function to permit window to open fully.
 1. Required for all Dwelling Unit operable windows when sill is less than 36 inches above finish floor, and window unit is located greater than 72 inches above finish grade.
- D. Finish of Exposed Hardware: Baked enamel, match interior sash and frame color.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify wall openings and adjoining air and vapor seal materials are ready to receive this work.

3.02 INSTALLATION

- A. Install window unit assemblies in accordance with manufacturers instructions and applicable building codes.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities as necessary.
- C. Provide continuous shim support along full length of sill.
- D. Align window plumb and level, free of warp or twist, and maintain dimensional tolerances and alignment with adjacent work.
- E. Set sill members and sill flashing in continuous bead of sealant.

- F. Provide thermal continuity of the building envelope. Fill shim spaces at perimeter of assembly with gap-filling foam specified in Section 07 21 00 - Thermal Insulation.

3.03 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

3.04 CLEANING

- A. Remove protective material from pre-finished surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.
- C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer and appropriate for application indicated.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for wood and insulated steel entry doors.
- B. Thresholds.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 20 - Steel Entry Doors.
- B. Section 08 14 16 - Wood Doors.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; 2013.
- C. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; 2011.
- D. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.
- E. BHMA A156.7 - American National Standard for Template Hinge Dimensions; 2014.
- F. BHMA A156.12 - American National Standard for Interconnected Locks; 2013.
- G. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.
- H. BHMA A156.17 - American National Standard for Self Closing Hinges & Pivots; 2014.
- I. BHMA A156.18 - American National Standard for Materials and Finishes; 2012.
- J. BHMA A156.21 - American National Standard for Thresholds; 2014.
- K. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems; 2013.
- L. BHMA A156.36 - American National Standard for Auxiliary Locks; 2014.
- M. DHI (KSN) - Keying Systems and Nomenclature; 1989.
- N. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- O. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- D. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- E. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
 - 1. Lock Cylinders: One for each master keyed group.
 - 2. Leversets and Dead Latches: One for each type specified.
 - 3. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.07 WARRANTY

- A. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
 - 1. Closers: Five years, minimum.
 - 2. Exit Devices: Three years, minimum.
 - 3. Locksets and Cylinders: Three years, minimum.
 - 4. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
 - 1. Applicable provisions of federal, state, and local codes.
 - 2. Accessibility: ADA Standards and ICC A117.1.
 - 3. Auxiliary Hardware: BHMA A156.16.
- D. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. Refer to Door Hardware Schedule at end of this section.
- E. Fasteners:
 - 1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
 - a. Aluminum fasteners are not permitted.
 - b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
 - 2. Fire-Rated Applications: Comply with NFPA 80.
 - a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
 - b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.

2.02 HINGES

- A. Manufacturers:
 - 1. McKinney; an Assa Abloy Group company: www.assaabloydss.com.
 - 2. Bommer Industries, Inc: www.bommer.com.
 - 3. C. R. Laurence Co., Inc: www.crl-arch.com.
 - 4. Hager Companies: www.hagerco.com.
 - 5. Stanley Manufacturing Co.: www.stanleyhardware.com.
- B. Hinges: Complying with BHMA A156.1, Grade 3.
 - 1. Self Closing Spring Hinges: Complying with BHMA A156.17.
 - 2. Butt Hinges: Complying with BHMA A156.1 and BHMA A156.7 for templated hinges.
 - a. Provide hinge width required to clear surrounding trim.
 - 3. Provide hinges on every swinging door.
 - 4. Provide self-closing spring hinges on dwelling unit entry doors.
 - 5. Provide ball-bearing hinges at each door with closer.
 - 6. Provide non-removable pins on exterior outswinging doors.
 - 7. Provide following quantity of butt hinges for each door:
 - a. Doors From 60 inches High up to 90 inches High: Three hinges.
 - b. Doors 90 inches High up to 120 inches High: Four hinges.

2.03 TRACK AND HANGERS

- A. Manufacturers:
 - 1. Basis of Design: Johnson Hardware; Series 1166.
 - 2. Hager Companies: www.hagerco.com.
 - 3. Hettich America, LP; Grant Folding and Sliding Door Hardware: www.hettichamerica.com.
 - 4. Johnson Hardware: www.johnsonhardware.com.

- B. Sliding and Bifolding Door Hardware: Complying with BHMA A156.14.
 - 1. Provide track, hanger fasteners, guides, and pulls; size track and hangers in accordance with manufacturer's recommendations for weight of doors.
 - 2. Provide flush cup pull on each sliding panel.

2.04 CYLINDRICAL LOCKS

- A. Manufacturers:
 - 1. Basis of Design: Schlage 'Elan'.
 - 2. Sargent or Yale; an Assa Abloy Group company: www.assaabloydss.com.
 - 3. Hager Companies: www.hagerco.com.
 - 4. Schlage, an Allegion brand: www.allegion.com/us.
 - 5. Weslock Door Hardware Inc.: www.weslock.com.
- B. Cylindrical Locks (Bored): Complying with BHMA A156.2, Grade 3.
 - 1. Bored Hole: 2-1/8 inch diameter.
 - 2. Latchbolt Throw: 1/2 inch, minimum.
 - 3. Backset: 2-3/4 inch unless otherwise indicated.
 - 4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
 - a. Finish: To match lock or latch.
 - b. Extra-Long-Lip Strikes: Provide for locks used on frames with applied wood casing trim.
 - 5. Provide a lock for each door, unless otherwise indicated that lock is not required.
 - 6. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.

2.05 INTERCONNECTED LOCKS

- A. Manufacturers:
 - 1. Basis of Design: Schlage S270PD 'Saturn'.
 - 2. Hager Companies: www.hagerco.com.
 - 3. Schlage, an Allegion brand: www.allegion.com/us.
 - 4. Best Access Systems, division of Stanley Access Technologies LLC: www.bestaccess.com.
- B. Interconnected Locks: Complying with BHMA A156.12, Grade 3.

2.06 AUXILIARY LOCKS (DEADLOCKS)

- A. Manufacturers:
 - 1. Basis of Design: Schlage 'B60' & 'B680'.
 - 2. Yale; an Assa Abloy Group company: www.assaabloydss.com.
 - 3. Hager Companies: www.hagerco.com.
 - 4. Schlage, an Allegion brand: www.allegion.com/us.
 - 5. Weslock Door Hardware Inc.: www.weslock.com.
- B. Auxiliary Locks (Deadlocks): Complying with BHMA A156.36, Grade 3.
 - 1. Type: Bored (cylindrical).
 - 2. Backset: 2-3/4 inch, unless otherwise indicated.
 - 3. Bolt Throw: 1 inch, with latch made of hardened steel.
 - 4. Provide strike that matches frame.

2.07 CLOSERS

- A. Manufacturers; Surface Mounted:
 - 1. Basis of Design: Falcon SC93/94; Jamb top.
 - 2. Sargent, Yale, or AdamsRite; an Assa Abloy Group company: www.assaabloydss.com.
 - 3. C. R. Laurence Company, Inc: www.crl-arch.com.
 - 4. Hager Companies: www.hagerco.com.
 - 5. Falcon or LCN, an Allegion brand: www.allegion.com/us.
- B. Closers: Complying with BHMA A156.4, Grade 3.
 - 1. Type: Surface mounted to door.
 - 2. Provide door closer on each exterior door of the Community Building.
 - 3. Provide door closer on each fire-rated and smoke-rated door of the Community Building.
 - 4. At outswinging exterior doors, mount closer on interior side of door.

5. Provide adapter plate where required.

2.08 WALL STOPS

- A. Manufacturers:
 1. Basis of Design: Trimco 1270 Series.
 2. Rockwood; an Assa Abloy Group company: www.assaabloydss.com.
 3. Hager Companies: www.hagerco.com.
 4. Hiawatha, Inc, division of Activar Construction Products Group, Inc: www.activarcpg.com/hiawatha.
 5. Trimco: www.trimcohardware.com.
- B. Wall Stops: Complying with BHMA A156.16, Grade 3 and Resilient Material Retention Test as described in this standard.
 1. Type: Bumper, convex, wall stop.
 2. Material: Stainless steel housing with rubber insert.

2.09 THRESHOLDS

- A. Manufacturers:
 1. Basis of Design: (add mfr. name here).
 2. Pemko; an Assa Abloy Group company: www.assaabloydss.com.
 3. Hager Companies: www.hagerco.com.
 4. National Guard Products, Inc: www.ngpinc.com.
- B. Thresholds: Complying with BHMA A156.21.
 1. Provide threshold at each exterior door, unless otherwise indicated.
 2. Type: Low Profile.
 - a. Thresholds at outswing exterior doors may be rabbeted with door stop type; 1/4 inch vertical rise, 1/2 inch total height; maximum 1:2 bevel.
 3. Material: Aluminum.
 4. Threshold Surface: Thermally broken.
 5. Field cut threshold to profile of frame and width of door sill for tight fit.
 6. Provide non-corroding fasteners at exterior locations.

2.10 BALL CATCH

- A. Manufacturers:
 1. Basis of Design: Ives 347.
 2. Rockwood; an Assa Abloy Group company: www.assaabloydss.com.
 3. Ives, an Allegion brand: www.allegion.com/us.
- B. Ball Catch: Provide on doors not provided with latchsets that must stay in closed position within the frame.
 1. Location: Mount ball catch at top of door with strike plate fastened to head of door frame.
 2. Material: Brass.

2.11 VIEWER

- A. Manufacturers:
 1. Basis of Design: Ives U696.
 2. Ives, an Allegion brand: www.allegion.com/us.
 3. Prime-Line Inc: www.primeline.net
 4. Gatehouse Inc.: www.lowes.com
- B. Viewer: Provide at inside of door at eye level to see who is on outside of door.
 1. Material: Stainless steel.
 2. Size: 1/2 inch diameter mounting hole.
 3. View: 160 degree field of view.
 4. Finish: Brushed nickel.

2.12 KEY CONTROL SYSTEMS

- A. Key Control Systems: Complying with guidelines of BHMA A156.28.
 1. Provide keying information in compliance with DHI (KSN) standards.
 2. Keying: Master keyed.
 3. Supply keys in following quantities:

- a. 4 each Master keys.

2.13 FINISHES

- A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
 - 1. Primary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
 - 2. Exceptions:
 - a. Where base material metal is specified to be different, provide finish that is an equivalent appearance in accordance with BHMA A156.18.
 - b. Hinges for Fire-Rated Doors: Steel base material with painted finish, in compliance with NFPA 80.
 - c. Door Closer Covers and Arms: Color as selected by Architect from manufacturer's standard colors unless otherwise indicated.
 - d. Aluminum Surface Trim and Gasket Housings: Anodized to match door panel finish, not other hardware, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- C. Use templates provided by hardware item manufacturer.
- D. Do not install surface mounted items until application of finishes to substrate are fully completed.
- E. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list, unless noted otherwise on drawings.
 - 1. Mounting heights in compliance with ANSI, UFAS, or ADA Standards, where applicable:
 - a. Locksets: 40-5/16 inch.
 - b. Deadlocks (Deadbolts): 48 inch.
 - c. Door Viewer: accessible unit height 43 inch; typical unit height 60 inch.
- F. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.03 ADJUSTING

- A. Adjust hardware for smooth operation.

3.04 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.05 PROTECTION

- A. Protect finished Work under provisions of Section 01 70 00 - Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

PART 4 SCHEDULES (SEE NEXT PAGE)

4.01 HARDWARE SETS

A. Group No 01: Dwelling Unit - Entry Door

- 3 EA Self-closing spring Hinges - 3-1/2 inch x 3-1/2 inch
- 1 EA Dead latch - single cylinder w/ thumb turn.
- 1 EA Locking Leverset
- 1 EA Viewer (peephole) (2 ea. at accessible dwelling units)
- 1 EA Wall-mounted Stop

B. Group No 02: Community Building - Entry Doors

- 3 EA Hinges - 3-1/2 inch x 3-1/2 inch
- 1 EA Locking Leverset
- 1 EA Dead latch - single sided thumb turn only
- 1 EA Closer
- 1 EA Wall-mounted Stop

C. Group No 03: Community Building - Toilet Room Doors

- 3 EA Hinges - 3-1/2 inch x 3-1/2 inch
- 1 EA Privacy Leverset
- 1 EA Wall-mounted Stop

D. Group No 04: Dwelling Unit - Bedroom and Bath Doors

- 3 EA Hinges - 3-1/2 inch x 3-1/2 inch
- 1 EA Privacy Leverset
- 1 EA Wall-mounted Stop

E. Group No 05: Dwelling Unit - Double Closet Doors

1. Provide for each door in the pair:

- 3 EA Hinges - 3-1/2 inch x 3-1/2 inch
- 1 EA Dummy Leverset
- 1 EA Ball Catch
- 1 EA Wall-mounted Stop

F. Group No 5A: Dwelling Unit - By-Pass Closet Doors

1. Provide 1 mounting track and floor-mounted door guide per opening.
2. Provide for each door in the pair:

- 1 PR Adjustable Roller Hangers
- 1 EA Flush Cup Pull

G. Group No 06: Dwelling Unit - Mechanical Closet Doors

- 3 EA Hinges - 3-1/2 inch x 3-1/2 inch
- 1 EA Passage Leverset
- 1 EA Wall-mounted Stop

H. Group No 07: Other Interior Doors (Dwelling Unit and Comm. Building)

1. Self-closing hinges where noted/required.

- 3 EA Hinges - 3-1/2 inch x 3-1/2 inch
- 1 EA Passage Leverset
- 1 EA Wall-mounted Stop

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Gypsum wallboard.
- C. Joint treatment and accessories.
- D. Textured finish system.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Building framing and sheathing.
- B. Section 07 21 00 - Thermal Insulation: Acoustic insulation.
- C. Section 07 84 00 - Firestopping: Top-of-wall assemblies at fire rated walls.

1.03 REFERENCE STANDARDS

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- B. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- C. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- D. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- E. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014a.
- F. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2013.
- G. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- H. GA-216 - Application and Finishing of Gypsum Board; 2013.
- I. GA-600 - Fire Resistance Design Manual; 2015.
- J. UL (FRD) - Fire Resistance Directory; current edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on gypsum board, accessories, and joint finishing system.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
 - 1. Fire Rated Partitions: UL listed assembly No. U341; One (1) hour rating.
 - 2. Fire Rated Ceilings: GA-600 File Number RC 2602; One (1) hour fire rating.
 - 3. Fire Rated Exterior Walls: UL listed assembly No. U356; One (1) hour rating
 - 4. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. American Gypsum Company: www.americangypsum.com.
 - 2. Georgia-Pacific Gypsum: www.gpgypsum.com.
 - 3. National Gypsum Company: www.nationalgypsum.com.
 - 4. USG Corporation: www.usg.com.
 - 5. Or approved equal.

- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. Glass mat faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
 - 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold resistant board is required at all damp locations.
 - 1) Locations include:
 - (a) Shower and tub walls and ceilings.
 - (b) Back and side walls adjacent to Water Closet, to 48 inches above finished floor.
 - (c) Back wall behind Lavatory, to 48 inches above finished floor.
 - (d) Back wall behind Kitchen Sink and Dishwasher, to 48 inches above finished floor.
 - (e) Back wall behind location designated for Laundry appliances, to 48 inches above finished floor.
 - 4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 5. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.
 - 6. Paper-Faced Products:
 - a. American Gypsum Company; ClassicRoc Gypsum Wallboard.
 - b. American Gypsum Company; FireBloc Type X Gypsum Wallboard.
 - c. Georgia-Pacific Gypsum; ToughRock.
 - d. Georgia-Pacific Gypsum; ToughRock Fireguard X.
 - e. National Gypsum Company; Gold Bond Brand Gypsum Wallboard.
 - f. National Gypsum Company; Gold Bond Brand Fire-Shield Gypsum Board.
 - g. USG Corporation; Sheetrock Brand Gypsum Wallboard.
 - h. USG Corporation; Sheetrock Brand Firecode X.
 - 7. Mold Resistant Paper Faced Products:
 - a. American Gypsum Company; M-Bloc.
 - b. American Gypsum Company; M-Bloc Type X.
 - c. Georgia-Pacific Gypsum; ToughRock Mold-Guard.
 - d. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard.
 - e. National Gypsum Company; Gold Bond XP Gypsum Board.
 - f. USG Corporation; Sheetrock Brand Mold Tough (Firecode X).

2.03 ACCESSORIES

- A. Acoustic Insulation: As specified in Section 07 21 00.
- B. Finishing Accessories: ASTM C1047, galvanized steel, rolled zinc, or rigid plastic, unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
 - 3. Products:
 - a. Same manufacturer as framing materials.
- C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 2. Ready-mixed vinyl-based joint compound.
 - 3. Powder-type vinyl-based joint compound.
- D. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.
- E. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Studs: Space studs as indicated.
 - 1. Extend partition framing to structure in all locations.
- B. Furring for Fire Ratings: Install as required for fire resistance ratings indicated and to GA-600 requirements.
- C. Blocking: Install wood blocking for support of:
 - 1. Framed openings.
 - 2. Wall mounted cabinets.
 - 3. Plumbing fixtures.
 - 4. Toilet accessories.

3.03 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 - 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- E. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For non-rated assemblies, install as follows:
 - 1. Single-Layer Applications: Screw attachment.
 - 2. Construct floating internal corners, except where special isolation or edge trim is indicated.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. At building expansion, seismic, or construction joints.
 - 2. Not more than 30 feet apart on walls and ceilings over 50 feet long.
 - 3. At interior ceilings with perimeter relief; not more than 50 feet apart, and area contained within joints not to exceed 2,500 square feet.
 - a. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.
 - 4. At interior ceilings without perimeter relief; not more than 30 feet apart, and area contained within joints not to exceed 900 square feet.
 - a. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.
 - 5. At exterior ceilings; not more than 30 feet apart, and area contained within joints not to exceed 900 square feet.
 - a. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.05 JOINT TREATMENT

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 - 2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.

3.06 TEXTURE FINISH

- A. Apply finish texture coating by means of trowel in accordance with manufacturer's instructions.
- B. Texture finish on walls and ceilings:
 - 1. Community Building ceiling; As Scheduled.
 - 2. Dwelling Unit Ceilings; As Scheduled.
 - 3. All Walls; As Scheduled.
- C. Texture Required: Knock Down.

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient sheet flooring.
- B. Resilient tile flooring.
- C. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- C. Section 06 10 00 - Rough Carpentry.
- D. Section 06 20 00 - Finish Carpentry: Coordination of wood trim and cabinets with base.
- E. Section 09 68 16 - Sheet Carpeting: Coordination of transition strips.

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- C. ASTM F1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing; 2004 (Reapproved 2014).
- D. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2013a.
- E. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.
- F. RFCI (FloorScore) - Resilient Floor Covering Institute Indoor Air Quality certification program.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Owner's initial selection.
- D. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of sub-floor is acceptable.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material:
 - a. Community Building: Amount equal to 5 percent of each type and color.
 - b. Dwelling Unit Buildings: Amount equal to 5 percent of each type and color for each multi-unit building.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 65 degrees F and 90 degrees F.
- D. Protect roll materials from damage by storing on end.
- E. Do not double stack pallets.

1.06 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature between 65 degrees F and 85 degrees F to achieve temperature stability. Thereafter, maintain conditions above 65 degrees F.

PART 2 PRODUCTS

2.01 SHEET FLOORING

- A. Vinyl Sheet Flooring: Transparent or translucent vinyl wear layer over interlayer and backing.
 - 1. Manufacturers:
 - a. Armstrong Flooring Inc; StrataMax Best: www.armstrong.com.
 - b. Mannington Residential; Luxury Vinyl Sheet: www.mannington.com.
 - c. Or approved equal.
 - 2. Minimum Requirements: Comply with ASTM F1303, Type I, with Class C foamed plastic backing.
 - 3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - 4. VOC Content Limits: As specified in Section 01 61 16.
 - 5. Printed Interlayer: Closed cell urethane foam.
 - 6. Wear Layer Thickness: 0.016 inch minimum.
 - 7. Total Thickness: 0.085 inch minimum.
 - 8. Sheet Width: 144 inch minimum.
 - 9. Pattern: To be selected by Owner/Architect from manufacturer's full range..

2.02 TILE FLOORING

- A. Vinyl Plank: Printed film type, with transparent or translucent wear layer, floating floor.
 - 1. Manufacturers:
 - a. Metroflor Corporation; Konecto - 'Project Plank': www.aspectaflooring.com.
 - b. Or approved equal.
 - 2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
 - 3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - 4. VOC Content Limits: As specified in Section 01 61 16.
 - 5. Plank Tile Size: 6 by 36 inch.
 - 6. Wear Layer Thickness: 0.006 inch.
 - 7. Total Thickness: 0.177 inch.
 - 8. Color: To be selected by Owner from manufacturer's full range.

2.03 ACCESSORIES

- A. Subfloor Filler: Fast-setting, portland-cement based; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
 - 1. VOC Content Limits: As specified in Section 01 61 16.
- C. Moldings, Transition and Edge Strips: Same material as flooring.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 - 1. Test in accordance with ASTM F710.

2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- C. Prohibit traffic until filler is fully cured.
- D. Clean substrate.
- E. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints and butt seams tightly.
- E. Set flooring in place, press with heavy roller to attain full adhesion.
- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 1. Metal Strips: Attach to substrate before installation of flooring using stainless steel screws.
 2. Resilient Strips: Attach to substrate using adhesive.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - SHEET FLOORING

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- B. Seams are prohibited in bathrooms and toilet rooms.
- C. Cut sheet at seams in accordance with manufacturer's instructions.
- D. Chemically bond seams using seam sealer where indicated.

3.05 INSTALLATION - PLANK FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.07 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.
- B. If construction activities are on-going, provide heavy, undyed, kraft paper protective coverings to prevent damage. Replace as required.

END OF SECTION

SECTION 09 68 16
SHEET CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet, stretched-in with cushion underlay and direct-glued.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied carpet.
- C. Section 03 54 00 - Cast Underlayment.

1.03 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016.
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- D. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two samples 12 by 12 inch in size illustrating color and pattern for each carpet and cushion material specified.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet with minimum three years documented experience.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 72 hours prior to installation.
- B. Maintain minimum 70 degrees F ambient temperature 24 hours prior to, during and 24 hours after installation.
- C. Ventilate installation area during installation and for 72 hours after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carpet:
 - 1. Shaw Industries Group: www.shawfloors.com.
 - 2. Interface, Inc: www.interfaceinc.com.
 - 3. J & J Industries, Inc: www.jjindustries.com.
 - 4. Milliken & Company: www.milliken.com.
- B. Cushion:
 - 1. FXI Foam Innovation: www.fxi.com.
 - 2. Proflex Products, Inc: www.proflex.us.
 - 3. Leggett & Platt, Inc: www.lpurethane.com.

2.02 CARPET

- A. Carpet, Type C1; Community Building:

1. Product: 'Textured Loop'; as selected by Owner.
 2. Roll Width: 12 ft.
 3. Face Weight: 28 oz/sq yd.
 4. Dye Method: Solution Dyed.
 5. Fiber Treatment: Soil/Stain Protection.
 6. Primary Backing:
 - a. Material: Polypropylene.
 7. Secondary Backing:
 - a. Material: Classicbac.
 8. Maximum Electrostatic Charge: 3 Kv. at 20 percent relative humidity (RH).
 9. Critical Radiant Flux: Minimum of 0.45 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
 10. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
 11. VOC Content: Comply with Section 01 61 16.
- B. Carpet, Type C2; Dwelling Units:
1. Product: Medium Pile; as selected by Owner.
 2. Roll Width: 12 ft.
 3. Face Weight: 32 oz/sq yd.
 4. Dye Method: Solution Dyed.
 5. Fiber Treatment: Soil/Stain Protection and Antimicrobial.
 6. Secondary Backing:
 - a. Material: Classicbac.
 7. Maximum Electrostatic Charge: 3 Kv. at 20 percent relative humidity (RH).
 8. Critical Radiant Flux: Minimum of 0.45 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
 9. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
 10. VOC Content: Comply with Section 01 61 16.
- C. Owner/Architect shall determine if alternate manufacturer style/colors submitted are equal to basis of specification.
- D. All carpeting shall be back-stamped in accordance with HUD UM Bulletin No. 44d. Certificate of compliance to be given to Owner at project completion.
- E. For each type of carpeting specified; all carpeting shall be from the manufacturer's same dye lot.

2.03 CUSHION

- A. Cushion: Synthetic Fiber; Typical Dwelling Units (Omit at Accessible Units).
1. Product: Syntex manufactured by Leggett & Platt.
 2. Nominal Thickness: 0.275 inch.
 3. Weight: 24 oz/sq yd.
 4. Density: 7 lb/cu ft.
- B. HUD UM Bulletin No.72 compliant. Certificate of compliance to be given to Owner at project completion.

2.04 ACCESSORIES

- A. Sub-Floor Filler: Type recommended by carpet manufacturer.
- B. Tackless Strip: Carpet gripper, of type recommended by carpet manufacturer to suit application, with attachment devices.
- C. Moldings and Edge Strips: Vinyl, color as selected.
1. All transitional strips shall comply with the applicable accessibility codes requirements.
- D. Adhesives:
1. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GL) certified; in lieu of labeled product, independent test report showing compliance is acceptable.
- E. Seam Adhesive: Recommended by carpet manufacturer.
- F. Carpet Adhesive: Recommended by carpet manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive carpet.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesives to sub floor surfaces.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and alkalinity (pH).
 - 1. Test in accordance with ASTM F710.
 - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet and cushion in accordance with manufacturer's instructions.
- C. Verify carpet match before cutting to ensure minimal variation between dye lots.
- D. Lay out carpet and locate seams in accordance with shop drawings.
 - 1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
 - 2. Do not locate seams perpendicular through door openings.
 - 3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
 - 4. Locate change of color or pattern between rooms under door centerline.
 - 5. Provide monolithic color, pattern, and texture match within any one area.
- E. Install carpet tight and flat on subfloor, well fastened at edges, with a uniform appearance.

3.04 STRETCHED-IN CARPET - TYPICAL DWELLING UNITS

- A. Install tackless strips with pins facing the wall around entire perimeter, except across door openings. Use edge strip where carpet terminates at other floor coverings.
- B. Space tackless strips slightly less than carpet thickness away from vertical surfaces, but not more than 3/8 inch.
- C. Install cushion in maximum size pieces using spot adhesive to adhere to sub-floor.
- D. Lay out cushion so that seams will be perpendicular to, or offset from, minimum 6 inches from carpet seams.
- E. Butt cushion edges together and tape seams.
- F. Trim cushion tight to edge of tackless strip and around projections and contours.
- G. Double cut carpet seams, with accurate pattern match. Make cuts straight, true, and unfrayed. Apply seam adhesive to all cut edges immediately.
- H. Join seams using hot adhesive tape. Form seams straight, not overlapped or peaked, and free of gaps.
- I. Following seaming, hook carpet onto tackless strip at one edge, power stretch, and hook firmly at other edges. Follow manufacturer's recommendations for method and amount of stretch.
- J. Trim carpet neatly at walls and around interruptions. Tuck edges into space between tackless strip and wall.
- K. Complete installation of edge strips, concealing exposed edges.

1. Installation of transitional strips shall not begin until the work of all other trades has been completed, especially overhead trades.

3.05 DIRECT-GLUED CARPET - COMMUNITY BUILDING AND ACCESSIBLE DWELLING UNITS

- A. Double cut carpet seams, with accurate pattern match. Make cuts straight, true, and unfrayed. Apply seam adhesive to cut edges of woven carpet immediately.
- B. Apply contact adhesive to floor uniformly at rate recommended by manufacturer. After sufficient open time, press carpet into adhesive.
- C. Apply seam adhesive to the base of the edge glued down. Lay adjoining piece with seam straight, not overlapped or peaked, and free of gaps.
- D. Roll with appropriate roller for complete contact of adhesive to carpet backing.
- E. Trim carpet neatly at walls and around interruptions.
- F. Complete installation of edge strips, concealing exposed edges.
 1. Installation of transitional strips shall not begin until the work of all other trades has been completed, especially overhead trades.

3.06 CLEANING

- A. Remove excess adhesive from floor and wall surfaces without damage.
- B. Install temporary surface protection over carpet material in areas where other construction activities or construction foot traffic are still present and/or where snow, rain, mud, dirt, etc. may be tracked into area from the outside.
- C. After all construction activities are complete, clean and vacuum carpet surfaces of all dirt, debris, stains, and residues per manufacturer's written instructions.

END OF SECTION

SECTION 09 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints and stains.
- C. Materials for backpriming woodwork.
- D. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Factory-primed Entry doors.
 - 2. Exposed surfaces of steel lintels and ledge angles.
 - 3. Galvanized roof flashings and drip edges.
 - 4. Steel Bollards.
 - 5. Mechanical and Electrical:
 - a. Exposed pipe and conduit.
- E. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 4. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead.
 - 5. Floors, unless specifically indicated.
 - 6. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
 - 7. Glass.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 50 00 - Metal Fabrications: Final coating of shop-primed items.
- C. Section 05 51 00 - Metal Stairs: Final coating of shop-primed items.
- D. Section 06 20 00 - Finish Carpentry.
- E. Section 06 66 00 - Ornamental Simulated Woodwork.
- F. Section 07 46 46 - Fiber Cement Siding.
- G. Section 09 21 16 - Gypsum Board Assemblies.
- H. Section 09 91 23 - Interior Painting.
- I. Section 32 17 23 - Painted Pavement Markings: Painted pavement markings.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2015.
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- E. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; Fourth Edition.
- F. SSPC-SP 1 - Solvent Cleaning; 2015.
- G. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).
- H. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 3. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit three paper "draw down" samples, 8 by 12 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Allow 10 days for approval process, after receipt of complete samples by Architect.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.
 - 1. All materials used on the work shall be stored in a single place designated by the Owner/Architect and shall be kept clean and orderly at all times.
 - 2. Care shall be taken to prevent damage to the storage area, and any damage incurred shall be repaired.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for Transparent Finishes: 65 degrees F for exterior, unless required otherwise by manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
 - 1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
- B. Paints:
 - 1. Behr Process Corporation: www.behr.com.
 - 2. Benjamin Moore Paints: www.benjaminmoore.com.
 - 3. PPG Paints: www.ppgpaints.com/sle.
 - 4. Pratt & Lambert Paints: www.prattandlambert.com.

5. Sherwin-Williams Company: www.sherwin-williams.com.
- C. Transparent Finishes:
1. Behr Process Corporation: www.behr.com.
 2. Benjamin Moore Paints: www.benjaminmoore.com.
 3. PPG Paints Flood Exterior Transparent Finishes: www.flood.com/sle.
 4. Sherwin-Williams Company: www.sherwin-williams.com.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content: Comply with Section 01 61 16.
- C. Colors: To be selected from manufacturer's full range of available colors.
1. Selections to be made by Owner.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including concrete masonry units, engineered wood siding, primed wood, primed metal, and primed urethane decorative elements.
1. Two top coats and one coat primer.
 2. Top Coat(s): Exterior Latex.
 3. Top Coat Sheen:
 - a. Flat: MPI gloss level 1; use this sheen for overhead surfaces.
 - b. Satin: MPI gloss level 4; use this sheen at all locations.
- B. Paint E-TR-W - Stain on Wood:
1. 2 coats stain.
 2. Stain: Exterior Solid Stain for Wood, Water Based; MPI #16.
- C. Paint ME-OP-3A - Ferrous Metals, Unprimed, Alkyd, 3 Coat:
1. One coat of alkyd, water based primer.
 2. Semi-gloss: Two coats of alkyd, water based, enamel.
- D. Paint ME-OP-2A - Ferrous Metals, Primed, Alkyd, Water Based, 2 Coat:
1. Applications include factory-primed entry doors, steel stairs, handrails, guardrails, and bollards.
 2. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 3. Semi-gloss: Two coats of water based alkyd enamel.
- E. Paint MgE-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
1. Applications include galvanized metal fabrications, flashing, and trim.
 2. One coat galvanize primer.
 3. Semi-gloss: Two coats of alkyd, water based, enamel.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
1. Alkyd Primer for Galvanized Metal.
 2. Rust-Inhibitive Water Based Primer; MPI #107.
 3. Latex Primer for Exterior Wood; MPI #6.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Fiber Cement Siding: 12 percent.
 - 2. Engineered Wood Siding: 12 percent.
 - 3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 - 4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Masonry:
 - 1. Prepare surface as recommended by top coat manufacturer.
 - 2. Clean surfaces with pressurized water. Use pressure range of 600 to 1500 psi at 6 to 12 inches. Allow to dry.
- G. Fiber Cement Siding: Remove dirt, dust and other foreign matter with a stiff fiber brush. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
- H. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 - 2. Prepare surface according to SSPC-SP 2.
- I. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
 - 3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- J. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied. Back prime concealed surfaces before installation.

- K. Exterior Wood to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior calking compound after sealer has been applied. Prime concealed surfaces.
- L. Metal Entry Doors to be Painted: Shop-Primed Surfaces; Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.
- C. Apply products in accordance with manufacturer's written instructions.
- D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- F. Apply each coat to uniform appearance.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. Upon completion of the work, the Contractor shall remove all paint spots from all decks, patios, glass, and adjacent surfaces.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints and stains.
- C. Materials for backpriming woodwork.
- D. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Both sides and all edges of interior wood doors.
 - 3. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
- E. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 4. Floors, unless specifically indicated.
 - 5. Ceramic and other tiles.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- C. Section 05 51 00 - Metal Stairs: Shop-primed items.
- D. Section 06 20 00 - Finish Carpentry.
- E. Section 06 66 00 - Ornamental Simulated Woodwork: Painting louvers and shutters.
- F. Section 09 21 16 - Gypsum Board Assemblies.
- G. Section 09 91 13 - Exterior Painting.
- H. Section 12 35 30 - Residential Casework: Transparent finishes on casework and trim moldings.
- I. Section 32 17 23 - Painted Pavement Markings: Painted pavement markings.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2015.
- D. SCAQMD 1113 - South Coast Air Quality Management District Rule No.1113; current edition.
- E. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; Fourth Edition.
- F. SSPC-SP 1 - Solvent Cleaning; 2015.
- G. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 3. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit three paper "draw down" samples, 8 by 12 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Allow 10 days for approval process, after receipt of complete samples by Architect.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.
 - 1. All materials used on the work shall be stored in a single place designated by the Owner/Architect and shall be kept clean and orderly at all times.
 - 2. Care shall be taken to prevent damage to the storage area, and any damage incurred shall be repaired.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for transparent Finishes: 65 degrees F for interior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
 - 1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for submittals.
- B. Paints:

1. Behr Process Corporation: www.behr.com.
 2. Benjamin Moore Paints: www.benjaminmoore.com.
 3. PPG Paints: www.ppgpaints.com/sle.
 4. Pratt & Lambert Paints: www.prattandlambert.com.
 5. Sherwin-Williams Company: www.sherwin-williams.com.
- C. Transparent Finishes:
1. Behr Process Corporation: www.behr.com.
 2. Benjamin Moore Paints: www.benjaminmoore.com.
 3. PPG Paints Deft Interior Clears/Polyurethanes: www.ppgpaints.com.
 4. Sherwin-Williams Company: www.sherwin-williams.com.
- D. Stains:
1. Behr Process Corporation: www.behr.com.
 2. Benjamin Moore Paints: www.benjaminmoore.com.
 3. PPG Paints Deft Interior Stains: www.ppgpaints.com.
 4. Sherwin-Williams Company: www.sherwin-williams.com.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content: Comply with Section 01 61 16.
- C. Colors: To be selected from manufacturer's full range of available colors.
1. Selection to be made by Owner.
 2. Extend colors to surface edges; colors may change at any edge as directed by Architect or Owner.
 3. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, wood, uncoated steel, and shop primed steel.
1. Two top coats and one coat primer.
 2. Top Coat(s): Interior Latex.
 3. Top Coat Sheen:
 - a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
 - b. Eggshell: MPI gloss level 3; use this sheen at all locations.
 4. Primer: As recommended by top coat manufacturer for specific substrate.
- B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
1. Medium duty applications include doors, door frames, window sills and casing, and wood baseboards.
 2. Two top coats and one coat primer.
 3. Top Coat(s): Interior Alkyd, Water Based.
 4. Top Coat Sheen:
 - a. Eggshell: MPI gloss level 3; use this sheen at all locations except doors.
 - b. Semi-Gloss: MPI gloss level 5; use this sheen at door edges and faces.
 5. Primer: As recommended by top coat manufacturer for specific substrate.

- C. Paint I-TR -W - Transparent Finish on Wood.
 - 1. Applications include unfinished cabinets, cabinet crown molding, and cabinet quarter round.
 - 2. 3 top coats over 2 coats stain over sanding sealer.
 - 3. Stain: Semi-Transparent Stain for Wood.
 - 4. Sealer: Alkyd, Sanding Sealer, Clear.
 - 5. Top Coat(s): Polyurethane Varnish, Oil Modified.
 - 6. Top Coat(s): Polyurethane Varnish, High Build.
 - 7. Top Coat Sheen:
 - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 - 1. Interior Latex Primer Sealer.
 - 2. Latex Primer for Interior Wood.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Masonry, Concrete, and Concrete Masonry Units : 12 percent.
 - 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
 - 1. Clean floors and all adjacent surfaces prior to application.
- B. Mask or otherwise protect floors, adjacent walls, fixtures, and other construction throughout application.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Masonry:
 - 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
 - 2. Prepare surface as recommended by top coat manufacturer.

- H. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- I. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- J. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- K. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- L. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal exposed surface entirely. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.
- M. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with tinted primer.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions.
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. Upon completion of the work, the Contractor shall remove all paint spots from the floors, glass and adjacent surfaces.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs.
- B. Building Identification signs.
- C. Dwelling Unit identification signs.
- D. Monument Signs.
- E. Traffic signs.
- F. Egress Door signage.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Attachment of signage to Masonry.
- B. Section 07 46 46 - Fiber Cement Siding: Attachment of signage to siding.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. Submit for approval by Owner through Architect prior to fabrication.
- D. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- E. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

1.06 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flat Signs:
 - 1. Best Sign Systems, Inc; HC300: www.bestsigns.com.
 - 2. Cosco Industries (ADA signs); ADA Series 2: www.coscoarchitecturalsigns.com.
 - 3. Inpro; Aspen Series: www.inprocorp.com.
 - 4. Mohawk Sign Systems, Inc; Mohawk 1000 Sand Carved: www.mohawksign.com.
 - 5. National Signage Affiliates; PoliTouch Series: www.nationalsignageaffiliates.com
 - 6. Stamprite Supersine, Inc.; Supersine TFA: www.supersine.com
- B. Dwelling Unit and Building Identification Signs:
 - 1. Best Sign Systems, Inc; Graphic Blast FG: www.bestsigns.com.

2. Inpro; Photopolymer: www.inprocorp.com.
 3. Mohawk Sign Systems, Inc; Series 200A : www.mohawksign.com.
 4. Stamprite Supersine, Inc.; Supersine PPA: www.supersine.com
- C. Egress Door Signs:
1. Lynch Signs, Inc.: www.lynchsign.com.
 2. Seton Identification Products: www.seton.com.
 3. Compliance Signs, Inc.: www.compliancesigns.com.

2.02 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide signs as indicated in Signage Schedule.
1. Sign Type: Flat signs with raised panel media as specified.
 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
 3. Character Height: 5/8 inch.
 4. Sign Size: As required to accommodate required graphics and text.
 - a. Maintain consistent size throughout building.
 5. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", and braille.
- C. Egress Door Sign, Community Building:
1. Sign Type: Printed vinyl self-adhesive, UV stable, chemical, abrasion, and moisture resistant.
 2. Sign size: 2 by 24 inches, unless otherwise indicated.
 3. Text Height: 1 inch minimum on contrasting background.
 4. Message: "THIS DOOR TO REMAIN UNLOCKED WHEN BUILDING IS OCCUPIED".
- D. Occupant Load Sign, Community Building: Shall be as required by the Local Fire Marshal, or Local Authority having Jurisdiction.
- E. Dwelling Unit and Building Identification Signs:
1. Sign Type: Flat signs with raised panel media as specified.
 2. Material: Fiberglass or Photopolymer signs.
 3. Mounting: Countersunk Screws.
 4. Install on outside wall at apartment entries as indicated on drawings.
 5. Refer to Dwelling Unit Sign drawing at end of section.
- F. Monument Sign: Provide sign as indicated on Drawings.
1. Aluminum sheet, 22 gauge (0.020 inch), laminated to OSB construction panel, exterior grade. Back primed and painted.
 - a. Individual vinyl, 3 mil thickness, self-adhesive, UV stable, chemical, abrasion, and moisture resistant letters and numbers; as indicated.
- G. Traffic Signs: Provide Parking/Traffic signs and mounting poles of types indicated on drawings.

2.03 SIGN TYPES

- A. Flat Signs: Signage media without frame.
1. Edges: Square.
 2. Corners: Square.
 3. Wall Mounting of Interior One-Sided Signs: Tape adhesive or silicone adhesive.
 4. Wall Mounting of Exterior One-Sided Signs: Countersunk screws.
- B. Color and Font: Unless otherwise indicated:
1. Character Font: Helvetica, Arial, or other sans serif font.
 2. Character Case: Upper case only.
 3. Background Color: Selected by Owner/Architect.
 4. Character Color: Contrasting color.

2.04 TACTILE SIGNAGE MEDIA

- A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
1. Total Thickness: 1/8 inch.

- B. Injection Molded Panels: One-piece acrylic plastic, with raised letters and braille.
 - 1. Total Thickness: 1/8 inch.
- C. Applied Character Panels: Acrylic plastic base, with applied acrylic plastic letters and braille.
 - 1. Total Thickness: 1/8 inch.
 - 2. Letter Thickness: 3/32 inch.
 - 3. Letter Edges: Square.

2.05 NON-TACTILE SIGNAGE MEDIA

- A. Sand Blasted Plastic Panels: High gloss acrylic plastic; letters sand blasted to dull sheen:
 - 1. Total Thickness: 1/8 inch.

2.06 ACCESSORIES

- A. Exposed Screws: Chrome plated.
- B. Tape Adhesive: Double sided tape, permanent adhesive.
- C. Silicone Adhesive: Type as recommended by manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Protect from damage until Substantial Completion; repair or replace damaged items.

PART 4 SCHEDULES

4.01 SIGNAGE SCHEDULE

Description/ Text	Location	Quantity
Building Number/Address	Exterior	1 @ Comm. Bldg.
Dwelling Unit Number/Address	Exterior	1 per Unit
Men's Restroom	Interior	1
Women's Restroom	Interior	1
Management Office	Interior	1
Occupant Load	Interior	1
Exercise Room	Interior	1
Computer Room	Interior	1
Laundry	Exterior	1
Storage	Interior	1
Exit	Interior	3
Egress Door Signage	Interior	2

END OF SECTION

SECTION 10 28 00
TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Accessories for toilet rooms and dwelling unit bathrooms.
- B. Grab bars.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Concealed supports for toilet and bathroom accessories, including in wall framing and plates.

1.03 REFERENCE STANDARDS

- A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2011.
- E. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- F. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fixture and Accessory Manufacturers:
 - 1. Better Homes Products, Inc.: www.betterhomesproducts.com.
 - 2. Pfister, a Spectrum Brands company: www.pfisterfaucets.com.
 - 3. Delta Faucet Company, Inc.: www.deltafaucet.com.
- B. Commercial Toilet and Shower Accessories:
 - 1. ASI - American Specialties, Inc: www.americanspecialties.com.
 - 2. Bradley Corporation: www.bradleycorp.com.
 - 3. Bobrick Washroom Equipment Inc.: www.bobrick.com.
- C. All items of each type to be made by the same manufacturer.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Type 304.
- E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- F. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- G. Adhesive: silicone, waterproof.

- H. Fasteners, screws, and bolts: Corrosion resistant or stainless steel.

2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, SC 2, satin finish, unless otherwise noted.
- C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.
- D. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.

2.04 TOILET AND BATHROOM ACCESSORIES

- A. Toilet Paper Dispenser: Single roll, surface mounted bracket type, nickel-plated solid brass.
 - 1. Product: Candlestick Park #2209 manufactured by Better Homes Products, or equal.
- B. Paper Towel Dispenser: Manual, roll paper type.
 - 1. Cover: High-impact plastic.
 - 2. Paper Discharge: Push lever.
 - 3. Capacity: 8 inch diameter roll.
 - 4. Mounting: Surface mounted.
 - 5. Product: Model 2497 manufactured by Bradley, or equal.
- C. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
 - 1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
 - 2. Size: 24 inch by 36 inch or as indicated on the drawings.
 - 3. Frame: 0.04 inch channel shapes, with mitered and welded and ground corners; satin finish.
 - 4. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
- D. Grab Bars: Stainless steel, nonslip grasping surface finish.
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force, minimum.
 - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
 - c. Finish: Safety-grip.
 - d. Length and Configuration: As indicated on the Drawings.
 - e. Product: Series 832 manufactured by Bradley, or equal.
- E. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for concealed mounting.
 - 1. Product: Model B-207 manufactured by Bobrick, or equal.
- F. Folding Shower Seat: Not Used.
- G. Towel Bar: Solid brass, nickel-plated.
 - 1. Finish: Satin.
 - 2. Length: 32 inches.
 - 3. Product: Candlestick Park #2232 manufactured by Better Homes Products, or equal.
- H. Towel Ring: Solid brass, nickel-plated, 2-1/2 inch extension from wall, with round ring, for concealed attachment.
 - 1. Finish: Satin.
 - 2. Product: Candlestick Park #2204 manufactured by Better Homes Products, or equal.
- I. Robe Hook: Solid brass, nickel-plated, double-prong for concealed attachment.
 - 1. Finish: Satin.
 - 2. Product: Candlestick Park #2202 manufactured by Better Homes Products, or equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.

- C. Verify that field measurements are as indicated on drawings.
- D. See Section 06 10 00 - Rough Carpentry for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

3.02 PREPARATION

- A. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
 - 1. Towel bars and shower curtain rods shall be secured to solid blocking or studs.
 - 2. Grab bars shall be secured to solid blocking capable of withstanding a 250 pound-force of 5 minute duration.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
 - 1. Grab Bars: As indicated on drawings.
 - 2. Mirrors: 40 inch maximum, measured to bottom of mirrored surface.
 - 3. Robe Hooks:
 - a. Typical locations: 60 inches measured to top of hook.
 - b. Accessible locations: 48 inches measured to top of hook.
 - 4. Other Accessories: As indicated on drawings.

3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

PART 4 ACCESSORY SCHEDULES

4.01 COMMUNITY BUILDING TOILET ROOMS

Mark	Qty	Description	Model #	Mfr
A	1	Toilet Paper Holder; surface-mounted	#2209	BHP
B	1	Paper Towel Dispenser; surface-mounted	#2497	Bradley
C	1	Mirror; 24 by 36 inches	----	----
D1	1	Grab Bar; 42 inch	BR832-00142	Bradley
D2	1	Grab Bar; 36 inch	BR832-00136	Bradley
D4	1	Grab Bar; 18 inch	BR832-00118	Bradley
I	1	Robe Hook; door-mounted, typical height	#2202	BHP

4.02 TYPICAL DWELLING UNIT BATHROOMS

Mark	Qty	Description	Model #	Mfr
A	1	Toilet Paper Holder; surface-mounted	#2209	BHP
E	1	Shower Curtain Rod	B-207	Bobrick
G	1	Towel Bar; 32 inch	#2232	BHP
H	1	Towel Ring	#2204	BHP
I	1	Robe Hook, typical height	#2202	BHP

4.03 ACCESSIBLE DWELLING UNIT BATHROOMS

A. In addition to Items in 4.02 above, include the following:

Mark	Qty	Description	Model #	Mfr
D1	1	Grab Bar; 42 inch (toilet)	BR832-00142	Bradley
D2	1	Grab Bar; 36 inch (toilet)	BR832-00136	Bradley
--	1	'U-shaped' Grab Bar; factory installed, in roll-in shower enclosures as per drawings	---	--
I	1	Robe Hook; accessible height	#2202	BHP

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Roughed-in wall openings.
- B. Section 09 21 16 - Gypsum Board Assemblies.
- C. Section 09 91 23 - Interior Painting.

1.03 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, and anchorage details.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. Kidde, a unit of United Technologies Corp: www.kidde.com.
 - 2. Nystrom, Inc: www.nystrom.com/sle.
 - 3. Pyro-Chem, a Tyco Business: www.pyrochem.com.
 - 4. Strike First Corporation of America: www.strikefirstusa.com.
- B. Fire Extinguisher Cabinets and Accessories:
 - 1. JL Industries, Inc; Clear Vu Model 1535F25: www.jlindustries.com.
 - 2. Larsen's Manufacturing Co; Model C2409R: www.larsensmfg.com.
 - 3. Potter-Roemer; Model 7360: www.potterroemer.com.
 - 4. Or Approved Equal.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
 - 1. Stored Pressure Operated: Deep Drawn.
 - 2. Class: 2A-10BC type.
 - 3. Size: 10 pound; For installation in common areas.
 - 4. Size: 2.6 pound; For installation in each individual dwelling unit.
 - 5. Finish: Baked polyester powder coat, Red color.
 - 6. Temperature range: Minus 40 degrees F to 120 degrees F.

- C. Dry Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gage.
 - 1. Class: K type.
 - 2. Size: 1.6 gallons.
 - 3. Finish: Polished stainless steel.
 - 4. Temperature range: Minus 20 degrees F to 120 degrees F.

2.03 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated, by extinguisher manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 PREINSTALLATION COORDINATION

- A. Contractor shall be responsible, during the rough framing stage, to coordinate a site visit with the Local Authority having Jurisdiction, to verify the required locations of all fire extinguisher cabinets to ensure installation of all necessary blocking.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install brackets plumb and level.
- C. Coordinate fire extinguisher cabinet with millwork wainscot installation – millwork wainscot shall be trimmed as necessary to abut cabinet flush with no gaps.
- D. Secure rigidly in place.
- E. Place common area extinguishers on wall brackets.
 - 1. Provide Multi-Purpose Dry Chemical extinguisher in Management Office, Community Room, Laundry Room, Computer Room, and Maintenance Room.
 - 2. Provide K-Type extinguisher in Community Building near kitchen.
 - 3. Install in accessible location within reach range of 15 inches to 48 inches above finished floor.
- F. Place Dwelling Unit extinguishers in brackets mounted inside sink base cabinet or where otherwise directed.
 - 1. Extinguisher brackets in Accessible Dwelling Units shall be mounted in accessible locations and within the reach range of 15 inches to 48 inches above finished floor.

END OF SECTION

SECTION 10 55 00
POSTAL SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Central mail delivery boxes.
- B. Rent Drop and Collection box.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Framing and blocking for recessed mailbox units.

1.03 REFERENCE STANDARDS

- A. 39 CFR 111 - U.S. Postal Service Standard 4C; effective date September 3, 2006.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's specifications and descriptive literature, installation instructions, maintenance information, and current USPS approval documentation.
- C. Shop Drawings: Indicate plans for each unit or groups of units, front elevations with compartment layout and model number, overall dimensions, rough-in opening sizes, construction and anchorage details.

1.05 WARRANTY

- A. Provide manufacturer's warranty against defects in materials or workmanship for a period of 5 years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 CENTRAL MAIL DELIVERY BOXES

- A. Manufacturers:
 - 1. Florence Manufacturing Company: www.florencemailboxes.com.
 - 2. Postal Products Unlimited, Inc: www.postalproducts.com.
 - 3. Salsbury Industries: www.mailboxes.com.
- B. Central Mail Delivery Boxes: Provide products approved for United States Postal Service (USPS) delivery.
 - 1. Materials: Aluminum with stainless steel hardware.
 - 2. Finish: Powder coat in color selected by Owner from manufacturer's standard colors.
 - 3. Unit Types and Sizes: As specified.
 - 4. Configurations: Refer to Drawings for quantity of units and locations.
 - a. Provide a minimum of one (1) customer compartment for each dwelling unit and the Manager's office.
- C. Wall-Mounted Mailboxes: Fully-recessed, complying with 39 CFR 111 (USPS-STD-4C).
 - 1. Unit A: Front-loading with pair of master doors, double-column design, 16 customer compartments, 1 outgoing mail compartment, and 2 parcel compartments.
 - a. Florence Manufacturing Company; Model # 4C15D-16.
 - b. Postal Products Unlimited, Inc; Model # N1029410.
 - c. Salsbury Industries; Model # 3715D-16.
 - 2. Total Required: 3 Units.

2.02 COMPONENTS

- A. Locking - Front Loading Master Door: Three-point latching mechanism with USPS master lock furnished and installed by postmaster.
- B. Locking - Customer Compartment Doors: USPS approved cam lock, 3 keys each lock.
- C. Locking - Parcel Compartment Doors: Double-lock arrangement with USPS approved cam lock for customer access, and USPS master lock furnished and installed by postmaster.
- D. Identification - Customer and Parcel Compartments: Sequential numerical or alphabetic characters, top to bottom, left to right; factory-installed.

1. Silver adhesive decals, 3/4 inch high black characters centered on 1-1/2 inch high by 1-3/4 inch long decal.
2. Customer Name Marking: Self-adhesive labels; attach below front of each compartment shelf.

2.03 AUXILIARY ITEMS

- A. Tenant Payment Drop: Recessed mounted, through-wall letter drop with interior mounted locking collection box, and clear plexiglass window in door. Install at Management office where indicated on the Drawings.
 1. Materials: Aluminum with steel hardware.
 2. Finish: Powder coat in color selected by Architect from manufacturer's standard colors.
 3. Size:
 - a. Deposit Slot: 11 by 4 inches.
 - b. Collection Box: 15 by 19 by 7-1/2 inches.
 4. Text engraved on flap: PAYMENT.
 5. Manufacturers:
 - a. Salsbury Industries; Model 2255 & 2256.
 - b. Or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that concrete base and anchor bolts are ready to receive pedestal-mounted units.
- B. Verify that rough-openings are ready to receive wall-mounted units.
- C. Do not begin installation until unacceptable conditions are corrected.

3.02 INSTALLATION

- A. Install postal specialties in accordance with approved shop drawings, manufacturer's instructions, and USPS requirements.
- B. Adjust and lubricate door hardware to operate properly.

END OF SECTION

SECTION 10 57 23
CLOSET AND UTILITY SHELVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall mounted wire closet shelving.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Blocking in walls for attachment of shelving.
- B. Section 06 20 00 - Finish Carpentry.
- C. Section 09 21 16 - Gypsum Board Assemblies: Blocking in metal stud walls for attachment of standards.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, with installation instructions.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.
- C. Store flat to prevent warpage and bending.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wire Storage Shelving:
 - 1. ClosetMaid Corporation : www.closetmaid.com.
 - 2. RubberMaid Closet and Organization Products : www.rubbermaidcloset.com.

2.02 SHELVING APPLICATIONS

- A. Shelf Depth: 12 inches, unless otherwise indicated.
- B. Bedroom Closets:
 - 1. Wall-to-wall shelf with free sliding hanger rod.
 - 2. Provide intermediate bracing for shelves longer than 36 inches.
- C. Coat Closets:
 - 1. Wall-to-wall shelf with integral hanger rod.
 - 2. Provide intermediate bracing for shelves longer than 36 inches.
- D. Linen and Pantry Shelving:
 - 1. Wall-to-wall shelves spaced as shown on the Drawings, not less than 16 inch deep.

2.03 MATERIALS

- A. Wire Shelving: Factory-assembled coated wire mesh shelf assemblies for wall-mounting, with all components and connections required to produce a rigid structure that is free of buckling and warping.
 - 1. Construction: Cold-drawn steel wire with average tensile strength of 100,000 psi resistance welded into uniform mesh units, square, rigid, flat, and free of dents or other distortions, with wires trimmed smooth.
 - 2. Coating: PVC or epoxy, applied after fabrication, covering all surfaces.
 - 3. PVC Coating: 9 to 11 mils thick.
 - 4. Epoxy Coating: Non-toxic epoxy-polyester powder coating baked-on finish, 3 to 5 mils thick.
 - 5. Standard Mesh Shelves: Cross deck wires spaced at 1 inch.

6. Shelf and Rod Units: Integral hanging rod at front edge of shelf.
 7. Free-Sliding Hanging Rod: Integral hanging rod that permits uninterrupted sliding of hangers the full width of the shelf.
- B. Hanging Rod: Tubular steel, 1 inch diameter, with end caps on open ends.
 1. Finish: Epoxy powder coat.
 2. Wall Thickness: 20 gage, 0.035 inch.
 - C. Mounting Hardware: Provide manufacturer's standard mounting hardware; include support braces, wall brackets, back clips, end clips, poles, and other accessories as required for complete and secure installation; factory finished to match shelving.
 - D. Fasteners: As recommended by manufacturer for mounting substrates.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect areas to receive shelving, to verify that spaces are properly prepared to receive shelf units, and are of dimensions indicated on shop drawings.
- B. Verify appropriate fastening hardware.
- C. Do not begin installation until substrates have been properly prepared.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, with shelf surfaces level.
- B. Cap exposed ends of cut wires and hanging rods.
- C. Install back clips, end clips at side walls, and support braces at open ends. Install intermediate support braces at 32 inches on center, maximum, or as recommended by manufacturer.
- D. Mounting Heights:
 1. Single Hanging Rod Units: Install shelf at 68 inches above floor.
 - a. At Accessible Units install shelf at 48 inches above floor.

3.04 CLEANING

- A. Clean soiled surfaces after installation.

3.05 PROTECTION

- A. Protect installed work from damage.
- B. Touch-up, repair, or replace damaged products before Substantial Completion in a manner that eliminates evidence of replacement.

END OF SECTION

SECTION 11 30 13
RESIDENTIAL APPLIANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Kitchen appliances.
- B. Laundry appliances.

1.02 RELATED REQUIREMENTS

- A. Section 12 35 30 - Residential Casework: Installation of appliances in casework.
- B. Section 22 10 05 - Plumbing Piping: Plumbing connections for appliances.
- C. Section 26 05 83 - Wiring Connections: Electrical connections for appliances.

1.03 REFERENCE STANDARDS

- A. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.
- C. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Electric Appliances: Listed and labeled by UL (DIR) and complying with NEMA Standards (National Electrical Manufacturers Association).

1.06 SERVICE AGREEMENT

- A. Provide one (1) year service contract on all appliances with qualified local area dealer or bona fide repair service, regardless of where purchased.

PART 2 PRODUCTS

2.01 KITCHEN APPLIANCES

- A. Energy Star Rating: Provide Equipment Eligible for Energy Star Rating where available and applicable.
- B. Refrigerator, Accessible Dwelling Units: Free-standing, side-by-side, and frost-free.
 - 1. Capacity: Total minimum storage of 23.2 cubic ft; minimum 25 percent freezer capacity.
 - 2. Energy Usage: Energy Star Rated.
 - 3. Features: Include glass shelves, light in freezer compartment, and ADA compliant front-mounted controls.
 - 4. Exterior Finish: Porcelain enameled steel, color as selected by Owner.
 - 5. Manufacturers:
 - a. To be selected by Owner.
- C. Refrigerator, Typical Dwelling Units: Free-standing, top-mounted freezer, and frost-free.
 - 1. Capacity: Total minimum storage of 21.2 cubic ft; minimum 29 percent freezer capacity.
 - 2. Energy Usage: Energy Star Rated.
 - 3. Features: Include glass shelves and light in freezer compartment.
 - 4. Exterior Finish: Porcelain enameled steel, color as selected by Owner.
 - 5. Manufacturers:
 - a. To be selected by Owner.
- D. Range, Accessible Dwelling Units: Electric, free-standing, with standard burners and removable drip pans.
 - 1. Size: 30 inches wide.
 - 2. Oven: Self-cleaning.
 - 3. Elements: Four (4).
 - 4. Controls: Push-to-turn knobs with electronic clock and timer.

5. Features: Include oven door window, broiler pan and grid, oven light, anti-tip restraint, and front mounted controls.
 6. Exterior Finish: Porcelain enameled steel, color as selected by Owner.
 7. Manufacturers:
 - a. To be selected by Owner.
- E. Range, Typical Dwelling Units: Electric, free-standing, with standard burners and removable drip pans.
1. Size: 30 inches wide.
 2. Oven: Manual cleaning.
 3. Elements: Four (4).
 4. Controls: Push-to-turn knobs with electronic clock and timer.
 5. Features: Include oven door window, broiler pan and grid, oven light, anti-tip restraint, and front mounted controls.
 6. Exterior Finish: Porcelain enameled steel, color white.
 7. Manufacturers:
 - a. To be selected by Owner.
- F. Cooking Exhaust, Accessible Dwelling Units: Range hood; fan and light wired to wall switches. Refer to drawings for switch heights.
1. Size: 30 inches wide.
 2. Fan: Two-speed, 500 cfm
 3. Exhaust: Recirculating.
 4. Features: Include cooktop light and removable grease filter.
 5. Exterior Finish: Painted steel, color white.
 6. Manufacturers:
 - a. To be selected by Owner.
- G. Microwave, Accessible Dwelling Units: Countertop.
1. Capacity: 1.4 cubic ft.
 2. Power: 1100 watts.
 3. Height: 12 inches maximum.
 4. Features: Include turntable.
 5. Exterior Finish: White.
 6. Manufacturers:
 - a. To be selected by Owner.
- H. Microwave, Typical Dwelling Units: Over-the-range, microwave/hood combination.
1. Capacity: 1.7 cubic ft.
 2. Power: 1000 watts.
 3. Features: Include turntable, cooktop light, night light, 2-speed exhaust fan, built-in trim kit, and undercabinet mounting kit.
 4. Exterior Finish: White.
 5. Manufacturers:
 - a. To be selected by Owner.
- I. Dishwasher, Accessible Dwelling Units: Undercounter, for installation at 34 inch counters.
1. Controls: Solid state electronic.
 2. Energy Usage: Energy Star Rated.
 3. Wash Options: Two (2).
 4. Cycles: Six (6), including heavy, sanitize, normal, eco, quick, and rinse and hold.
 5. Features: Include rinse aid dispenser, optional no-heat dry, optional water temperature boost, adjustable upper rack, and adjustable lower rack.
 6. Finish: Porcelain enameled steel, color as selected by Owner.
 7. Manufacturers:
 - a. To be selected by Owner.
- J. Dishwasher, Typical Dwelling Units: Undercounter.
1. Controls: Solid state electronic.
 2. Energy Usage: Energy Star Rated.
 3. Wash Options: Three (3).
 4. Cycles: Four (4), including heavy, normal, light, and auto-sense.

5. Features: Include rinse aid dispenser, optional no-heat dry, optional water temperature boost, adjustable upper rack, and customizable bottom rack .
6. Finish: Porcelain enameled steel, color as selected by Owner.
7. Manufacturers:
 - a. To be selected by Owner.

2.02 LAUNDRY APPLIANCES

- A. Provide Equipment Eligible for Energy Star Rating: Energy Star Rated.
- B. Clothes Washer: Community Building: Commercial Grade; Coin-operated.
 1. Size: Large capacity.
 2. Controls: Rotary.
 3. Cycles: Include normal, permanent press, delicate, and soak.
 4. Motor Speed: Two-speed, three combinations.
 5. Features: Include bleach dispenser, fabric softener dispenser, sound insulation, and end of cycle signal.
 6. Finish: Painted steel, color as selected by Owner.
 7. Manufacturers:
 - a. To be selected by Owner.
- C. Clothes Dryer: Electric, Commercial Grade; Coin-operated.
 1. Size: Large capacity.
 2. Controls: Rotary, with temperature-sensing dry control.
 3. Temperature Selections: Four.
 4. Cycles: Include normal, permanent press, knit/delicate, and air only.
 5. Features: Include interior light, reversible door, sound insulation, and end of cycle signal.
 6. Finish: Painted steel, color as selected by Owner.
 7. Manufacturers:
 - a. To be selected by Owner.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify utility rough-ins are provided and correctly located.

3.02 INSTALLATION

- A. All appliances to be installed in locations as shown on Drawings.
- B. Install in accordance with manufacturer's instructions.
- C. Coordinate installation/operating dimensions/clearances for all appliances with Millwork Cabinetry layouts.
- D. Provide all installation hardware, accessories kits, and power cords as required for complete installation of each appliance.
- E. Anchor built-in equipment in place.

3.03 ADJUSTING

- A. Adjust equipment to provide efficient operation.

3.04 CLEANING

- A. Remove packing materials from equipment and properly discard.
- B. Wash and clean equipment.

3.05 CLOSE OUT

- A. Operating Manuals for each appliance shall be left in the individual Dwelling Units and Community Building kitchen respectively, unless directed otherwise.
- B. Warranty registration information shall be turned over to Owner upon completion of installation.

END OF SECTION

SECTION 11 68 13
PLAYGROUND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Playground layout (staking).
- B. Playground equipment.
- C. Protective Ground cover.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Footings for playground equipment.
- B. Section 31 22 00 - Grading: Shaping subgrade to specified grade levels; removal of excess soil and rocks.
- C. Section 32 31 13 - Chain Link Fences and Gates: Fence enclosures at play areas.

1.03 PRICE AND PAYMENT PROCEDURES

- A. Contractor shall assist Owner in the selection of products, and shall submit proposed layouts and product data for approval.
 - 1. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.

1.04 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe; 2009 (Reapproved 2014).
- C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- D. ASTM A513/A513M - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing; 2015.
- E. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2014.
- F. ASTM B108/B108M - Standard Specification for Aluminum-Alloy Permanent Mold Castings; 2015.
- G. ASTM B179 - Standard Specification for Aluminum Alloys in Ingot and Molten Forms for Castings from All Casting Processes; 2014.
- H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- J. ASTM D648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position; 2016.
- K. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test; 2005 (Reapproved 2011).
- L. ASTM F1292 - Standard Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment; 2013.
- M. ASTM F1487 - Standard Consumer Safety Performance Specification for Playground Equipment for Public Use; 2011.
- N. CPSC Pub. No. 325 - Public Playground Safety Handbook; 2010.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meetings: Convene a meeting one week before starting earthwork for playground to discuss coordination between various installers.
 - 1. Require attendance by personnel responsible for grading and installers of playground equipment, protective surfacing, footings, and adjacent work.
 - 2. Include representatives of Contractor.

3. Notify Architect at least 2 weeks prior to meeting.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Proposals for Substitutions: Substitutions that will increase the fall height, platform height, or maximum equipment height will not be considered; submit shop drawings with proposed modifications clearly identified and sufficient information to determine compliance with specified criteria.
- C. Product Data: For all manufactured equipment, provide manufacturer's product data showing materials of construction, compliance with specified standards, installation procedures, safety limitations, and the number of users permitted.
- D. Shop Drawings: Detailed scale drawings showing play event layout, Use Zone perimeters, and fall height for each play event.
 1. Show locations and dimensions of footings and anchorage points.
 2. Clearly identify mounting elevations in relation to a fixed survey point on site and to subgrade elevation and depth of protective surfacing.
 3. Show locations of underground utilities, storm drainage system and irrigation system.
 4. Show locations of related construction such as walkways and roadways, fences, site furnishings, and plantings.
- E. Samples: For each item for which color must be selected provide color chart showing full range of colors and finishes.
- F. Maintenance Data: Provide manufacturer's recommended maintenance instructions and list of replaceable parts for each equipment item, with address and phone number of source of supply.
- G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company regularly engaged in manufacturing materials and products specified in this section, with not less than three years of experience.
- B. Installer Qualifications: Company certified by manufacturer for training and experience installing play events and equipment.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store equipment to project site in accordance with manufacturer's recommendations.
- B. Store materials in a dry, covered area, elevated above grade.

1.09 WARRANTY

- A. Provide manufacturer's standard Limited Lifetime Warranty for playground equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Playground Equipment:
 1. GameTime, Inc: www.gametime.com.
 2. Landscape Structures, Inc: www.playlsi.com.
 3. Park Structures, Inc: www.parkstructures.com.

2.02 PLAYGROUND EQUIPMENT - GENERAL

- A. Design Assumptions: Because the safety of the playground depends on strict conformance to the design criteria, this information is provided for Contractor's information.
 1. Provide four (4) piece, multiple-play system designed for inclusive play including minimum-use and full-use play zones.
 - a. Provide layout and specifications from manufacturer for Owner's approval.
 2. Playground is to be designed for children ages 5 through 12.
 3. Access by wheelchair into playground area is not required.
 4. If deviations from specified dimensions, especially fall heights, is required, obtain approval prior to proceeding; follow approval request procedure as specified for substitutions.
- B. Mount all equipment on concrete footings, unless otherwise indicated.

1. The playground protective ground cover constitutes a resilient layer installed over the subgrade; the top of footings and anchorage devices are to be located below the surface of the subgrade.
2. Provide supports as required to mount equipment at proper height above finish and sub-grades to allow installation of sufficient depth of protective surfacing; portion of support below top of surfacing must comply with specified requirements for equipment.

2.03 CUSTOM PLAY STRUCTURES

- A. Materials, Configuration, and Dimensions: As indicated on shop drawings.
- B. Fabricate in accordance with ASTM F1487 unless otherwise indicated; in particular, requirements for sharp points and edges, protrusions, entanglement hazards, crush and shear points, and head and neck entrapment.
- C. Stairs and Ship's Ladders: Treads and handrails of vinyl-coated steel and stringers of vinyl-coated steel.
- D. Ladders: Stringers of vinyl-coated steel with rungs of vinyl-coated steel, secured to prevent turning.
- E. Sliding Poles: Hot-dipped galvanized steel pipe, 1.9 inch diameter, maximum; continuous surface with no protruding welds or joints along the sliding area.
- F. Flexible Climber: Flexible grid of cables to provide access to an elevated platform; anchored at both ends; ground anchor below bottom of protective surfacing.

2.04 MATERIALS

- A. Steel Pipe and Tube: Conforming to ASTM A135/A135M, ASTM A500/A500M, or ASTM A513/A513M; hot-dipped galvanized and free of excess weld and spatter.
 1. Tensile Strength: 45,000 psi, minimum.
 2. Yield Point: 33,000 psi, minimum.
 3. Galvanizing: Hot-dip metal components in zinc after fabrication, in accordance with ASTM A123/A123M; remove tailings and sharp protrusions and burnish edges.
- B. Extruded Aluminum: ASTM B221 or ASTM B221M, Alloy 6061, 6062, or 6063.
 1. Tensile Strength: 39,000 psi, minimum.
 2. Yield Point: 36,500 psi, minimum.
- C. Cast Aluminum: ASTM B26/B26M, ASTM B108/B108M, or ASTM B179.
- D. Chain: Corrosion resistant zinc plated steel; minimum size 4/0; polyvinyl chloride coating.
- E. Rope Cable: Strands of steel cable with UV-stabilized polypropylene synthetic covering; ends capped to prevent fraying.
- F. Hardware: Of design without hazardous protrusions, corners, or finishes, and requiring tools for removal after installation; countersunk fasteners are preferred.
 1. Use stainless steel for metal-to-metal connections; select type to minimize galvanic corrosion of materials connected by hardware.
 2. Use stainless steel with plastic components.
 3. Bearings: Self lubricating.
 4. Hooks, Including S-Hooks: Closed loop; maximum gap 0.04 inches, less than the thickness of a dime.
 5. Rails, Loops, and Hand Bars: Same metal as item is mounted on or aluminum; with polyvinyl chloride coating.
 6. Anchors: In accordance with manufacturer's recommendations.
- G. Transparent Plastic: Clear polycarbonate plastic sheets, flat; shatterproof; resistant to crazing, cracking, and fogging.
 1. Sheet Thickness: 3/16 inch, minimum.
- H. Opaque Plastic: Molded homogeneous plastic; do not use plastic as major load bearing members; use as panels and railings is acceptable.
 1. Homogeneous Plastic: Ultraviolet and color stabilized polyethylene without applied surface coating; color through entire thickness.
 2. Maximum Deflection: 1/360 of span, when tested in accordance with ASTM D648, with a uniform live load of 40 pounds/ft.
 3. Panel Thickness: 3/16 inch, minimum.

4. Panel Edges: 3/16 inch radius, minimum.
- I. Polyvinyl Chloride (PVC) Coating: Ultraviolet stabilized and mold-resistant; slip-resistant finish. Prime parts to be coated with clear acrylic thermosetting solution, and preheat prior to dipping in liquid PVC.
 1. Thickness: 0.08 inch, minimum, plus/minus 0.02 inch.
 2. Hardness: 85 durometer, when tested in accordance with ASTM D3363.
- J. Concrete: As specified in Section 03 30 00.

2.05 PROTECTIVE GROUND COVER

- A. Wood Mulch Fill: Untreated chipped bark or untreated chipped tree prunings; free of sharp or foreign objects or toxic chemicals; free of twigs, leaves, branches, thorns, dirt, grass, yard clippings, soil, or poisonous plants; do not use mulch manufactured from recycled pallets, or lumber containing nails or metal fasteners.
 1. Chip Length: 1-1/2 inches, maximum.
 2. Depth - Other Than High Play Activity Area: 9 inches.
 3. Depth - High Play Activity Area: 18 inches.
- B. Recycled Rubber Fill: Loose fill; 100 percent recycled rubber chips, shreds, granules, or nuggets; installed over subgrade.
 1. Chip Size: 3/8 inch, nominal.
 2. Depth: As required to achieve specified Critical Fall Height as defined in ASTM F1292 but not more than depth indicated; maintain top elevation flush with adjacent grades.
 3. Color: As selected from manufacturer's full range.
 4. Manufacturers:
 - a. No Fault Sport Group; No Fault Loose Fill Rubber Mulch: www.nofault.com.
 - b. Or approved equal.
- C. Geotextile Fabric: Nonwoven polypropylene sheet.
- D. Containment Edging: Manufacturer's standard molded, interlocking High-density polyethylene, UV stabilized, free of sharp vertical edges, protruding elements, and trip hazards, complete with installation hardware.

PART 3 EXECUTION

3.01 LAYING OUT THE WORK

- A. Stake the location of playground elements, including Use Zone perimeters, perimeter of protective surfacing, access and egress points, hard surfaces, walls, fences, and structures, and planting locations.
- B. Stake the layout of the entire Use Zone perimeter before starting any work .
 1. Verify that Use Zone perimeters do not overlap hard surfaces, whether currently installed or not.
 2. Verify that Use Zones are free of obstructions that would extend into the protective surfacing.
 3. If conflicts or obstructions exist, notify Architect.
 4. Do not proceed until revised drawings have been provided, showing corrected layout, and obstructions have been removed.

3.02 EXAMINATION

- A. Verify that playground equipment footings have been installed in proper locations and at proper elevations.
- B. Verify location of underground utilities and facilities in the playground area. Damage to underground utilities and facilities will be repaired at Contractor's expense.

3.03 INSTALLATION

- A. Coordinate work with preparation for and installation of protective surfacing specified in Section 32 18 16.13. The protective surfacing is to be installed after playground equipment installation.
- B. Install in accordance with CPSC Pub. No. 325, ASTM F1487, manufacturer's instructions, and requirements of authorities having jurisdiction.
- C. Anchor equipment securely below the bottom elevation of the resilient surfacing layer.

- D. Install without sharp points, edges, or protrusions; entanglement hazards; or pinch, crush, or shear points.
- E. Do not modify play events on site without written approval of manufacturer.
- F. Install required signage if not factory-installed.
- G. Protective Ground Cover:
 - 1. Install in accordance with CPSC Pub. No. 325 and ASTM F1487, and requirements of authorities having jurisdiction.
 - 2. Cover subgrade with geotextile fabric:
 - a. Lap minimum 4 inches width at seams. Adhere seams in accordance with manufacturer's recommendations.
 - b. Install fabric smooth, and free of tensile stresses, folds, or wrinkles.
 - c. Protect fabric from clogging, tears, or other damage during surfacing installation.
 - d. Repair or replace damaged fabric in accordance with manufacturer's recommendations.
 - 3. Install loose fill to depths indicated, with smooth even surface flush with tops of containment curbs.

3.04 FIELD QUALITY CONTROL

- A. Owner or Owner's representative will inspect playground equipment after installation to verify that playground meets specified design safety and accessibility requirements.
- B. Repair or replace rejected work until compliance is achieved.

3.05 CLEANING

- A. Restore adjacent existing areas that have been damaged from the construction.
- B. Clean playground equipment of construction materials, dirt, stains, filings, and blemishes due to shipment or installation. Clean in accordance with manufacturer's instructions, using cleaning agents as recommended by manufacturer.
- C. Clean playground area of excess construction materials, debris, and waste.
- D. Remove excess and waste material and dispose of off-site in accordance with requirements of authorities having jurisdiction.

3.06 PROTECTION

- A. Protect installed products until Date of Substantial Completion.
- B. Replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 12 21 13
HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Horizontal PVC faux-wood slat louver blinds.
- B. Operating hardware.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

1.03 REFERENCE STANDARDS

- A. WCMA A100.1 - Safety of Corded Window Covering Products; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating physical and dimensional characteristics and operating features.
- C. Color Charts: Standard color options for selection by Owner/Architect.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Horizontal Louver Blinds:
 - 1. CACO Inc.: www.cacoinc.com
 - 2. Hunter Douglas: www.hunterdouglas.com.
 - 3. Levolor Contract: www.levolorcontract.com.
 - 4. SWFcontract, a division of Spring Window Fashions, LLC.: www.swfcontract.com.
 - a. Bali Blinds.
 - b. Graber Blinds
- B. Basis of Design: 'Visions' 2 inch faux-wood blinds by Bali Blinds

2.02 BLINDS

- A. Description: Horizontal slat louvers hung from full-width headrail with full-width bottom rail.
- B. Manual Operation: Control of raising and lowering by cord with full range locking; blade angle adjustable by control wand.
- C. Plastic Slats: Extruded PVC, square slat corners.
 - 1. Width: 2 inch.
 - 2. Thickness: 0.10 inch.
 - 3. Color: As selected by Owner.
 - 4. Texture: Simulated wood-grain.
- D. Slat Support: Woven polypropylene cord, ladder configuration.
- E. Head Rail: Pre-finished, formed steel box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats.
 - 1. Height: 1 inches.
 - 2. Color: Same as slats.
- F. Bottom Rail: Pre-finished, formed steel ; with end caps.
 - 1. Color: Same as headrail.
- G. Lift Cord: Braided nylon; continuous loop; complying with WCMA A100.1.
- H. Headrail Attachment: Wall brackets.

- I. Accessory Hardware: Type recommended by blind manufacturer.

2.03 FABRICATION

- A. Fabricate blinds to fit within openings with uniform edge clearance of 1/8 inch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings are ready to receive the work.
- B. Ensure structural blocking and supports are correctly placed. See Section 06 10 00.

3.02 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with concealed fasteners.
- C. Install intermediate head supports at midpoint of double windows.

3.03 ADJUSTING

- A. Adjust blinds for smooth operation.

3.04 CLEANING

- A. Clean blind surfaces just prior to occupancy.

END OF SECTION

SECTION 12 35 30
RESIDENTIAL CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Kitchen cabinets.
- B. Kitchen countertops.
- C. Vanity cabinets.
- D. Vanity countertops.
- E. Casework hardware.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 06 20 00 - Finish Carpentry: Installation of base and crown molding to casework.
- C. Section 07 92 00 - Joint Sealants: Sealing joints between casework and countertops and adjacent walls, floors, and ceilings.
- D. Section 09 68 16 - Sheet Carpeting.
- E. Section 09 65 00 - Resilient Flooring.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- B. KCMA A161.1 - Performance and Construction Standard for Kitchen and Vanity Cabinets; 2012.
- C. KCMA (DIR) - Directory of Certified Cabinet Manufacturers; current edition, online.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, configurations, and construction details.
- C. Shop Drawings: Indicate casework locations, scale plans, elevations, clearances required, rough-in and anchor placement dimensions and tolerances, and color samples.
 - 1. Provide 5 copies of clearly legible shop drawings, for approval, prior to manufacture.
- D. Warranty: Manufacturer's warranty for all items provided under this section.
 - 1. Cabinets: Manufacturer's standard 1 year warranty.
 - 2. Acrylic or Acrylic/Polyester Vanity Countertop: Manufacturer's 10 year warranty against defects.

1.06 QUALITY ASSURANCE

- A. Products: Complying with KCMA A161.1 and KCMA Certified.
- B. Manufacturer: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Residential Casework:
 - 1. Wellborn Cabinet, Inc: www.wellborn.com.
 - 2. Mid-America Cabinets Inc; "Sierra/Mesa": www.midamericacabinets.com.
 - 3. All Wood Cabinetry Inc.; "All Wood": www.allwoodfast.com.
 - 4. Or approved equal.

2.02 COMPONENTS

- A. Cabinet Construction;
 - 1. Door Fronts: 3/4 inch kiln-dried hardwood, mortice and tenon construction, with 1/4 inch flat, veneer-covered panel insert.
 - 2. Drawer Fronts: 3/4 inch kiln-dried hardwood.
 - 3. Face frames: 3/4 inch kiln-dried hardwood, screwed and glued.
 - 4. End panels: 1/2 inch plywood with hardwood veneer to match face frame.
 - 5. Top and Bottom Panels: 1/2 inch plywood, dadoed into end panels and interlocked with hanging rails.
 - 6. Drawers: 1/2 inch plywood full box with 1/4 inch plywood bottom.
 - 7. Shelves: 1/2 inch plywood with edge banding.
 - 8. Back Panel: 1/4 inch plywood.
 - 9. Finish:
 - a. Exterior: Factory applied urethane - Color: To be selected by Owner from manufacturer's standard line.
 - b. Interior: Melamine.
- B. Kitchen Countertops and All Countertops in Community Building: Post formed plastic laminate over particle board with, rolled edge, and coved to back splash.
 - 1. Side Splash: Plastic laminate over particle board, square internal intersections to back splash and top surface, contoured to suit counter top profile, and of equal height.
 - a. Provide side splash where end of countertops abut partitions/endwalls.
 - 2. Colors/Patterns: To be selected by Owner from manufacturer's standard line.
- C. Vanity Countertop: Post formed plastic laminate over particle board, coved to back splash.
 - 1. Side Splash: Plastic laminate over particle board, square internal intersections to back splash and top surface, contoured to suit counter top profile.

2.03 HARDWARE

- A. Hardware: Manufacturer's standard.
- B. Drawer and Door Pulls: Satin Nickel manufacturer's standard, 4 inches wide.
 - 1. Hardware to comply with accessibility requirements of UFAS, ANSI, and ADA Standards where applicable.
- C. Drawer Slides: Dual side-mount, "soft closing".
- D. Hinges: Self-closing concealed hinges..

2.04 FABRICATION

- A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- B. Fabricate corners and joints without gaps or inaccessible spaces or areas where dirt or moisture could accumulate.
- C. Fabricate each unit to be rigid and not dependent on adjacent units for rigidity.
- D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of support framing.

3.02 INSTALLATION

- A. Install casework, components and accessories in accordance with manufacturer's instructions.
- B. Set casework items plumb and square, securely anchored to building structure.
- C. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Use filler strips; not additional overlay trim for this purpose.

3.03 CLEANING

- A. Clean casework, countertops, shelves, and hardware.

3.04 PROTECTION

- A. Do not permit finished casework to be exposed to continued construction activity.

END OF SECTION

SECTION 22 00 00

PLUMBING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Flanges, unions, and couplings.
 - 4. Pipe hangers and supports.
 - 5. Valves.
 - 6. Check valves/Backflow preventers.
- B. Piping Specialties
 - 1. Drains.
 - 2. Cleanouts.
 - 3. Washing machine boxes and valves.
 - 4. Refrigerator valve and recessed box.
 - 5. Water hammer arrestors.
 - 6. Mixing valves.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 09 91 13 - Exterior Painting.
- C. Section 09 91 23 - Interior Painting.
- D. Section 31 23 16 - Excavation.
- E. Section 31 23 23 - Fill: Bedding and backfilling for utilities.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of valves, cleanouts, backflow preventers, and water hammer arrestors.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- B. Accept specialties on site in original factory packaging. Inspect for damage.
- C. Store cross-linked polyethylene (PEX) out of direct sunlight.

1.06 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Provide all fixtures and equipment as scheduled on the Drawings.
- B. Potable Water Supply Systems: Provide piping, piping specialties, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

- C. Water Efficiency: EPA WaterSense label is required for all water closets, lavatory faucets, and showerheads.
 - 1. Showerhead flow rate: Between 2.0 gpm, minimum to less than 2.5 gpm (NGBS).
 - 2. Lavatory faucet flow rate: 1.5 gpm, maximum (NGBS).
 - 3. Toilet flush: 1.28 gpf, maximum (NGBS).
- D. Full S-traps and Trap Standards shall be allowed only where specifically called for on the Drawings.

2.02 SANITARY SEWER PIPING, BURIED BEYOND 5 FEET OF BUILDING

- A. PVC Pipe: ASTM D3034 SDR 35.
 - 1. Fittings: PVC.
 - 2. Joints: Push-on, using ASTM F477 elastomeric gaskets.

2.03 SANITARY SEWER PIPING, BURIED UNDER FLOOR SLAB

- A. PVC Pipe: ASTM D2665 or ASTM D3034 SCH 40.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.04 SANITARY SEWER PIPING, ABOVE GRADE

- A. PVC Pipe: ASTM D2665 SCH 40.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.05 DOMESTIC WATER PIPING, BURIED BEYOND 5 FEET OF BUILDING

- A. PVC Pipe: AWWA C900.

2.06 DOMESTIC WATER PIPING, BURIED UNDER FLOOR SLAB

- A. Copper Pipe: ASTM B42, hard drawn, between meter and water heater.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
- B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
 - 1. PPI TR-4 Pressure Design Basis:
 - a. 100 psig at maximum 180 degrees F.

2.07 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Pipe: ASTM B42, hard drawn, between meter and water heater.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
- B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
 - 1. PPI TR-4 Pressure Design Basis:
 - a. 100 psig at maximum 180 degrees F.
 - 2. Fittings: Brass and engineered polymer (EP) ASTM F1960.

2.08 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Copper tube and pipe: Class 150 bronze unions with soldered joints.

2.09 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with manufacturer's recommendations for material type and application.

2.10 GATE VALVES

- A. Manufacturers:
 - 1. Crane Company, Inc.: www.cranefs.com
 - 2. Jenkins, a Crane CPE brand: www.cranecpe.com/chem-energy/brand/jenkins
 - 3. Nibco, Inc: www.nibco.com.
- B. Construction, 2-1/2 inches and Smaller: MSS SP-80, Type 1, 200 psi CWP, bronze body, non-rising stem, bronze wedge disk, with balancing stops, solder or threaded ends.

2.11 BALL VALVES

- A. Manufacturers:
 - 1. Crane Company, Inc.: www.cranefs.com
 - 2. Jenkins, a Crane CPE brand: www.cranecpe.com/chem-energy/brand/jenkins
 - 3. Nibco, Inc: www.nibco.com.
- B. Construction, 2-1/2 Inches and Smaller: MSS SP-110, Class 150, 200 psi CWP, bronze body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder or threaded ends with union.

2.12 HORIZONTAL SWING CHECK VALVE ASSEMBLIES

- A. Manufacturers:
 - 1. Crane Company, Inc.: www.cranefs.com
 - 2. Jenkins, a Crane CPE brand: www.cranecpe.com/chem-energy/brand/jenkins
 - 3. Nibco, Inc: www.nibco.com.
- B. Check Valve Assemblies:
 - 1. Construction, 2-1/2 Inches and Smaller: MSS SP-80, NSF/ANSI 61, NSF/ANSI 372, 200 psi CWP, Lead-free Bronze body, Y-pattern, with corrosion resistant internal parts, renewable seat and disk, and stainless steel springs.

2.13 DRAINS

- A. Floor Drain:
 - 1. ASME A112.6.3; PVC or ABS, one piece body with Schedule 40 hub connection, round polypropylene strainer, concealed cleanout, and backwater valve.

2.14 CLEANOUTS

- A. Cleanouts at Exterior:
 - 1. Line type Extension Cleanout with Dura-coated cast iron body and round bronze, scored, gasketed cover.
- B. Cleanouts at Interior Finished Floor Areas:
 - 1. Dura-coated cast iron body with anchor flange, threaded top assembly, square polished nickel bronze frame and scored cover.
- C. Cleanouts at Interior Finished Wall Areas:
 - 1. Line type with PVC molded body, and round gasketed cover, and round chrome plated access cover secured with machine screw.

2.15 WASHING MACHINE BOXES AND VALVES

- A. Description: Plastic preformed rough-in box with brass valves with single lever handle, socket for 2 inch waste, slip in finishing cover.

2.16 REFRIGERATOR VALVE AND RECESSED BOX

- A. Description: Plastic preformed rough-in box with brass valves with lever handle, slip in finishing cover.

2.17 WATER HAMMER ARRESTORS

- A. Water Hammer Arrestors:
 - 1. Copper construction, piston type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F and maximum 150 psi working pressure.

2.18 MIXING VALVES

- A. Thermostatic Mixing Valves:
 - 1. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment set to 120 degrees F.
- B. Pressure Balanced Mixing Valves:
 - 1. Valve: Chrome plated cast brass body, stainless steel cylinder, integral temperature adjustment set to 120 degrees F.

2.19 ACCESSORIES

- A. Escutcheons: Chrome-plated steel collar escutcheon, sure-grip mounting.

- B. Controls: Provide blade or lever type handles at Community Building and all Dwelling Unit sinks, lavatories, and tub/shower faucets.
- C. Traps: Provide Chrome-plated brass traps where exposed in finished spaces.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 INSTALLATION - GENERAL

- A. Install all items in accordance with manufacturer's instructions.
- B. Provide support for utility meters in accordance with requirements of utility companies.
- C. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- D. Excavate in accordance with Section 31 23 16.
- E. Backfill in accordance with Section 31 23 23.

3.03 INSTALLATION - PIPING

- A. Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover.
- B. Install bell and spigot pipe with bell end upstream.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Perform Hydrostatic testing of all piping systems, as per prevailing codes, prior to placing concrete slabs or enclosing interior walls with gypsum board.
- F. Install required vents at all new fixtures per prevailing codes. Locate vents through roof to rear facing roof slope or least visible area.
- G. Install vent piping penetrating roofed areas to maintain integrity of roof assembly; refer to Section 07 31 13 - Asphalt Shingles.
- H. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
 1. Painting of interior plumbing systems and components is specified in Section 09 91 23.
 2. Painting of exterior plumbing systems and components is specified in Section 09 91 13.
- I. Install water piping to ASME B31.9.
- J. Install approved portable water protection devices on plumbing lines where contamination of domestic water may occur or as required by prevailing codes.
- K. Install water hammer arrestors on hot and cold water supply piping to each fixture in accordance with prevailing codes and per manufacturer's specification, where applicable.
- L. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- M. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- N. Cross-Linked Polyethylene (PEX) Pipe shall not be installed within the first 18 inches of piping connected to a water heater.
- O. Install valves on hot and cold supply piping at water heater, at fixtures as indicated, or where required to allow future maintenance.
- P. Provide access where valves and fittings are not exposed.
- Q. Install valves with stems upright or horizontal, not inverted.
- R. Install overflow piping from water heater temperature/pressure relief valve directly over floor drain. Mount securely to walls, floor and drain. Provide air gap separation at drain in accordance with prevailing codes.

3.04 INSTALLATION - CLEANOUTS, TRAPS, DRAINS

- A. Provide cleanouts at base of each soil stack, interior downspout stack, or as otherwise indicated on plans.

- B. Provide cleanouts to all traps not integral with fixtures or floor drains, or traps located below floor slabs. Locate downstream of trap.
- C. Install floor cleanouts and drains at elevation to accommodate finished floor.
- D. Install cleanouts in horizontal waste lines at required intervals and size noted:
 - 1. 4 inches or smaller: 50 feet maximum; Opening equal to line size.
 - 2. 6 inches or larger: 100 feet maximum; 4 inch opening.
- E. Extend cleanouts to finished floor. Ensure clearance at cleanout for rodding of drainage system.
- F. Encase exterior cleanouts in 12 in by 12 in by 12 in block of concrete flush with grade.
- G. Install separate, water-sealed P-traps at each floor drain and fixture with waste connections. Locate as close to drain or fixture as possible.
- H. Floor drains in concrete slabs; set drain elevation to allow for positive slope to drain.

3.05 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves.

END OF SECTION

SECTION 23 00 00
HEATING, VENTILATING, AND AIR CONDITIONING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air-source heat pumps.
- B. Forced air furnaces.
- C. Indoor air handler (fan & coil) units for duct connection.
- D. Controls.
- E. Metal ductwork.
- F. Manufactured (flexible) ductwork.
- G. Duct insulation.
- H. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 22 00 00 - Plumbing; Includes indoor coil condensate drain.
- C. Section 26 20 00 - Electrical Service and Distribution: Electrical service and connections for mechanical equipment.

1.03 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008, Including All Addenda.
- B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.
- C. ASHRAE Std 23.1 - Methods of Testing for Rating the Performance of Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Temperatures of the Refrigerant; 2010.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- E. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2012.
- F. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- G. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2015.
- H. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2014.
- I. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- K. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- L. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- M. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- N. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.
- O. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).
- P. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.
- Q. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.

- R. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.
- S. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
- T. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- D. Sustainable Design Documentation: Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.
- E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- F. Warranties: Submit manufacturer's standard warranties and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. All equipment furnished, and all work performed under this Contract shall be in strict compliance with current applicable standards as set forth by the National Fire Protection Association (NFPA), Underwriters' Laboratories (UL), the American Gas Association (AGA), the American Society of Heating, Refrigeration and air-conditioning Engineers (ASHRAE), Sheet Metal and air-conditioning Contractors National Association (SMACNA), and other national standards where applicable.

1.06 WARRANTY

- A. Provide manufacturer's standard ten year limited warranty on furnace and air conditioner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carrier Corporation: www.carrier.com.
- B. Rheem Manufacturing Co.
- C. Trane Inc: www.trane.com.
- D. York International Corporation / Johnson Controls: www.york.com.

2.02 SYSTEM DESIGN

- A. Basis of Design: Rheem Classic; RA14/RF1P Series
- B. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
 - 1. Cooling: Air-source electric heat pump located in outdoor unit with evaporator.
 - 2. Heating: Electric resistance heating.
 - 3. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.
- C. Performance Requirements: See Drawings for additional requirements.
 - 1. Efficiency:
 - a. Seasonal Energy Efficiency Ratio: 15, minimum.
 - b. Energy Efficiency Ratio: 12 minimum.
 - c. Heating Seasonal Performance Factor: 8.5, minimum.
- D. Electrical Characteristics:
 - 1. 8 kW.
 - 2. 240 volts, single phase, 60 Hz.
 - 3. 50 amperes maximum fuse size.

2.03 INDOOR UNITS FOR DUCTED SYSTEMS

- A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating and cooling element(s), controls, and accessories; wired for single power connection with control transformer.
 - 1. Air Flow Configuration: Upflow.
 - 2. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
- B. Supply Fan: Centrifugal type rubber mounted with direct or belt drive with adjustable variable pitch motor pulley.
 - 1. Motor Electrical Characteristics:
 - a. 240 volts, single phase, 60 Hz.
- C. Air Filters: 1 inch thick glass fiber, disposable type arranged for easy replacement.
- D. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
 - 1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
 - 2. Manufacturers: System manufacturer.
- E. Condensate Drain: ASTM D2665; PVC pipe and fittings.

2.04 OUTDOOR UNITS: HEAT PUMP

- A. Outdoor Units/Heat Pumps: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
 - 1. Comply with AHRI 210/240.
 - 2. Refrigerant: Puron (R410a) .
 - 3. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.
- B. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
 - 1. Condenser Fan Motor: Enclosed, 1-phase type, permanently lubricated.
- C. Coil: Air-cooled, aluminum fins bonded to copper tubes.
- D. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gage ports, thermometer well (in liquid line).
 - 1. Provide thermostatic expansion valves.
 - 2. Provide heat pump reversing valves.
- E. Operating Controls:
 - 1. Control by room thermostat to maintain room temperature setting.
- F. Mounting Pad: Ultralite prefabricated pad, refer to drawings.

2.05 ELECTRIC FURNACE COMPONENTS

- A. Electric Heater: Helix wound bare nichrome wire heating elements arranged in incremental stages of 5 kW each, with porcelain insulators.
- B. Operating Controls:
 - 1. Heater stages energized in sequence with pre-determined delay between heating stages.
 - 2. High limit temperature control to de-energize heating elements, with automatic reset.

2.06 ACCESSORY EQUIPMENT

- A. Room Thermostat: Wall-mounted, electric solid state microcomputer based room thermostat with remote sensor to maintain temperature setting; low-voltage; with following features:
 - 1. Automatic switching from heating to cooling.
 - 2. Programming based on weekdays, Saturday and Sunday.
 - 3. Battery replacement without program loss.
 - 4. Thermostat Display:
 - a. Time of day.
 - b. Actual room temperature.
 - c. Programmed temperature.
 - d. Day of week.

- e. System Mode Indication: Heating, Cooling, Fan Auto, Off, and On, Auto or On, Off.

2.07 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to NFPA 90A and NFPA 90B standards.
- B. Ducts: Galvanized steel, unless otherwise indicated.
- C. Low Pressure Supply (System with Cooling Coils): 1/2 inch w.g. pressure class, galvanized steel.
- D. Outside Air Intake: 1/2 inch w.g. pressure class, galvanized steel.

2.08 DUCT MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
 - 3. For Use With Flexible Ducts: UL labeled.
- C. Ductwork Support: ASTM A36/A36M; steel, galvanized strapping continuous around sides and bottom of duct and securely fastened to building construction.

2.09 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.
- C. Construct T's, bends, and elbows with inside radius of not less than 1/2 the width of duct. Where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- E. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.10 MANUFACTURED DUCTWORK

- A. Flexible Ducts: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound spring steel wire.
 - 1. Insulation: Fiberglass insulation with aluminized vapor barrier film.
 - a. R-value: 8.0 minimum where installed in unconditioned spaces.
 - 2. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
 - 3. Maximum Velocity: 4000 fpm.
 - 4. Temperature Range: Minus 20 degrees F to 210 degrees F.
- B. Exhaust Fan and Dryer Vent: Minimum 28 gauge, 0.0156 inch thick, single wall, galvanized steel. Sizes as indicated on the Drawings.
 - 1. Install insulation wrap where ducts pass through unconditioned space.

2.11 DUCT LINER

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.
- B. Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket; impregnated surface and edges coated with poly vinyl acetate polymer or acrylic polymer.
 - 1. Fungal Resistance: No growth when tested according to ASTM G21.
 - 2. Apparent Thermal Conductivity: Maximum of 0.24 at 75 degrees F.
 - 3. Service Temperature: Up to 250 degrees F.
 - 4. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.

- C. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- D. Liner Fasteners: Galvanized steel, self-adhesive pad or impact applied with integral head.

2.12 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. 'K' value: 0.26 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. R-value: 8.0 minimum where installed in unconditioned spaces.
- C. Vapor Barrier Jacket:
 - 1. 0.0032 inch vinyl.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.13 REGISTERS AND GRILLES

- A. Supply Vents: Provide ceiling or wall mounted rectangular, multi-louvered with damper diffuser to discharge air in two way pattern as scheduled on the Drawings.
 - 1. Frame: Provide surface mount type.
- B. Return Air Grilles: Provide ceiling or wall mounted fixed, streamlined blades with 15 degree deflection as scheduled on the Drawings.
 - 1. Frame: Provide surface mount type.
- C. Manufactured by Lima, Air-Vent, or Titus, sized per plan.

2.14 FIRE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- B. Horizontal Radiation Type Dampers: Galvanized steel, 22 gauge, 0.0299 inch frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.
- C. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations or closure under air flow conditions. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.
- D. Fusible Links: UL 33, separate at 212 degrees F with adjustable link straps for combination fire/balancing dampers.

2.15 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
 - a. Net Fabric Width: Approximately 2 inches wide.
 - 2. Metal: 3 inches wide, 24 gage, 0.0239 inch thick galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and in correct location.
- C. Verify that ducts have been tested before applying insulation materials.
- D. Verify that duct surfaces are clean, and dry before applying insulation materials.

3.02 INSTALLATION

- A. Install equipment and products accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
- B. Installation of electrical wiring for power and control of mechanical systems included in this section shall be by the Electrical Contractor.

- C. Install HVAC system in accordance with NFPA 90A and NFPA 90B.
- D. Provide vent connections in accordance with NFPA 211, and all prevailing codes.
- E. Pipe drain from cooling coils to nearest floor drain. Mount securely to unit cabinet, wall, and floor as required.
- F. Install, support, and seal ducts in accordance with SMACNA (DCS).
- G. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- H. At exterior wall louvers, seal duct to louver frame.
- I. Flexible Ducts: Connect to metal ducts with draw bands.
- J. Install duct insulation in accordance with NAIMA National Insulation Standards.
- K. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- L. Install insulated duct liner where metal ductwork is located in non-conditioned spaces, or as indicated on the Drawings.
- M. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- N. Demonstrate re-setting of fire dampers to Owner's representative.
- O. At fans and motorized equipment, except inline dryer booster fans, associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

3.03 CLEANING

- A. Clean duct systems with high power vacuum machines. Protect equipment that could be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

END OF SECTION

SECTION 26 20 00
ELECTRICAL SERVICE AND DISTRIBUTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Main service disconnect switchgear
- B. Breaker panels.
- C. Conductors and cables
- D. Conduit and raceways
- E. Overcurrent protective devices for panelboards.
- F. Wiring devices

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Installation of recessed panelboards.
- B. Section 26 21 00 - Electrical Service Entrance.
- C. Section 31 23 16 - Excavation.
- D. Section 31 23 23 - Fill: Bedding and backfilling for electrical service .

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70 (National Electric Code - NEC).
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Main Service Disconnect
 - 1. Coordinate with Utility Company to provide switchgear with suitable provisions for electrical service and utility metering, where applicable.
 - 2. Obtain Utility Company approval of switchgear prior to fabrication.
- C. Conduit
 - 1. Coordinate minimum sizes and types of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 3. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 - 1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
 - 2. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.

- D. Service Entrance Switchgear: Include documentation of Utility Company approval of switchgear.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- F. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70 (NEC).
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.07 FIELD CONDITIONS

- A. Maintain ambient temperature within the following limits during and after installation of panelboards:
 - 1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
 - 2. Panelboards Containing Fusible Switches: Between -22 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.01 LOW VOLTAGE SWITCHGEAR

- A. Description: Dead-front arc-resistant type metal-enclosed drawout switchgear complying with IEEE C37.20.1 and ANSI C37.51; listed and labeled as complying with UL 1558; ratings, configurations and features as indicated on the drawings.
- B. Arc-Resistance Rating:
 - 1. Passes criteria for arc-resistant functionality when tested in accordance with applicable requirements of IEEE C37.20.7 for Type 2 accessibility.
 - 2. Arc resistant rating valid through maximum current of not less than the available fault current at the installed location.
- C. Service Entrance Switchgear:
 - 1. Listed and labeled as suitable for use as service equipment according to UL 869A.
 - 2. Comply with Utility Company requirements for electrical service.
- D. Short Circuit Current Rating:
 - 1. Provide switchgear with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- E. Conductor Terminations: Suitable for use with the conductors to be installed.
 - 1. Line Conductor Terminations:
 - a. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - b. Main and Neutral Lug Type: Mechanical.
 - 2. Load Conductor Terminations:
 - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

- b. Lug Type:
 - 1) Provide mechanical lugs unless otherwise required.
- F. Enclosures:
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Outdoor Locations: Type 3R.
 - 2. Finish: Manufacturer's standard unless otherwise indicated.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- C. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- D. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- E. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.

2.03 LOAD CENTERS

- A. Description: Circuit breaker type load centers listed and labeled as complying with UL 67; ratings, configurations, and features as indicated on the drawings.
- B. Bussing:
 - 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 - 2. Bus Material: Aluminum or copper.
- C. Circuit Breakers: Thermal magnetic plug-in type.
- D. Enclosures:
 - 1. Provide flush-mounted enclosures unless otherwise indicated.
 - 2. Fronts: Provide hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 - 3. Provide circuit directory label on inside of door.

2.04 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 3. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
6. Provide the following circuit breaker types where required:
 - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
 - b. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
7. Do not use handle ties in lieu of multi-pole circuit breakers.
8. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.

2.05 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Nonmetallic-sheathed cable is permitted only as follows:
 1. Where not otherwise restricted, may be used:
 - a. For branch circuit wiring in dry locations within multifamily dwellings permitted to be of Types III, IV, and V construction.
 2. In addition to other applicable restrictions, may not be used:
 - a. Where exposed to view.
 - b. Where exposed to damage.
 - c. For damp, wet, or corrosive locations.
- C. Service entrance cable is permitted only as follows:
 1. Where not otherwise restricted, may be used:
 - a. For overhead service drop, installed in raceway to service head.
 - b. For underground service entrance, direct buried.
- D. Armored cable and Metal-clad cable is permitted only as follows:
 1. Where not otherwise restricted, may be used:
 - a. Where concealed in hollow stud walls and above accessible ceilings for branch circuits up to 20 A.
 2. In addition to other applicable restrictions, may not be used:
 - a. Where not approved for use by the authority having jurisdiction.
 - b. Where exposed to damage.
 - c. For damp, wet, or corrosive locations.

2.06 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70 (NEC).
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Conductor Material:
 1. Provide copper conductors except where aluminum conductors are specifically indicated or permitted for substitution. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
 - a. Substitution of aluminum conductors for copper is permitted, when approved by Owner and authority having jurisdiction, only for the following:
 - 1) Service Feeders: Copper conductors size 1/0 AWG and larger.
 - b. Where aluminum conductors are substituted for copper, comply with the following:
 - 1) Size aluminum conductors to provide, when compared to copper sizes indicated, equivalent or greater ampacity and equivalent or less voltage drop.
 - 2) Increase size of raceways, boxes, wiring gutters, enclosures, etc. as required to accommodate aluminum conductors.
 - 3) Provide aluminum equipment grounding conductor sized according to NFPA 70.

- G. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
- H. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.07 NONMETALLIC-SHEATHED CABLE

- A. Description: NFPA 70, Type NM multiple-conductor cable listed and labeled as complying with UL 719, Type NM-B.
- B. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid.
 - 2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.

2.08 SERVICE ENTRANCE CABLE

- A. Service Entrance Cable for Above-Ground Use: NFPA 70, Type SE multiple-conductor cable listed and labeled as complying with UL 854.
- B. Service Entrance Cable for Underground Use: NFPA 70, Type USE single-conductor cable listed and labeled as complying with UL 854, Type USE-2, and with UL 44, Type RHH/RHW-2.
- C. Conductor Stranding: Stranded.
- D. Insulation Voltage Rating: 600 V.

2.09 ARMORED CABLE

- A. Description: NFPA 70, Type AC cable listed and labeled as complying with UL 4, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid.
 - 2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN.
- E. Grounding: Combination of interlocking armor and integral bonding wire.
- F. Armor: Steel, interlocked tape.

2.10 METAL-CLAD CABLE

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid.
 - 2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- E. Grounding: Full-size integral equipment grounding conductor.
- F. Armor: Steel, interlocked tape.

2.11 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

2.12 CONDUIT

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit, PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.

2. Exterior, Direct-Buried: Use PVC-coated galvanized steel rigid metal conduit or rigid PVC conduit.
 3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit where emerging from underground.
 4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use PVC-coated galvanized steel rigid metal conduit elbows for bends.
 5. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.
- C. Concealed Within Hollow Stud Walls: Use intermediate metal conduit (IMC) or electrical metallic tubing (EMT).
- D. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), electrical metallic tubing (EMT), or Liquidtight flexible metal conduit.
1. Provide conduit, conduit bodies, fittings, boxes, suitable for use in wet locations.
- E. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
1. Locations subject to physical damage include, but are not limited to:
 - a. Where exposed below 8 feet, except within electrical and communication rooms or closets.
- F. Exposed, Exterior: Use galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit.

2.13 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
1. Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.
 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.14 INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
1. Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.
 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.15 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil.
- C. PVC-Coated Fittings:
1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
 2. Use fittings listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.
 4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil.
- D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil.

2.16 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.17 ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.
 - 4. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

2.18 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 or Schedule 80 as required; rated for use with conductors rated 90 degrees C.
- B. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.
- C. Accessories:
 - 1. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

2.19 ELECTRICAL NONMETALLIC TUBING (ENT)

- A. Description: NFPA 70, Type ENT electrical nonmetallic tubing complying with NEMA TC 13 and listed and labeled as complying with UL 1653.
- B. Fittings:
 - 1. Manufacturer: Same as manufacturer of ENT to be connected.
 - 2. Use solvent-welded type fittings.
 - 3. Solvent-Welded Fittings: Rigid PVC fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; suitable for use with ENT.

2.20 LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC)

- A. Description: NFPA 70, Type LFNC liquidtight flexible nonmetallic conduit listed and labeled as complying with UL 1660.
- B. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B; suitable for the type of conduit to be connected.

2.21 WIRING DEVICES

- A. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
- D. Mounting Heights: As scheduled on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that interior of building has been protected from weather.
- C. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- D. Verify that mounting surfaces are ready to receive panelboards.
- E. Verify that work likely to damage wire and cable has been completed.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install switchgear in accordance with NECA 1 (general workmanship) and IEEE C37.20.1.
- C. Install galvanized steel rigid metal conduit (RMC) and intermediate metal conduit (IMC), in accordance with NECA 101.
- D. Install rigid polyvinyl chloride (PVC) conduit, electrical nonmetallic tubing (ENT), and liquidtight flexible nonmetallic conduit (LFNC) in accordance with NECA 111.
- E. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.
- F. Install all field-installed devices, components, and accessories.
- G. Install panelboards securely, in a neat and workmanlike manner in accordance with NECA 1 (general workmanship), NECA 407 (panelboards), and NEMA PB 1.1.
- H. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- I. Install all equipment plumb and level.
- J. Mount panelboards at heights as indicated on the Drawings.
- K. At Accessible Dwelling Units, mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 48 inches above the floor.
- L. Install all field-installed branch devices, components, and accessories.
- M. Direct Burial Cable Installation:
 - 1. Provide trenching and backfilling in accordance with Section 31 23 16 - Excavation and Section 31 23 23 - Fill.
 - 2. Install cable with minimum cover of 48 inches unless otherwise indicated or required.
 - 3. Protect cables from damage in accordance with NFPA 70.
- N. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies.
 - 2. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
- O. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated and routing is not shown, determine exact routing required.
 - 3. Conceal all conduits unless specifically indicated to be exposed.
 - 4. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 - 5. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
 - 6. Arrange conduit to provide no more than 150 feet between pull points.
 - 7. Route conduits above water and drain piping where possible.
 - 8. Maintain minimum clearance of 6 inches between conduits and piping for other systems.

9. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.

3.03 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers. Tests listed as optional are not required.
- C. Test GFCI circuit breakers to verify proper operation.
- D. Test AFCI circuit breakers to verify proper operation.
- E. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

PART 4 SCHEDULES (SEE NEXT PAGE)

4.01 CIRCUIT SCHEDULE

CIRCUITS FOR TYPICAL 1,2,& 3 BEDROOM DWELLING UNITS 120/240 V, Single Phase				
Circuit Number	Description	Voltage	Breaker Size	Wire Size
Main	Panel	240V	125A-MLO	#2 - 3 W/G SER
1 & 3	Water Heater	240V	30A	#10-2 W/G
2 & 4	Range	240V	40A	#8-3 W/G
5 & 7	Furnace & Coil	240V	60A	#6-2 W/G
6 & 8	Condensing Unit	204V	30A	#12-2 W/G
9	Kitchen & Dining Room Small Appliances Receptacles	120V	20A	#12-2 W/G
10	Kitchen Sm Appliances Receptacles	120V	20A	#12-2 W/G
11	Living Rm, Dining Rm., Hall Lighting/ Hall Receptacles	120V	20A	#12-2 W/G
12	Lighting & Receptacles - Bedroom	120V	20A	#12-2 W/G
13	Lighting & Receptacles - Bedroom	120V	20A	#12-2 W/G
14	Lighting & Receptacles - Bathroom	120V	20A	#12-2 W/G
15	Washing Machine	120V	20A	#12-2 W/G
16 & 18	Dryer	240V	30A	#10-3 W/G
18	Microwave	120V	20A	#12-2 W/G
17	Disposal, Dishwasher	120V	20A	#12-2 W/G
20	Refrigerator, Rangehood	120V	20A	#12-2 W/G

A. Notes:

1. Number of circuits and breakdown of circuits shall comply with the N.E.C. and prevailing state or local codes.
2. Main size and service conductor size shown is for typical dwelling unit. This and other mains shall comply with the N.E.C. and prevailing State and local codes.
3. All 120V designated circuits shall be 20A - #12-2 wire with Ground.
4. Electrical Contractor shall coordinate with HVAC Contractor and verify the exact type of service required for furnace and condenser supplied to project and provide breaker and wiring accordingly.
5. Provide 30A circuit for (2)-4500W, non-simultaneous element, water heaters.
6. Furnaces, water heaters, dishwashers and disposals shall be hardwired and be provided with all disconnecting means in accordance with the N.E.C.
7. Electrical contractor shall provide and install power cords for 3 washing machine and dryer units in Community Building.

END OF SECTION

SECTION 26 21 00
ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical service requirements.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Materials and installation requirements for cast-in-place concrete equipment pads.
- B. Section 26 20 00 - Electrical Service and Distribution.
- C. Section 31 23 16 - Excavation.
- D. Section 31 23 23 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

- A. IEEE C2 - National Electrical Safety Code; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
- B. Coordination:
 - 1. Verify the following with Utility Company representative:
 - a. Utility Company requirements, including division of responsibility.
 - b. Exact location and details of utility point of connection.
 - c. Utility easement requirements.
 - d. Utility Company charges associated with providing service.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
 - 3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Utility Company charges associated with providing permanent service to be paid by Contractor.
- E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
- F. Scheduling:
 - 1. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.
- C. Project Record Documents: Record actual locations of equipment and installed service routing.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. IEEE C2 (National Electrical Safety Code).
 - 2. NFPA 70 (National Electrical Code).
 - 3. The requirements of the Utility Company.
 - 4. The requirements of the local authorities having jurisdiction.

- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor rated products which are not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Utility Company: To be determined by Contractor.
- D. Division of Responsibility: Per Utility Company requirements.
- E. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Verify and mark locations of existing underground utilities.

3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required trenching and backfilling in accordance with Section 31 23 16 and Section 31 23 23.
- E. Construct cast-in-place concrete pads for utility equipment in accordance with Utility Company requirements and Section 03 30 00.
- F. Provide required protective bollards in accordance with Utility Company requirements.
- G. Provide all required support and attachment components for complete installation.
- H. Provide grounding and bonding for service entrance equipment in accordance with NFPA 70 (NEC).

3.04 PROTECTION

- A. Protect installed equipment from subsequent construction operations.

END OF SECTION

SECTION 26 50 00
LIGHTING AND FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior lighting fixtures, ceiling fans, lamps, and all accessories.
- B. Exterior lighting fixtures, controllers, lamps and all accessories.
- C. Photoelectric switches for control of exterior lighting.
- D. Mounting hardware, stems, and brackets.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.
- B. Section 04 73 00 - Manufactured Stone Veneer: Installation of exterior fixtures.
- C. Section 06 10 00 - Rough Carpentry: Coordination of blocking for fixtures.
- D. Section 07 46 46 - Fiber Cement Siding: Installation of exterior fixtures.
- E. Section 07 92 00 - Joint Sealants.

1.03 REFERENCE STANDARDS

- A. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- E. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of lighting fixtures with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of lighting fixtures and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of lighting fixtures with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on lighting fixture construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED lighting fixtures:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - 2. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
- C. Sustainable Design Documentation: Submit manufacturer's product data on lamp mercury content, rated lamp life, and Energy Star certification, showing compliance with specified requirements.

- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Provide products certified as complying with Energy Star ratings where applicable.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle, and store products according to manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

PART 2 PRODUCTS

2.01 LIGHTING FIXTURES GENERAL

- A. Furnish products as indicated on the Drawings, including lighting for exterior building and common areas.
- B. Provide complete fixtures including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to mount, position, energize and protect the lamp and distribute the light.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- D. Provide products that comply with requirements of NFPA 70.
- E. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- F. All lighting fixtures in the Community Building, Common areas, and Public spaces shall be Energy Star rated for the fixtures and controls.
- G. All Ceiling Fans shall be Energy Star rated.
- H. Provide a photocell of 1800 watt capacity, 120 volt, single phase, for control of each building's exterior light fixtures circuits, as required.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting fixtures.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 20 00 as required for installation of lighting fixtures provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install lighting fixtures securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).
- D. Install lighting fixtures plumb and square and aligned with building lines and with adjacent lighting fixtures.
- E. Recessed lighting fixtures:
 - 1. Install trims tight to mounting surface with no visible light leakage.
 - 2. Non-IC Rated lighting fixtures: Maintain required separation from insulation and combustible materials according to listing.
 - 3. Lighting fixtures Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- F. Suspended fixtures:
 - 1. Unless otherwise indicated, specified mounting heights are to bottom of fixture.
 - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 - 3. Install canopies tight to mounting surface.
 - 4. Unless otherwise indicated, support pendants from swivel hangers.
- G. Wall-Mounted lighting fixtures: Unless otherwise indicated, specified mounting heights are to center of lighting fixture.
- H. Install accessories furnished with each lighting fixture.
- I. Bond products and metal accessories to branch circuit equipment grounding conductor.
- J. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- K. Install lamps in each lighting fixture.

END OF SECTION

Comm. Bldg.



Job Name - Valley Springs Cottages
 Job Location - Little Rock, AR
 Job No. - 3522
 State Job No. - 0

This Sheet - Comm. Bldg.
 Unit - Comm. Bldg.
 Discipline - Electrical
 Heated SF - 1,733 SF

Electrical (2011 NEC ARTICLE 220, SECTION IV)

Lighting (1 VA X SF)		1 VA	1,733 SF	1,733 VA		
Kitchen Small Appliance Curcuits		1,500 VA	2	3,000 VA		
Receptacles (180VA)		180 VA	50	9,000 VA		
Exxterior Site Lights		100 VA	25	2,500 VA		
Range (8000 VA)		8,000 VA	1	8,000 VA		
Microhood/ Rangehood		1,176 VA	1	1,176 VA		
Heating / A/C	Larger = Heating	15,000 VA	1	15,000 VA		
Water Heater (Non-Simul 4500 W Elements):		4,500 VA	1	4,500 VA		
Water Heater (instant heat)		24,000 VA	0	VA		
Disposal Outlet (1/2 HP, 1176 VA):		1,176 VA	0	VA		
Refrigerator Outlet (1500 VA):		1,500 VA	1	1,500 VA		
Dishwasher Outlet (1176 VA):		1,176 VA	1	1,176 VA		
Washer/ Laundry Curcuit (1500 VA):		1,500 VA	3	4,500 VA		
Dryer:		5,000 VA	3	15,000 VA		
				67,085 VA	=	280 A
						300.0 A
					or	.0 A
Conclusion:						300.0 A

Dwelling Unit



Job Name - Valley Springs Cottages
 Job Location - Little Rock, AR
 Job No. - 3522
 State Job No. - 0

This Sheet - Dwelling Unit
 Unit -
 Discipline - Electrical
 Heated SF - 1,267 SF

Electrical (2011 NEC ARTICLE 220, SECTION IV)

LIGHTING (3 VA X SF)		3 VA	#####	3,801 VA		
KITCHEN SMALL APPLIANCE CIRCUITS		1,500 VA	2	3,000 VA		
RANGE (8000 VA)		8,000 VA	1	8,000 VA		
MIRCOHOOD/RANGEHOOD		1,176 VA	1	1,176 VA		
HEATING / A/C:	Larger = Heating	12,000 VA	1	12,000 VA		
WATER HEATER (NON-SIMUL 4500 W ELEMENTS):		4,500 VA	1	4,500 VA		
DISPOSAL OUTLET (1/2 HP, 1176 VA):		1,176 VA	1	1,176 VA		
REFRIGERATOR OUTLET (1500 VA):		1,500 VA	1	1,500 VA		
DISHWASHER OUTLET (1176 VA):		1,176 VA	1	1,176 VA		
WASHER/LAUNDRY CIRCUIT (1500 VA):		1,500 VA	1	1,500 VA		
DRYER:		5,000 VA	1	5,000 VA		
				42,829 VA	=	178 A
						200.0 A

SERVICE EQUIPMENT SIZING (2011 NEC SECTION 220.82)

(BASED ON 40% LOADING AFTER FIRST 10000 VA PLUS 100% HVAC)

Heating/Cooling Load		12,000 VA		
First 10,000 VA		10,000 VA		
Remaining VA at (40%)		8,332 VA		
		30,332 VA	=	126.4 A
			Min.	150.0 A
			or	.0 A
		Conclusion:		150.0 A

SECTION 27 50 10
TELEPHONE AND CABLE TELEVISION SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Telephone System.
- B. Cable Television Distribution System.
- C. Cable and accessories.

1.02 REFERENCE STANDARDS

- A. BICSI TDMM - Telecommunications Distribution Methods Manual; 13th Edition.
- B. FCC Title 47, Part 76 - Multichannel Video and Cable Television Service; 2013.
- C. NECA/BICSI 568 - Standard for Installing Building Telecommunications Cabling; National Electrical Contractors Association; 2006.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SYSTEM DESCRIPTION - TELEPHONE

- A. Service entrance from local telephone company.
- B. Premises wiring for individual dwelling unit telephone service including individual terminal jacks.
- C. Combine Telephone and Cable TV jacks into one box where applicable.

1.04 SYSTEM DESCRIPTION - CABLE TELEVISION

- A. Service entrance from local cable utility.
- B. Premises wiring for broadband distribution of television signal, including individual outlets.
- C. Signal at each outlet: 3 dBmV across 75 ohms, minimum, plus 5 dB, minus 0 dB.
- D. Combine Telephone and Cable TV jacks into one box where applicable.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate electrical characteristics and connection requirements. Show installation details, cable routing, and system configuration.
- C. Product Data: Provide showing electrical characteristics and connection requirements for each component.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- E. Operation Data: Instructions for setting and tuning channels.
- F. Maintenance Data: Basic trouble-shooting procedures.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70 and cable television utility company.
- B. Cable television system shall conform to the standards as set forth in FCC Title 47, Part 76.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience with service facilities within 100 miles of Project.
- D. Installer Qualifications: Authorized installer of specified manufacturer with service facilities within 100 miles of the project.
 - 1. Installer shall be capable of providing full system testing, inspection, and maintenance services, including spare parts.
- E. Products: Listed, classified and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Manufacturers:
 - 1. Blonder Tongue Laboratories, Inc: www.blondertongue.com.
 - 2. Hubbell Electrical Systems: www.hubbell-wiring.com
 - 3. Channel Master: www.channelmaster.com.
 - 4. Thomas and Betts: www.tnb.com
 - 5. Or approved equal.

2.02 AMPLIFIERS AND CONVERTERS

- A. Broadband RF Amplifier: Provide broadband, two-way capable, multi-channel, indoor distribution amplifier suitable for multi dwelling-unit residential complexes. Wall mount at CATV equipment location.
 - 1. Impedance: 75 ohm.
 - 2. Input Match: 14 dB return loss.
 - 3. Output Match: 14 dB return loss.

2.03 ACCESSORIES

- A. Telephone Tap (Jack)
 - 1. Recessed, suitable for mounting in standard electrical wall box, type and model suitable to local telephone company.
- B. Cable Tap (Outlet):
 - 1. Recessed, suitable for mounting in standard electrical wall box, all channel, back-matched tap.
 - 2. Through Loss: 0.7 dB, maximum.
 - 3. Return Loss: 20 dB, maximum.
 - 4. Isolation: 12 dB.
 - 5. Connector: F type coaxial connector.
- C. Splitter:
 - 1. Inline, all channel, back-matched splitter.
 - 2. Through Loss: 3.5 dB for two-way; 6.7 dB for four-way.
 - 3. Isolation: 16 dB, minimum.
- D. Main Distribution Cable:
 - 1. Description: RG11/F or RG6/F as required.
- E. Branch Distribution Cable:
 - 1. Description: RG 6/F.
- F. Television Lead Cable:
 - 1. Provide set-matched cord . Use RG 6 coax cable, minimum length 8 feet.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Connect cable television service in accordance with cable utility instructions.
- C. Install telephone and cable television in accordance with the requirements of BICSI TDMM and NECA/BICSI 568, current editions.
- D. Provide proper grounding of telephone and television system components and wiring. Bond outdoor components to lightning protection system.

3.02 CABLE TELEVISION SYSTEM MAINTENANCE

- A. Provide service and maintenance of television system for 3 years from Date of Substantial Completion.

END OF SECTION

SECTION 28 46 00
SMOKE DETECTORS AND SIGNALING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Typical Dwelling Unit smoke detectors.
- B. Audible/Visual Level 5 Dwelling Units and Community Building smoke detectors with visual strobe alarm.
- C. Audible/Visual Doorbell Signaler for A/V designated Level 5 Dwelling Units.
- D. Video Intercom system for A/V designated Level 5 Dwelling Units.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Coordination of supports for mounting boxes.
- B. Section 07 84 00 - Firestopping: Materials and methods for work to be performed by this installer.
- C. Section 26 20 00 - Electrical Service and Distribution: wiring, conduit, and boxes for work installed under this section.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- D. ISO 9001 - Quality Management Systems-Requirements; 2008.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 72 - National Fire Alarm and Signaling Code; 2016.
- G. UFAS - Uniform Federal Accessibility Standards - HUD 24 CFR part 40; 1984.
- H. UL 1638 - Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories; 2016.
- I. UL 217 - Standard for Smoke Alarms; 2015.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's detailed data sheet for each component, including wiring diagrams, and installation instructions.
- C. Furnish spare smoke detectors, strobe alarms, A/V door signalers, and A/V video intercom of same manufacturer and model as those installed; deliver in original packaging, labeled in same manner as in operating and maintenance data.
 - 1. 2 of each type component specified.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 WARRANTY

- A. Provide manufacturer's standard warranty that system components other than wire and conduit are free from defects and will remain so for 10 years after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Smoke Detectors:
 - 1. Kidde/FireX; Model PI2010: www.kidde.com.
 - 2. FirstAlert/BRK; Model 3120B: www.brkelectronics.com

3. Or approved equal.
- B. Visual Strobe Alarms:
 1. Kidde/FireX; Model SLED 177i: www.kidde.com.
 2. FirstAlert/BRK; Model SL177: www.brkelectronics.com
 3. Or approved equal.
- C. Audible/Visual Doorbell Signaler:
 1. Edwards Signalling Inc; Model 6536-G5: www.edwards-signals.com
 2. Cooper Wheelock; Model RSS-24MCW-DW
 3. W L Jenkins Co.; Model BL-1: www.wljenkinsco.com.
 4. Or approved equal.
- D. Video Intercom:
 1. Aiphone Corporation; Model JF-2MED / JF-DA: www.aiphone.com.
 2. Alpha Communications; Model VK-237: www.alphacommunications.com.
 3. Legrand North America; Model IC5003/ON-Q: www.legrand.us.
 4. Or approved equal.

2.02 GENERAL

- A. Provide all components necessary, regardless of whether shown in the contract documents or not.
- B. Extent of Protection: Community Building and Individual Dwelling Units
- C. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
 1. UFAS and ADA Standards.
 2. The requirements of the State Fire Marshal.
 3. The requirements of the local authority having jurisdiction.
 4. Applicable local codes.
 5. The contract documents (drawings and specifications).
 6. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
- D. Hearing Impaired Occupants: Provide visible notification devices in all public areas and in A/V designated dwelling units.
- E. Smoke detectors shall not be interconnected between dwelling units.

2.03 COMPONENTS

- A. Smoke Detectors: UL 217, NFPA 72 certified, single station, 120v AC/ 60hz powered, monitored battery backup, dual type smoke-sensing chambers - ionization and photoelectric.
 1. Solid state, piezo horn rated at 85dB minimum measured at 10 feet.
 2. Visual power indicator to confirm unit is receiving AC power.
 3. Latching Features: Alarm latch to identify initiating unit after alarm condition has subsided, and Low Battery latch to identify which unit is operating in low battery mode.
 4. Anti-tampering locking features to deter removal of battery or unit.
 5. Test/temporary alarm silence button for nuisance alarms and low battery.
 6. Operating temperature range: 40 to 100 degrees F and 10 - 95% relative humidity.
 7. Plug in connection capable of interconnection of up to 18 alarms, 12 of which may be smoke detectors.
- B. Visual Strobe Alarm: UL 217, NFPA 72, ICC/ANSI A117.1 certified, single station, 120v AC / 60 hz powered strobe light signalling device for use in conjunction with smoke detectors listed above.
 1. Xenon or LED strobe capable of producing 177 candela light output.
 2. Separate flash patterns to distinguish smoke/heat and carbon monoxide dangers.
 3. Visual power indicator to confirm unit is receiving AC power.
 4. Listed for installation on ceiling or walls.
 5. Anti-tampering locking features to deter removal of unit.
 6. Operating temperature range: 32 to 120 degrees F and 10 - 95% relative humidity.
 7. Plug in connection capable of interconnection of up to 18 multiple alarms.

- C. Audible/Visual Door Entry Unit: UL 1638 Integrated, low-voltage signalling unit that provides audible/visible notification when video intercom is activated.
 - 1. Solid state, piezo horn rated at 85dB minimum measured at 10 feet.
 - 2. Strobe output: 50 cd on-axis
 - 3. Flash Rate: 5 fps.
 - 4. Transformer: 120v AC / 60hz primary; 24v AC secondary; remote located.
- D. Video intercom Unit: Video entry security system, 12-18v DC, comprising a master control unit with color LCD screen and video door station, capable of expansion to 2 door stations; ISO 9001 compliant.
 - 1. Chime tone sounds, caller visible on video screen, and outside speaker activated when door call button is pressed.
 - 2. Entrance Monitoring function: Video monitor displays image from door station and incoming audio is heard. Sound from inside is not heard outside.
 - 3. 2-conductor wiring.
 - 4. Installation on standard single or double-gang electrical boxes, as required by manufacturer.
 - 5. Transformer: 120v AC / 60hz primary; 12 or 18v AC secondary; remote located.

PART 3 EXECUTION

3.01 APPLICATION

- A. Typical Dwelling Units
 - 1. Install one smoke detector in each bedroom, and in the hallway leading to the bedrooms.
 - 2. Interconnect all units within each dwelling unit, such that in an alarm event, all detector units activate.
- B. UFAS Designated Accessible Units (4 Units - Total)
 - 1. Install one smoke detector in each bedroom, and in the hallway leading to the bedrooms.
 - 2. Interconnect all units within each dwelling unit, such that in an alarm event, all detector units activate.
 - 3. Install video intercom at entry door.
- C. UFAS Designated Audible/Visual Accessible Dwelling Units (1 Unit - Total)
 - 1. Install one smoke detector and one visual strobe alarm in each bedroom, and in the hallway leading to the bedrooms. Interconnect strobes with the smoke detectors to activate during an alarm event.
 - 2. Install an additional visual strobe alarm in the bathrooms.
 - 3. Interconnect all smoke detectors/strobes within each dwelling unit, such that in an alarm event, all detector/strobe units activate.
 - 4. Install video intercom and A/V door signaler at entry door.
- D. Community Building
 - 1. Install one smoke detector and one visual strobe alarm where indicated on the Drawings. Interconnect strobes with the smoke detectors to activate during an alarm event.
 - 2. Interconnect all smoke detectors/strobes within the Office/Laundry Building, such that in an alarm event, all detector/strobe units activate.

3.02 EXAMINATION

- A. Verify that conditions are satisfactory for installation prior to starting work.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Do not begin work until unacceptable conditions have been corrected.

3.03 INSTALLATION

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and the contract documents.
- B. Coordinate all wiring, conduit, boxes, and supports locations for installation of work in this section.
- C. Obtain Owner's approval of locations of devices, before installation.
- D. Leave one copy of unit operation instructions in each dwelling unit and the leasing office.

3.04 INSPECTION AND TESTING FOR COMPLETION

- A. Notify Owner 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- D. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- E. Correct defective work, adjust for proper operation, and retest.

END OF SECTION

SECTION 31 1000 – SITE CLEARING & DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Remove and dispose of landscaping by methods permissible in the jurisdiction of the work.
- B. Remove and replacement of pavement as required for placement of medical unit.
- C. It is the intent that the demolition be complete and adequate for the intended purpose. This work shall include the removal of all items, whether in view or hidden underneath the surface of the ground, regardless of whether shown on the drawings or encountered during construction.

1.2 PERMITS

- A. Contractor shall comply with all applicable local, state, and federal requirements regarding materials, methods of work, and disposal of excess waste materials.

1.3 SUBMITTALS

- A. The contractor shall submit demolition and clearing procedures and operational sequences and schedules for review and acceptance by the Owner's representative.

1.4 GENERAL PROCEDURES

- A. Erect barriers to protect personnel, structures and utilities remaining intact.
- B. Protect on-site trees and plants noted on drawings. All neighboring landscaping and trees are to be protected from damage.
- C. Protect all existing objects intended to remain. In case of damage, make repairs or replacements necessary at no additional cost to the owner.
- D. Minimize interference with driveways, sidewalks, and adjacent facilities.
- E. Do not close or obstruct drives, sidewalks, alleys or passageways without permission from authorities having jurisdiction.
- F. If closure is permitted, provide signage indicating closure and signage to direct traffic to alternate route.
- G. Moisten surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other work on the site.

PART 2 - EXECUTION

2.1 PREPERATION

- A. Notification: Provide the owner's representative a minimum of two business days' notice prior to commencing work of this section.
- B. The contractor shall locate existing utility lines and services traversing the site and

determine the requirements for their protection. The contractor shall preserve active utilities on the site that are designated to remain.

- C. Before starting site operations, the contractor shall disconnect or arrange for the disconnection of all utility services designated to be removed. The contractor shall perform all such work in accordance with the requirements of the utility company or agency involved

2.2 PAVEMENTS

- A. In removing pavement, curb and gutter, sidewalks, etc., where a portion is left in place, removal shall be to an existing joint or to a joint sawed to a minimum depth of 2" with a true saw line and a vertical face. Remove sufficient pavement to provide for proper grade and connections in the new work regardless of any limits indicated on the drawing.

2.3 SEWERS

- A. Existing castings and culverts, if salvageable and removed intact, remain the property of the contractor.
- B. All sewers and drainage pipes, which have been or are to be abandoned, shall be permanently sealed at the ends with bulkheads constructed of concrete, having a minimum thickness of 8".
- C. Abandon storm or sanitary sewer structures by breaking the concrete bottom of the structure into pieces no larger than 12" in any direction and removing the top of the structure to 3" below finished grade. Plug all pipes with concrete and fill structure with 1" clean gravel.

2.4 DISPOSAL

- A. All debris shall be disposed of off-site
- B. Do not store or burn materials on-site unless permitted by the governing jurisdiction.
- C. All asphalt or concrete materials shall be disposed of off-site.
- D. Material acquired through demolition, other than those required to complete the construction project and designated for return to owner, will become the property of the contractor and will be removed from the site and off owner property. The material will be disposed of in a legal manner.

2.5 CONSTRUCTION LIMITS

- A. The Contractor's operations shall be restricted to those areas inside the construction limits indicated on the drawings. If limits are not indicated, restrict work to the owner's property, easement, or public rights-of-way.
- B. Complete work within public rights-of-way under the permission of the governing agency.
- C. The contractor shall repair damage outside the construction limits at no additional expense to the owner.

2.6 UTILITY ADJUSTMENT

- A. The contractor is responsible for the adjustment of all manholes, castings, and water valves within the grading limits to match the finished surface.
- B. Adjustments shall be coordinated with the utility companies and the cost for all adjustments shall be incidental to construction unless noted as a bid item.
- C. The contractor shall repair any damage to utility structures and appurtenances that occurs during construction at no additional cost to the owner.

END OF SECTION 311000

SECTION 31 2000 – EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide earthwork operations. The Contractor shall be responsible for the excavation of all footings and foundations in addition to preparing the pavement subgrade. The Contractor shall extend all utility excavations and services and make final, permanent connections to utility services as required.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Test Reports: Submit for approval test reports, list of materials and gradations proposed for use. **Obtain samples of any proposed fill material and contractor to provide standard proctor test reports to engineer. Supply in-place compaction reports from an independent testing service for all fill materials placed.**

1.3 QUALITY ASSURANCE

- A. Compaction:
 - 1. Under structures, building slabs, steps, pavements, and walkways, 95 percent Standard Proctor minimum density, ASTM D 698.
 - 2. Under lawns or unpaved areas, 90 percent, ASTM D 698.
- B. Grading Tolerances Outside Building Lines:
 - 1. Lawns, unpaved areas, and walks, plus or minus 1 inch.
 - 2. Pavements, plus or minus 1/2 inch

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Earthwork:
 - 1. Application: Excavation, filling, compacting and grading operations both inside and outside building limits as required for below-grade improvements and to achieve grades and elevations indicated. Provide trenching and backfill for mechanical and electrical work and utilities. Note: all graded gravel or crushed stone shall be provided by the Contractor.
 - 2. Application: Subbase materials, drainage fill, common fill, and structural fill materials for slabs, pavements, and improvements.
 - 3. Application: Suitable fill from off-site if on-site quantities are insufficient or unacceptable, and legal disposal of excess fill off-site.
 - 4. Subbase Material: Graded gravel or crushed stone.
 - 5. Bedding Course: Graded crushed gravel and sand.
 - 6. Borrow Soil: Off-site soil for fill or backfill.
 - 7. Drainage Fill: ashed gravel or crushed stone.
 - 8. Common Fill: Mineral soil free from unsuitable materials.
 - 9. Structural Fill: Graded gravel.
 - 10. Impervious Fill: Gravel and sand mixture.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All activities will be contained within construction boundaries indicated on site plan. Specified excavation requirements, precautions, and protective systems will be observed at all times.
- B. Movement of trucks and equipment on Owner's property will be in accordance with Owner's instructions.
- C. Topsoil will be stripped from the construction site and stockpiled in designated area. Excess topsoil will be stripped and disposed of legally off site.
- D. Trenches will not be backfilled until all required tests are completed and the utility systems, as installed, conform to requirements specified by the contract documents.
- E. Excavation is unclassified and includes excavation to subgrade regardless of materials encountered. Repair excavations beyond elevations and dimensions indicated as follows:
 - 1. At Structure: Concrete or compacted structural fill.
 - 2. Elsewhere: Backfill and compact as directed.
- F. Maintain stability of excavations; coordinate shoring and bracing as required by authorities having jurisdiction. Prevent surface and subsurface water from accumulating in excavations. Stockpile satisfactory materials for reuse, allow for proper drainage and do not stockpile materials within drip line of trees to remain.
- G. Compact materials at the optimum moisture content as determined by ASTM D 698 by aeration or wetting to the following percentages of maximum dry density:
 - 1. Structure, Pavement, Walkways: Subgrade and each fill layer to 95% (-2%+4%) of Standard Proctor maximum dry density to suitable depth. Compaction testing shall be performed immediately prior to the placement of reinforcing steel and new paving materials. Contractor shall be responsible for scheduling testing with owners designated testing agency.
 - 2. Unpaved Areas: Top 6" of subgrade and each fill layer to 90% maximum dry density.
 - 3. A proof-roll shall be required of the subgrade prior to placement of the base course. Proof rolling shall consist of passing a loaded, 20-ton, tandem dump truck over the prepared subgrade soil with a maximum allowable displacement of 1". Any areas that displace more than 1" shall be compacted until this criterion is met, or those areas may be excavated and backfilled with compacted Type 1 aggregate used for base material. All proof rolling shall be performed in the presence of the Owner's representative.
 - 4. **Cut areas under proposed asphalt or concrete pavements shall be cut and compacted. After grading to subgrade elevation, scarify the top six inches of the sub-base and compact as outlined above.**
- H. Place acceptable materials in layers not more than 8" loose depth for materials compacted by heavy equipment and not more than 4" loose depth for materials compacted by hand equipment to subgrades indicated as follows:
 - 1. Structural Fill: Use under foundations, slabs on grade in layers as indicated.
 - 2. Drainage Fill: Use under designated building slabs, at foundation drainage and elsewhere as indicated.

3. Common Fill: Use under unpaved areas.
 4. Subbase Material: Use under pavement, walks, steps, piping and conduit.
- I. Grade to within 1/2" above or below required subgrade and within a tolerance of 1/2" in 10'.
 - J. Protect newly graded areas from traffic and erosion. Recompact and regrade settled, disturbed and damaged areas as necessary to restore quality, appearance, and condition of work.
 - K. Control erosion to prevent runoff into sewers or damage to sloped or surfaced areas.
 - L. Control dust to prevent hazards to adjacent properties and vehicles. Immediately repair or remedy damage caused by dust including air filters in equipment and vehicles. Clean soiled surfaces.
 - M. Disposal of excavation waste and unsuitable materials shall be the responsibility of the site work contractor. No specific or pre-approved location is being provided by the owner.

END OF SECTION 312000

- 9. Structural Fill: Graded gravel.
- 10. Impervious Fill: Gravel and sand mixture.

PART 3 EXCAVATION

3.1 INSTALLATION

- A. All activities will be contained within construction boundaries indicated on site plan. Specified excavation requirements, precautions, and protective systems will be observed at all times.
- B. Movement of trucks and equipment on Owner’s property will be in accordance with Owner’s instructions.
- C. Topsoil will be stripped from the construction site and stockpiled in designated area. Excess topsoil will be stripped and disposed of legally off site.
- D. Trenches will not be backfilled until all required tests are completed and the utility systems, as installed, conform to requirements specified by the contract documents.
- E. Excavation is unclassified and includes excavation to subgrade regardless of materials encountered. Repair excavations beyond elevations and dimensions indicated as follows:
 - 1. At Structure: Concrete or compacted structural fill.
 - 2. Elsewhere: Backfill and compact as directed.
- F. Maintain stability of excavations; coordinate shoring and bracing as required by authorities having jurisdiction. Prevent surface and subsurface water from accumulating in excavations. Stockpile satisfactory materials for reuse, allow for proper drainage and do not stockpile materials within drip line of trees to remain.
- G. Compact materials at the optimum moisture content as determined by ASTM D 1557 by aeration or wetting to the following percentages of maximum dry density:
 - 1. Structure, Pavement, Walkways: Subgrade and each fill layer to 95% (-2%+4%) of Standard Proctor maximum dry density to suitable depth. Compaction testing shall be performed immediately prior to the placement of reinforcing steel and new paving materials. Contractor shall be responsible for scheduling testing with owners designated testing agency.
 - 2. Unpaved Areas: Top 6" of subgrade and each fill layer to 90% maximum dry density.
 - 3. A proof-roll shall be required of the subgrade prior to placement of the base course. Proof rolling shall consist of passing a loaded, 20-ton, tandem dump truck over the prepared subgrade soil with a maximum allowable displacement of 1". Any areas that displace more than 1" shall be compacted until this criterion is met, or those areas may be excavated and backfilled with compacted Type 1 aggregate used for base material. All proof rolling shall be performed in the presence of the Owner’s representative.
 - 4. C

. A

- H. Place acceptable materials in layers not more than 8" loose depth for materials compacted by heavy equipment and not more than 4" loose depth for materials compacted by hand equipment to subgrades indicated as follows:
 - 1. Structural Fill: Use under foundations, slabs on grade in layers as indicated.
 - 2. Drainage Fill: Use under designated building slabs, at foundation drainage and elsewhere as indicated.
 - 3. Common Fill: Use under unpaved areas.
 - 4. Subbase Material: Use under pavement, walks, steps, piping and conduit.

- I. Grade to within 1/2" above or below required subgrade and within a tolerance of 1/2" in 10'.
- J. Protect newly graded areas from traffic and erosion. Recompact and regrade settled, disturbed and damaged areas as necessary to restore quality, appearance, and condition of work.
- K. Control erosion to prevent runoff into sewers or damage to sloped or surfaced areas.
- L. Control dust to prevent hazards to adjacent properties and vehicles. Immediately repair or remedy damage caused by dust including air filters in equipment and vehicles. Clean soiled surfaces.
- M. Disposal of excavation waste and unsuitable materials shall be the responsibility of the site work contractor. No specific or pre-approved location is being provided by the owner.

END OF SECTION 31 2316

SECTION 31 2500 – EROSION CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Installation of temporary water pollution control measures to prevent discharge of pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage, or other harmful material from the project.
- B. Drawings and General Provisions of Contract, including General and Special Conditions, apply to this section.

1.2 GENERAL

- A. The Contractor shall manage his operations to control water pollution in accordance with this specification and applicable State regulations. Construction of permanent drainage facilities and other contract work, contributing to control of erosion, shall be scheduled at the earliest practicable time.
- B. The Contractor shall furnish, install, maintain and remove temporary erosion control measures. The Contractor shall prevent discharging silt or polluted storm water from the site.
- C. The Owner's Representative may require installation of additional erosion control facilities, by the Contractor, if in the sole opinion of the Owner's Representative the Contractor's efforts are adequate.

1.3 DEFINITIONS

- A. Temporary Berm: A temporary ridge of compacted soil, with or without a shallow ditch, constructed at the top of slopes or transverse to the centerline of a slope. The berm diverts storm runoff to temporary outlets to discharge water with minimal erosion.
- B. Temporary Seeding and Mulching: Placement of a quick ground cover to reduce erosion in areas expected to be re-disturbed.
- C. Straw Bales: Standard agricultural bales used to filter the flow of water trap, deposit sediment, and/or divert water.
- D. Silt Fence: A geotextile barrier fence to contain sediment by removing suspended particles from water passing through the fence.
- E. Sediment Removal: Removal of accumulated sediment to restore the efficiency of sediment control features.

1.4 SUBMITTALS

- A. The Contractor shall submit any coordinate any field modifications to the “Erosion Control Plan” for review and approval by the Owner’s Representative. Approval of the plan changes does not relieve the Contractor of his contractual responsibility to prevent the discharge of pollutants into the receiving drainage ways.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Temporary Seeding:
1. December 1 to March 1: 50 lbs. oats/acre
 2. March 1 to December 1: 50 lbs. cereal rye or wheat
- B. Mulch shall be wheat straw.
- C. Wire Supported and Self Supporting Silt Fence:
1. Geotextile Fabric
 - a. Fibers used in geotextiles shall consist of longchain synthetic polymers, composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvages.
 - b. The geotextile shall be free of any treatment or coating which might adversely alter its physical properties after installation.
 - c. Geotextile shall be furnished in 36” width rolls.
 - d. Geotextile rolls shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure.
 - e. Each roll shall be labeled or tagged to provide product identification sufficient for inventory.
 - f. Rolls shall be stored in a manner, which protects them from the elements.
 - g. Geotextile shall conform to the following:

TABLE 1
PHYSICAL REQUIREMENTS FOR
TEMPORARY SILT FENCE GEOTEXTILES

Property	Test Method	Wire Fence Supported Requirements	Self Supported Requirements
Tensile Strength, Lbs.	ASTM D4632	90 Minimum	90 Minimum
Elongation at 50% Minimum			
Tensile Strength (45 Lbs.)	ASTM D4632	N/A	50 Maximum
Filtering Efficiency, %	VTM-51	75	75
Flow Rate gal/ft/min	VTM-51	0.3	0.3
Ultraviolet Degradation at 500 hrs.	ASTM D4355	Minimum 70% Strength Retained	Minimum 70% Strength Retained

1. Notes: All numerical values represent minimum average roll value.

When tested in any principal direction. Virginia DOT test method.

2. Posts: Wood, steel, or synthetic post may be used. Posts shall have a minimum length of 36" plus embedment depth (24" min.). Posts shall have sufficient strength to resist damage during installation and to support applied loads.
3. Support Fence: Wire or other support fence shall be at least 24" high and strong enough to support applied loads.
4. Prefabricated Fence: Prefabricated fence systems may be used provided they meet all of the above material requirements.

2.2 CLEANOUTS

- A. The Contractor shall furnish a manufacturer's certification, stating the material conforms to the requirements of these specifications.
- B. The certification shall include, or have attached, typical results of tests for the specified properties, representative of the materials supplied.
- C. The Owner's Representative reserves the right to sample and test any material offered for use.

PART 3 – EXECUTION

3.1 GENERAL REQUIREMENTS

- A. The Owner's Representative may limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, or fill operations.
- B. The Owner's Representative may direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams, other watercourses, lake, ponds, or other areas of water impoundment. Work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, use of temporary mulches, seeding or other control devices or methods to control erosion.
- C. The Contractor shall incorporate permanent erosion control feature at the earliest practicable time.
- D. The Contractor at no additional cost shall provide temporary pollution control measures needed to control erosion during normal construction practices to the Owner.

3.2 LIMITATION OF AREA DISTURBED

- A. The Owner's Representative may limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, or fill operations.. The Contractor's operations shall be scheduled to install erosion control features immediately after clearing and grubbing.
- B. The Owner's Representative may limit the area of clearing and grubbing, excavation, borrow, and embankment operations commensurate with the Contractor's capability and progress in completing the finish grading, mulching seeding,

- C. The Contractor shall respond to seasonal variations. If required by weather, temporary erosion control measures shall be taken immediately.

3.3 BORROW AND WASTE AREAS

- A. Material pits other than commercially operated sources and material spoil areas shall be subject to pollution control measures of this specification. An offsite location does not relieve the Contractor of his contractual obligation to prevent the introduction of silt or other pollutants into receiving waterways.

3.4 CONFLICT WITH FEDERAL, STATE OR LOCAL LAWS, RULES OR REGULATIONS

- A. In case of conflict between these requirements and pollution control laws, rules, or regulations or other Federal, State or local agencies, the more restrictive laws, rules, or regulations shall apply.

3.5 TEMPORARY BERMS

- A. Temporary berms shall be constructed at the top of newly constructed slopes and/or transverse to grade to divert runoff and prevent erosion until permanent controls are installed and/or slopes are stabilized.
- B. Construction Requirements:
 - 1. Berms shall be constructed to the approximate dimensions indicated on the drawings. Berms shall be machine compacted with a minimum of one pass over the entire width with a bulldozer tread, grader wheel, or other approved method.
 - 2. Berms must drain to a compacted outlet at a slope drain. The top width of these berms may be wider and the side slopes flatter on transverse berms to allow equipment to pass over these berms with a minimal disruption.

3.6 TEMPORARY SEEDING AND MULCHING

- A. General
 - 1. This item is applicable to all projects.
 - 2. Seeding and/or mulching shall be a continuous operation on all cut slopes, fill slopes, and borrow pits during the construction process. All disturbed areas shall be seeded and mulched within five (5) working days after the last construction activity in all locations where necessary to eliminate erosion.
- B. Construction Requirements:
 - 1. Permanent seeding and mulching following temporary seeding will be performed during the favorable seeding seasons only.
 - 2. Temporary seeding mixtures and planting season:
 - a. December 1 to March 1: 50 lbs. oat grain per acre
 - b. March 1 to December 1: 50 lbs. (cereal rye or wheat) per acre

3. Temporary mulch, fertilizer, and lime for seeding:
4. Fertilizer and mulch for temporary seed mixtures shall be commercial type applied at the rate specified by the manufacturer.
5. Lime will not be required.

3.7 STRAW BALES

- D. General
1. Install at the bottom of embankment slopes less than 10' high to divert runoff from sheet flow and intercept some of the sediment in the sheet flow.
 2. Install as ditch checks in small ditches and drainage areas.
 3. Install on the lower side of cleared areas to catch sediment from sheet flow.
- E. Construction Requirements:
1. Bales of straw shall be utilized to control erosion, trap sediment, and divert runoff.
 2. Bales must be adequately braced from behind.

3.8 SILT FENCE

- F. General
1. Install along the toe of fills over 10' in height, along the right-of-way line, parallel to drainageways or around an inlet to prevent sediment from entering the pipe system.
- G. General Requirements:
1. The Contractor shall install a temporary silt fence in locations shown on the drawings, around inlets that accept flows containing silt, and other locations necessary to prevent the discharge of silt from the site.
 2. Installation shall conform to the detail at the end of this section.
 3. Fence construction shall be adequate to handle the stress from hydraulic and sediment loading.
- H. Installation
1. Geotextile at the bottom of the fence shall be buried as indicated on the detail.
 2. The trench shall be backfilled and the soil compacted over the geotextile. The geotextile shall be spliced together as indicated on the detail.
- I. Post Installation
1. Post spacing shall not exceed 8' for wire support fence installation or 5' for self-supported installations.
 2. Posts shall be driven a minimum of 24" into the ground. Where rock is encountered, posts shall be installed in a manner approved by the Owner's Representative.
 3. Closer spacing, greater embedment depth and/or wider posts shall be used in low areas, soft, or swampy ground to ensure adequate resistance to applied loads.
 4. When support fence is used, the mesh shall be fastened securely to the upstream side of the post.
 5. The mesh shall extend into the trench a minimum of 2" and extend a maximum of 36" above the original ground surface.

6. When self-supported fence is used, the geotextile shall be securely fastened to fence posts.

J. Maintenance

1. The Contractor shall maintain the integrity of silt fences as long as they are necessary to contain sediment runoff.
2. The Contractor shall inspect all temporary silt fences immediately after each rainfall. Inspect daily during prolonged rainfall.
3. The Contractor shall immediately correct deficiencies.
4. The Contractor shall make a daily review of the location of silt fences in areas where construction activities have changed the natural contour and drainage runoff to ensure that the silt fences are properly located for effectiveness.
5. Where a single fence is not adequate to handle the volume of silt or flows are not completely intercepted, additional silt fences shall be installed.
6. The Contractor shall remove and dispose of sediment deposits when the deposit approaches one-half the height of the fence.
7. The silt fence shall remain in place until the upstream surface is stabilized. Upon removal, the Contractor shall remove the silt fence, dispose of excess silt, and restore the disturbed area.

3.9 SEDIMENT REMOVAL

K. General

L. Sediment deposits shall be removed when:

- M. The deposits reach approximately one-half the height of a ditch check, straw bale barrier or silt fence.
- N. The sediments have reduced the ponded volume of sediment basins to one-third of the original volume.
- O. Requested by the Owner's Representative.
- P. Sediment removed from erosion control features shall be deposited in a location where it will not erode into construction areas or watercourses.

END OF SECTION 312500

SECTION 31 31 16
TERMITE CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Chemical soil treatment.
- B. Termite-resistant vapor barrier sheet.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Vapor barrier placement under concrete slab-on-grade.

1.03 REFERENCE STANDARDS

- A. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.
- B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.
- C. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act; 1947 (Revised 2001).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.
- C. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements.
- D. Test Reports: Indicate regulatory agency approval reports when required.
- E. Test Reports: Submit termite-resistant sheet manufacturer's summary of independent laboratory and field testing for effectiveness in subterranean termite exclusion.
- F. Manufacturer's Certificate: Certify that toxicants meet or exceed specified requirements.
- G. Manufacturer's Instructions: Indicate caution requirement.
- H. Record and document moisture content of soil before application.
- I. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three (3) years of documented experience.
- J. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing this type of work and:
 - 1. Having minimum of three (3) years documented experience.
 - 2. Approved by manufacturer of treatment materials.
 - 3. Licensed in the State in which the Project is located.

1.06 WARRANTY

- A. Provide five year installer's warranty against damage to building caused by termites.
- B. Termite-Resistant Vapor Barrier Sheet: Provide five year manufacturer's limited warranty.

PART 2 PRODUCTS

2.01 CHEMICAL SOIL TREATMENT

- A. Toxicant Chemical: EPA (Title 7, United States Code, 136 through 136y) approved; synthetically color dyed to permit visual identification of treated soil.
- B. Diluent: Recommended by toxicant manufacturer.
- C. Manufacturers:
 - 1. Bayer Environmental Science Corp; Premise Pre-Construction: www.backedbybayer.com/pest-management.
 - 2. FMC Professional Solutions; Dragnet SFR: www.fmcprosolutions.com.

3. Syngenta Professional Products; Altriset: www.syngentapmp.com.
- D. Mixes: Mix toxicant to manufacturer's instructions.

2.02 TERMITE BARRIER SHEET

- A. Termite-Resistant Vapor Barrier Sheet: Plastic sheet, complying with ASTM E1745, Class C; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs, and for exclusion of subterranean termites.
- B. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, prefabricated boots, etc., for sealing seams and penetrations in vapor retarder.
- C. Manufacturers:
 1. Stego Technology LLC; Pango Wrap with Pango Tape: www.stegoindustries.com.
 2. Lightning Underlayment Inc; ObeX11 12 mil Barrier: www.obex11.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.
- B. Verify final grading is complete.

3.02 APPLICATION - CHEMICAL TREATMENT

- A. Comply with requirements of U.S. EPA and applicable state and local codes.
- B. Inject toxicant in accordance with manufacturer's instructions.
- C. Apply toxicant at following locations:
 1. Under Slabs-on-Grade.
 2. At Both Sides of Foundation Surface.
 3. Soil Within 10 feet of Building Perimeter For a Depth of 4 feet.
- D. Under slabs, apply toxicant 24 hours prior to installation of vapor barrier.
- E. At foundation walls, apply toxicant 12 hours prior to finish grading work outside foundations.
- F. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- G. Re-treat disturbed treated soil with same toxicant as original treatment.
- H. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3.03 INSTALLATION - BARRIER SHEET

- A. Comply with ASTM E1643.
- B. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

3.04 PROTECTION

- A. Do not permit soil grading over treated work.
- B. Protect sheet materials from damage after completed installation. Repair damage with manufacturer's recommended products and according to the manufacturer's written instructions.

END OF SECTION

SECTION 32 1313 - CONCRETE PAVEMENT

PART 1 GENERAL

1.1 SUMMARY

1. Cast-in-place concrete paving shall be installed by the Contractor if for all portions of the project that have been accepted by the owner to be installed as concrete pavement in lieu of asphalt paving. This section applies to exterior driving and walking surfaces depicted on the plan.

1.2 SUBMITTALS

1. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
2. Design Mixes: Submit for approval design mixes, including adjustments for variations in project conditions.
 - a. Mixes to be designed in accordance with the Portland Cement Association.
 - b. All exposed concrete shall be air entrained. Allowable ranges shall be as follows:
 1. $\frac{3}{4}$ " to 1" aggregate size shall contain 6.0% average entrained air. The total air content range shall be between 5%-7%.
 - c. All concrete shall achieve 4000 psi compressive strength in 28 days.
 - d. Flint and chert to be limited to 1% maximum, by weight of the coarse aggregate, in all exposed concrete. Lignite will be limited to 0.07% by weight of the fine aggregate in all exposed concrete.
 - e. Sand shall be from local sources meeting ASTM C-33 Size 67 for concrete.
 - f. The use of calcium chloride in concrete mixes will not be permitted. Fly ash is permitted as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 15 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - a. Fly Ash: 15 percent.
 - g. Maximum water-to-cementitious materials ratio shall be .48
 - h. Concrete slump shall be a maximum of 4" +/- 1" (ASTM C- 143) as delivered in the field. Contractor may use chemical admixtures to attain a maximum slump of 8" for workability. No water may be added to the concrete mix on site unless water is withheld at the batching facility. If water is withheld at the batching facility it should be reflected on the load ticket. The total

amount of water in the mix shall not exceed what is noted on the approved mixed. This shall be noted in the special inspector's records.

3. Test Mix Reports: Submit test reports for approval prior to construction.

1.3 QUALITY ASSURANCE

1. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
2. Construction Tolerance: 1/8' in 10' for grade and alignment of top of forms; 1/4' in 10' for vertical face on longitudinal axis.
3. Testing: Independent testing agency shall be obtained by the contractor. Testing requirements shall be as follows:
 - a. An ACI certified Grade I field technician shall perform the testing
 - b. Test shall be performed for strength, air entrainment, temperature, and slump. Strength tests will require 4 cylinders (1 broken @ 7 days; 2 broken @ 28 days, 1 spare). Test results should be sent to the contractor, architect, and owner's representative.
 - c. Concrete will be tested at the minimum rate of one test for the first 25 cubic yards placed each day, and one test for each additional 50 cubic yards placed thereafter.
 - d. Test data from concrete cylinder breaks will be evaluated using procedures of ACI 214.

PART 2 PRODUCTS

2.1 MATERIALS

1. Concrete Paving Materials:
 1. Accessories:
 - a. Wire Mesh Reinforcement: Welded plain steel wire fabric, ASTM A 185.
 - b. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60.
 - c. Fabricated Bar Mats: Steel bar or rod mats, ASTM A 184, using ASTM A 615, Grade 60 steel bars.
 - d. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60.
 - e. Hook Bolts: ASTM A 307, Grade A threaded bolts.
 - f. Liquid-Membrane Forming and Sealing Curing Compound: ASTM C 309, Type I, Class A.
 - g. Bonding Compound: Polyvinyl acetate or acrylic base.
 - h. Color Pigment: ASTM C 979.
 - i. Marking Paint: FS TT-P-1952 white for parking stripes, and blue at handicap areas.
 - j. Epoxy Adhesive: ASTM C 881.

PART 3 EXECUTION

3.1 INSTALLATION

1. Comply with ACI 301 for measuring, mixing, transporting, and placing concrete.
2. Proof roll subbase and check for unstable areas. Report unsatisfactory conditions in writing to the owners representative.
3. Comply with concrete section for concrete mix, testing placement, joints, tolerances, curing, repairs and protection.
4. Dispose of over-mixed concrete off-site in a legal manner.
5. Protect concrete paving until weight of a person will not leave any impression. Remove and replace concrete paving, which shows impressions or other defects. Skim coating defects is not acceptable.
6. Contraction joints shall be tooled during finishing or sawed within 18 hours of concrete placement. If the joint edge ravel, do not proceed until concrete has sufficient cure time to saw without damage.
 - a. Contraction joints shall have a minimum depth of $\frac{1}{4}$ of the pavement thickness and a minimum width of $\frac{1}{8}$ "
 - b. Transverse contraction joints will be provided at a maximum of 2.5 times the pavement thickness (in inches) in feet for street pavements and 2.0 times for all other pavements.
 - c. Longitudinal joints shall have a maximum separation of 12 feet for streets and drives and 9 feet for sidewalks.
 - d. The ratio of slab width to length should not exceed 1.67 for street pavements and 1.25 for all other pavements.
 - e. All joints to be sealed with bituminous joint sealant.
7. Sweep and clean surface to eliminate loose material and dust and apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils

END OF SECTION 321313

SECTION 32 1373 – CONCRETE PAVING JOINT SEALANTS

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. Expansion and contraction joints within cement concrete pavement.
- B. Related Sections include the following:
 - 1. Division 32 Section “Concrete Paving” for constructing joints in concrete pavement.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealed product indicated.
- B. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials to comply with manufacturer’s written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.

2. When joint substrates are wet or covered with frost.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

2.3 COLD-APPLIED JOINT SEALANTS (SIDEWALKS)

- A. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.
 1. Products:
 - a. Crafcro Inc.; RoadSaver Silicone
 - b. Dow Corning Corporation; 888
 - c. W.R. Meadows; Pourthane NS
 2. Joint-Sealant Backer Materials
 - a. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing
 - b. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.4 HOT-APPLIED JOINT SEALANTS (PARKING LOTS)

- A. Joint Filler. After the pavement has been properly cured, all open joints including expansion joints, construction joints, and longitudinal joints, shall be cleaned, primed with a light grade of cut-back asphalt, and poured full of an approved hot poured joint sealing compound. The joint sealing compound shall be either polymeric asphalt based (AASHTO M301, ASTM D3405) or elastomeric-type (AASHTO M282, ASTM D3406), heated and applied in strict accordance with instructions of the manufacturer. Joints must be thoroughly clean and dry immediately before seal is poured and sealing compound shall be poured so that the joint is filled to the level of the adjacent concrete surfaces.

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.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of backer materials.
 - 2. Do not stretch, twist, puncture, or tear backer materials.
 - 3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.
- D. Install sealants using proven techniques that comply with the following and at the same time backing are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses provided for each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealants from surfaces adjacent to joint.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.
- G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 321373

SECTION 32 1723 - PAVEMENT MARKINGS

PART 1 GENERAL

1.1 SUMMARY OF WORK INCLUDED

- A. Cleaning and preparation of surfaces to receive paint striping with a high pressure water sprayer. Only the surfaces for striping require cleaning.
- B. Painting in parking lines, safety zones, handicap zones, loading zones, no parking zones in parking lots indicated on drawings.
- C. Protecting adjacent surfaces from paint drips, spatters and overspray
- D. Protect wet paint from vehicular and pedestrian traffic.

PART 2 PRODUCTS

2.1 PAINT

- A. Paint for parking lot striping shall be chlorinated rubber conforming to TT-P11SF epoxy pavement marking material without glass beads.
- B. Paint type must be compatible with the surfaces to be painted

2.2 COLORS

- A. Paint shall be applied per the following color code: White for standard parking space lines and sidewalk crossings. Blue for handicap parking stall and symbols

2.3 MATERIALS

- A. Materials shall include standard commercial grade masking materials, scrapers, cleaning solvents, and other materials required for the work.
- B. Use materials specified by manufacturer's direction label on container.

2.4 DELIVERY AND STORAGE

- A. Deliver materials in original containers with seals unbroken and labels intact.
- B. Protect all paint from freezing.
- C. Do not allow paint to settle, cake, or thicken in the container. Readily stir with a paddle to a smooth consistency.
- D. Paint shall arrive on the job color-mixed except for tinting of undercoats and possible thinning.

PART 3 EXECUTION

3.1 PROTECTION

- A. Prior to beginning cleaning or painting operations, contractor shall protect all items or surfaces not included in area to be painted. Protect vehicles, equipment, structures, or other items from paint spatters, over spray, or damage.
- B. Contractor shall provide barricades and any signage needed to protect all painted areas from pedestrian and vehicular traffic until achieving sufficient drying time.

3.2 INSTALLATION REQUIREMENTS

- A. Perform painting as soon as feasible and practical after the finishing of the pavement or as directed by the owners representative.
- B. Adequate lighting shall be available at the time of painting.
- C. Examine all surfaces to receive paint to make sure there are no defects in the surface to be striped. Do not paint over rust, scale, grease, oil, fuel, dust, wet pavement, or other conditions detrimental to paint adhesion. Remove grease, oil, or fuel on any surface before painting. Correct all surface defects before painting.
- D. Contractor shall examine areas to be painted. Notify the owners representative in writing of conditions that might delay timely completion of the work.

3.3 WEATHER CONDITIONS

- A. Painting shall not be performed when the ambient temperature is less than 55 degrees Fahrenheit, or while the surface is damp.
- B. The surface must be five degrees or more above the dew point temperature during painting operations and while paint is drying.

3.4 APPLICATION

- A. Areas to be painted shall receive one coat of paint not less than 25 mils thickness wet. In locations requiring multiple coats, prior coat shall be dry to manufacturer's recommendations before applying the next coat.
- B. Finished work shall be uniform, of approved color, free of runs, drips, defective brushing, spraying, and clogging. Parking lines and symbols shall be neat and well defined. Only skilled applicators shall apply paint. Owners representative shall approve application techniques.

3.5 QUALITY CONTROL

- A. Remove paint splatter from adjacent areas or areas not designated to receive paint.
- B. Contractor shall repair or touch up any surfaces if exposed to vehicular and pedestrian traffic, to the satisfaction of the owner's representative, at no additional cost to the owner.

END OF SECTION 32 1723

SECTION 32 17 26
TACTILE WARNING SURFACING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

1.02 RELATED REQUIREMENTS

- A. Section 32 13 13 - Concrete Paving: Concrete sidewalks.
- B. Section 32 17 23 - Painted Pavement Markings: Crosswalk and curb markings.

1.03 REFERENCE STANDARDS

- A. 49 CFR 37 - Transportation Services for Individuals with Disabilities (ADA); current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ATBCB PROWAG - Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; 2011.
- E. FED-STD-595C - Colors Used in Government Procurement (Fan Deck); 2008 (Chg Notice 1).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's product data, standard details, details specific to this project; written installation and maintenance instructions.
- C. Warranty: Submit manufacturer warranty; complete forms in Owner's name and register with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver to project site in manufacturer's protective wrapping and in manufacturer's unopened packaging.
- B. Store covered and elevated above grade and in manufacturer's unopened packaging until ready for installation. Maintain at ambient temperature between 40 and 90 degrees F.

1.07 WARRANTY

- A. Plastic Tiles: Provide manufacturer's standard five year warranty against manufacturing defects, breakage or deformation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Plastic Tactile and Detectable Warning Surface Tiles:
 - 1. Access Tile, a brand of Access Products, Inc: www.accesstile.com.
 - 2. ADA Solutions, Inc: www.adatale.com.
 - 3. Armor-Tile, a brand of Engineered Plastics, Inc: www.armortiletransit.com.

2.02 TACTILE AND DETECTABLE WARNING DEVICES

- A. Plastic Tactile and Detectable Warning Tiles: ADA Standards compliant, glass fiber and carbon fiber reinforced, exterior grade, matte finish polyester sheet with truncated dome pattern, solid color throughout, internal reinforcing of sheet and of truncated domes, integral radius cut lines on back face of tile; with factory applied removable protective sheeting.
 - 1. Installation Method: Cast in place.
 - 2. Shape: Rectangular.
 - 3. Dimensions: 24 inches by 48 inches.
 - 4. Pattern: In-line pattern of truncated domes complying with ADA Standards.
 - 5. Edge: Square.

6. Joint: Butt.
7. Color: FED-STD-595C, Table IV, Federal Yellow No. 33538.
8. Products:
 - a. Access Tile, a brand of Access Products, Inc; Cast in Place Replaceable Tactile Warning Tile: www.accesstile.com.
 - b. ADA Solutions, Inc; Cast in Place (Wet-Set): www.adatale.com/#sle.
 - c. Or approved equal.

2.03 ACCESSORIES

- A. Fasteners: ASTM A666, Type 304 stainless steel
 1. Type: Countersunk, color matched composite sleeve anchors
 2. Size: 1/4 inch diameter and 1-1/2 inches long.
- B. Sealant: Elastomeric sealant of color to match adjacent surfaces; approved by surfacing tile manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. When installation location is near site boundary or property line, verify required location using property survey.
- B. Verify that work area is ready to receive work:
 1. Examine work area with installer present.
 2. If existing conditions are not as required to properly complete the work of this section, notify Architect.
 3. Do not proceed with installation until deficiencies in existing conditions have been corrected.
- C. Reference Civil Drawings for additional information.
 1. Information contained on Civil Drawings shall take precedence over any information contained in this section.
- D. Verify that dimensions, tolerances, and attachment methods for work in this section are properly coordinated with other work on site.

3.02 INSTALLATION, GENERAL

- A. Install in accordance with manufacturer's written instructions.
 1. Install tactile warning units full width of walk, ramp, or access aisle.
 2. Do not install damaged, warped, bowed, dented, abraded, or otherwise defective units.
 3. Do not install when ambient or substrate temperature has been below 40 degrees F during the preceding 8 daylight hours.
- B. Field Adjustment:
 1. Cut units as required to fit width of walk, ramp, access aisle.
 2. Do not cut plastic tiles to less than 9 inches wide in any direction.
 3. Locate relative to curb line in compliance with ATBCB PROWAG, Sections 304 and 305.
 4. Orient so dome pattern is aligned with the direction of ramp.
 5. Align truncated dome pattern between adjacent units.
- C. Install units fully seated to substrate, square to straight edges and flat to required slope.
- D. Align units so that tops of adjacent units are flush and joints between units are uniform in width.

3.03 INSTALLATION, CAST IN PLACE PLASTIC TILES

- A. Concrete:
 1. See Section 03 30 00.
 2. Slump: 4 to 7 percent.
- B. When installing multiple adjacent units, leave a 3/16 inch gap between units to allow for expansion.
- C. Tamp and vibrate units as recommended by manufacturer.
- D. Place and position weights on units while concrete cures as recommended by manufacturer. Ensure no voids or air pockets exist between top surface of concrete and underside of units.

3.04 CLEANING PLASTIC UNITS

- A. Remove protective plastic sheeting within 24 hours of installation.
- B. Remove excess sealant or adhesive from joints and edges.
- C. Clean four days prior to date of scheduled inspection.

3.05 PROTECTION

- A. Protect installed units from traffic, subsequent construction operations or other imposed loads until concrete is fully cured.
- B. Touch-up, repair or replace damaged products prior to Date of Substantial Completion.

END OF SECTION

SECTION 322000-TURFS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division Specification sections, and the Approved DNR Land Disturbance Permit, apply to the Work specified in this Section.

1.2 DESCRIPTION OF WORK

- A. Furnish all materials, labor, equipment and services necessary to perform all Work.
- B. Work included in this Section includes clearing of weeds, seed bed preparation, installation of erosion control fabric and seeding operations required for seeding of the areas shown on Drawings.

1.3 SPECIFICATIONS AND STANDARDS

- A. U.S. Department of Agriculture: SRA 156 U.S. Department of Agriculture, Rules and Regulations under the Federal Seed Act.
- B. American Joint Committee on Horticultural Nomenclature Standard: 1942 Edition Standardized Plant Names.

PART 2 - PRODUCTS

2.1 SEED

- A. All seed shall be furnished in sealed, standard containers, unless otherwise approved. Seed which has become wet, moldy, or otherwise damaged will not be acceptable.
- B. Each container of seed shall be fully labeled in accordance with the Federal Seed Act and seed certifications shall be signed and made part of seed invoices.
- C. Seed shall be Fescue, 97 percent pure live seed
- D. Invoices and tags for seed shall show type furnished. Upon acceptance of the seeded areas, a final check of total quantities of seed used will be made against total area seeded and if minimum rates of application or specified quantities have not been met, the Architect will require distribution of additional quantities of these materials to make up minimum application specified.

2.2 FERTILIZER

- A. Fertilizer shall be uniform in composition, free-flowing, suitable for application with approved equipment and delivered to the site unopened in original containers each bearing the manufacturer's guaranteed analysis and in conformity with state fertilizer laws. Fertilizer shall contain the following minimum percentage of plant food by weight.
 - 1. 12 percent available nitrogen
 - 2. 12 percent available phosphoric acid
 - 3. 12 percent available potash

- B. Fertilizer application rates shall be 600 pounds per acre with a minimum of _____lbs applied.
- C. Invoices for fertilizer shall show grade furnished. Upon acceptance of the seeded areas, a final check of total quantities of fertilizer used will be made against total area seeded and if minimum rates of application or specified quantities have not been met, the Architect will require distribution of additional quantities of these materials to make up minimum application specified.

2.3 EROSION CONTROL FABRIC

- A. Fabric shall be “Soil Saver” as is distributed by Jim Walls Company in Dallas, Texas (214) 239-8577; or “Curlex Blankets” as is distributed by Americal Excelsior Company in North Kansas City, Missouri (816) 842-3034; or approved equal.

2.4 STAPLES

- A. Staples shall be a No. 11 gauge steel wire formed into a “U” shape, 6 inches long.

PART 3 - EXECUTION

3.1 GROUND PREPARATION

- A. General: the ground areas are to be seeded and fertilized as indicated on the Drawings and/or as specified herein. Equipment necessary for the proper preparation of the ground surface and for handling and placing all required materials shall be on hand, in good condition and shall be approved before the Work is started.
- B. Clearing: Prior to tillage, seeding or other specified operations, all vegetation which might interfere with the indicated treatment of the areas shall be mowed, grubbed, raked and the debris removed from the site. Prior to or during grading and tillage operations, the ground surface shall be cleared of materials which might hinder final operations. Areas which have been disturbed shall be finish graded and/or developed as indicated on the Drawings or as specified.
- C. Tillage: After the areas required to be seeded have been brought to the finish grades as specified, they shall be thoroughly tilled to a depth of at least 6 inches by plowing, disking, harrowing or other approved methods until the condition of the soil is acceptable to the Architect. Work shall be performed only during period when beneficial results are likely to be obtained. When conditions are such by reason of drought, excessive moisture, or other factors that satisfactory results are not likely to be obtained, Work shall be stopped. Work shall be resumed only when desired results are likely to be obtained.
- D. Leveling: Any undulations or irregularities in the surface resulting from tillage, fertilizing or other operations shall be leveled with a float drag before seeding operations are begun.
- E. Fertilizing: Fertilizer shall be distributed uniformly at the rate previously specified per 1,000 square feet over the areas to be seeded and shall be incorporated into the soil to a depth of at least 3 to 4 inches by disking, harrowing or other approved methods. The incorporation of fertilizer may be a part of the tillage operation hereinbefore specified. Distribution by means of an approved seed drill equipped to sow seed and distribute fertilizer at the same time will not be accepted. Fertilizer shall be incorporated into the soil a minimum of 10 days before seed is planted.
- F. Inspection: A minimum of 48 hours prior notice must be given to the Construction Administrator before fertilizing may commence.

- G. Planting Time: All seeding Work shall be done between the dates of April 1 to May 15 for spring planting and from August 15 to October 15 for fall planting except as otherwise directed in writing by the Construction Administrator.
- H. Planting Condition: No planting shall be done until a permanent source of water is available at the site for use by the Owner.

3.2 SEEDING

- A. General: Prior to seeding, any previously prepared seedbed areas compacted or damaged by interim rains, traffic, or other cause shall be reworked to restore the ground condition previously specified. Seed shall be planted by drill seeding.
- B. Drill Seeding: Seed shall be uniformly drilled to an average depth of ½ inch and at the rate of 8 pounds per 1,000 square feet using equipment having drills not more than 6 ½ inches apart. Row markers shall be used with the drill seeder.
- C. Rolling: Immediately after seeding, except for slopes 3 horizontal to 1 vertical and greater, the entire area shall be firmed with a roller not exceeding 90 pounds for each foot of roller width. Do not roll areas seeded with seed drills equipped with rollers.
- D. Inspection: A minimum of 48 hours prior notice must be given to the Construction Administrator before seeding may commence.

3.3 INSTALLATION OF EROSION CONTROL FABRIC

- A. Fabric shall be rolled out in place. Fabric shall be applied without stretching and shall lie smoothly but loosely on the soil surface. The Contractor shall refer to the Drawings for details of fabric fastening.
- B. Application of the erosion control fabric shall occur the same day that the seeding of an area has taken place.
- C. Fabric shall completely cover all areas which are shown on the Drawings to be protected from erosion. After fabric installation, the entire area shall be rolled with a smooth roller weighing between 200 to 250 pounds. After rolling, the fabric shall be in intimate contact with the soil surface at all points. Any clods, etc., which hold the fabric off the ground should be removed. The fabric shall be forced down into any depressions and held there with a staple.

3.4 MAINTENANCE

- A. General: The project areas shall be kept clean at all times and care shall be taken that use of the premises shall not be unduly hampered by Work herein specified. The intent of this Section is to ensure a healthy, well-established turf, and prevent soil erosion in compliance with the Land Disturbance Permit.
- B. Responsibility: The Owner shall be responsible for maintenance of all seeded areas upon completion of seeding and general acceptance by the Construction Administrator.
- C. Damage: Damage to seeded areas during the project shall be repaired by the persons responsible for causing such damage.

3.5 GENERAL ACCEPTANCE

- A. The Construction Administrator shall make an inspection of the seeded areas upon completion of seeding. Seeded areas shall be considered acceptable if the specified quantities of fertilizer & seed have been properly applied.

3.6 GUARANTEE

- A. The Contractor is responsible for the proper application of the fertilizer & seeding. Watering, weeding, re-seeding, and mowing will be the responsibility of the Owner after proper application of the seed.

END OF SECTION 322000

SECTION 32 90 00

LANDSCAPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Fertilizing.
- D. Sod installation.
- E. New trees and shrubs.
- F. Mulch and Fertilizer.
- G. Maintenance.
- H. Tree Pruning.

1.02 RELATED REQUIREMENTS

- A. Section 31 22 00 - Grading: Topsoil material.
- B. Section 31 22 00 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.
- C. Section 31 23 23 - Fill: Topsoil material.

1.03 DEFINITIONS

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.
- B. Plants: Living trees, plants, and ground cover specified in this Section, and described in ANSI Z60.1.

1.04 REFERENCE STANDARDS

- A. ANSI A300 Part 1 - American National Standard for Tree Care Operations -- Tree, Shrub and Other Woody Plant Maintenance -- Standard Practices; 2008 (R2014).
- B. TPI (SPEC) - Guideline Specifications to Turfgrass Sodding; 2006.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Planting Schedule: Submit schedule detailing coordination of normal planting times with construction schedule for related work.
 - 1. If conditions exist which warrant a variance in the stated planting dates, a request may be made to the Owner stating the cause, and the proposed variance.
- C. Certification: Submit certification of grass species and location of sod source.
- D. Maintenance Data: Include maintenance instructions, cutting and trimming methods, maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.06 QUALITY ASSURANCE

- A. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience, and certified by the State in which the project is located.
- B. Installer Qualifications: Company approved by the sod producer.
- C. Nursery Qualifications: Company specializing in growing and cultivating the plants with three years experience.
- D. Installer Qualifications: Company specializing in installing and planting the plants with three years experience.

1.07 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

- B. Provide certificate of compliance from authority having jurisdiction indicating approval of fertilizer and herbicide mixture.
- C. Plant Materials: Described by ASTM Z60.1; free of disease or hazardous insects.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.
- B. Deliver sod on pallets. Protect exposed roots from dehydration.
 - 1. Do not deliver more sod than can be laid within 24 hours.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- D. Protect and maintain plant life until planted.

1.09 FIELD CONDITIONS

- A. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.
- B. Do not install plant life when wind velocity exceeds 30 mph.

1.10 WARRANTY

- A. Provide one year warranty.
- B. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

PART 2 PRODUCTS

2.01 CLIMATE / GROWING ZONE

- A. The Grass Adaptation Climate Zone for this project is: Transition Zone.
- B. The Plant Hardiness Zone for this project is: 7b
- C. Planting Season: All Planting shall occur between the dates specified.
 - 1. Early Spring planting season: March 15th through May 15th.
 - 2. Early Fall planting season: August 15th through October 15th.

2.02 SODDING

- A. Sod: TPI (SPEC), Certified Turfgrass Sod quality; cultivated grass sod; type indicated below; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq ft. Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.
 - 1. Tall Fescue Grass Type: 15 percent.
 - 2. "Riviera" Bermuda Grass Type: 85 percent.
 - 3. Thickness: "Thick" sod, minimum 1 inch and maximum 1-3/8 inch topsoil base.
 - 4. Cut sod in area not exceeding 1 sq yd.
 - 5. Machine cut sod and load on pallets in accordance with TPI (SPEC) Guidelines.

2.03 PLANTS

- A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.
- B. Furnish balled and burlapped (B&B) trees and shrubs, except container-grown plants may be furnished if indicated size is below limit established in ANSI Z60.1.
 - 1. Deciduous shrubs may be furnished in bare root conditions if adequately maintained and protected from drying through transplanting period.
- C. Trees: Trees shall be 2-1/2 inch caliper, or as noted on planting schedule.
 - 1. Redbud trees shall be 1 inch caliper.
 - 2. Evergreen trees shall be 6 foot in height.

2.04 SOIL MATERIALS

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0.

2.05 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight, pH range of 4 to 5; moisture content of 30 percent.
- C. Fertilizer: Recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, to the following proportions:
 - 1. Nitrogen: 5 percent.
 - 2. Phosphoric Acid: 10 percent.
 - 3. Soluble Potash: 5 percent.
- D. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.
- E. Erosion Fabric: Jute matting, open weave.
- F. Wood Pegs: Softwood, sufficient size and length to ensure anchorage of sod on slope.
- G. Stakes: Softwood lumber, pointed end or Mild steel angle, galvanized, pointed end.
- H. Cable, Wire, Eye Bolts and Turnbuckles: Non-corrosive, of sufficient strength to withstand wind pressure and resulting movement of plant life.
- I. Plant Protectors: Rubber sleeves over cable to protect plant stems, trunks, and branches.
- J. String: Inorganic fiber.
- K. Weed Membrane: 20 mil thick, water permeable polyolefin fabric.
- L. Wrapping: Waterproof fabric.
- M. Edging: Steel, factory finished. 3/16 by 4 inch with steel stakes.
 - 1. Color: Green

2.06 PLANT SOIL MIX

- A. A uniform mixture of 1 part peat and 3 parts topsoil by volume.

2.07 SOURCE QUALITY CONTROL

- A. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- B. Submit minimum 10 oz sample of topsoil proposed. Forward sample to approved testing laboratory in sealed containers to prevent contamination.
- C. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared soil base is ready to receive the work of this Section.
- B. Saturate soil with water to test drainage.
- C. Verify that required underground utilities are available, in proper location, and ready for use.

3.02 PREPARATION GENERAL

- A. Plant at the earliest possible date site conditions permit in the Early spring planting season.
- B. Prepare subgrade in accordance with Section 31 22 00.
 - 1. In areas where topsoil has not been stripped, loosen soil to 6 inches depth, tilling to a fine level texture.

- C. Place topsoil in accordance with Section 31 22 00.
- D. Install edging at periphery of seeded or sodded areas in straight lines to consistent depth.

3.03 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 4 inches where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- D. Dig pits and beds 1-1/2 times larger than container or 12 inches larger than plant root system.

3.04 PLACING TOPSOIL

- A. Spread topsoil to a minimum depth of 4 inches over area to be planted. Rake smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.
- E. Install topsoil into pits and beds intended for plant root balls, to a minimum thickness of 6 inches.

3.05 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

3.06 LAYING SOD

- A. Lay sod in all areas as designated on Landscape Plan.
- B. Loosen topsoil base to a minimum depth of 4 inches in all areas to receive sod.
- C. Moisten prepared surface immediately prior to laying sod.
- D. Lay sod within 12 hours after harvesting to prevent deterioration.
- E. Lay sod smooth and tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.
- F. Where new sod adjoins existing grass areas, align top surfaces.
- G. Where sod is placed adjacent to hard surfaces, such as curbs, pavements, etc., place top elevation of sod 1/2 inch below top of hard surface.
- H. On slopes 6 inches per foot and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. Drive pegs flush with soil portion of sod.
- I. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.
- J. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities. Roll sodded areas with roller not exceeding 200 lbs.

3.07 PLANTING

- A. Place plants as indicated.
- B. Set plants vertical.
- C. Remove non-biodegradable root containers.
- D. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth of 6 inches under each plant. Remove burlap, ropes, and wires, from the root ball.
- E. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch layers. Maintain plant life in vertical position.

- F. Saturate soil with water when the pit or bed is half full of topsoil and again when full.
- G. Build 6 inch high berm of topsoil beyond edge of excavation around each tree.
- H. Apply mulch to a depth of 4 inches. Keep mulch from direct contact with tree trunks.

3.08 INSTALLATION OF ACCESSORIES

- A. Wrap deciduous shade and flowering tree trunks from ground to first branch and place tree protectors.

3.09 PLANT SUPPORT

- A. Brace plants vertically with plant protector wrapped guy wires and stakes to the following:
 1. Tree Caliper: 1 inch; Tree Support Method: 1 stake with one tie
 2. Tree Caliper: 2 to 4 inches; Tree Support Method: 3 guy wires with eye bolts and turn buckles

3.10 TREE PRUNING

- A. Prune trees as recommended in ANSI A300 Part 1.
- B. Prune newly planted trees as required to remove dead, broken, and split branches.

3.11 PROTECTION

- A. Identify seeded areas with stakes and string around area periphery. Set string height to 12 inches. Space stakes at 48 inches.
- B. Cover seeded slopes where grade is 4 inches per foot or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.
- C. Secure outside edges and overlaps at 36 inch intervals with stakes.
- D. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

3.12 MAINTENANCE

- A. Seeding and Sodding shall be completed 30 days prior to Final Inspection, weather permitting.
- B. Provide maintenance at no extra cost to Owner until completion and/or occupancy of the project; Owner will pay for water.
- C. Maintain plant life immediately after placement and until plants are well established and exhibit a vigorous growing condition. Continue maintenance until completion/occupancy of the project.
- D. Irrigate sufficiently to saturate root system and prevent soil from drying out.
- E. Cultivate and weed plant beds and tree pits.
- F. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.
- G. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- H. Neatly trim edges where necessary.
- I. Immediately remove clippings after mowing and trimming.
- J. Water to prevent grass and soil from drying out.
- K. Roll surface to remove minor depressions or irregularities.
- L. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- M. Immediately reseed areas that show bare spots.
- N. Protect seeded areas with warning signs during maintenance period.
- O. Remove dead or broken tree branches and treat pruned areas or other wounds.
 1. Do not remove more than 15 percent of branches.
- P. Maintain tree wrappings, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.

END OF SECTION

SECTION 32 9219 – SEEDING

PART 1 GENERAL

1.1 SCOPE

- A. The Landscape Contractor shall provide all labor, equipment, materials and services necessary to furnish and install seeding as specified herein, as indicated on the drawings and to all areas disturbed by this project for seeding.
- B. Work shall include, but is not limited to, the following:
 - 1. Soil Preparation
 - 2. Seeding
 - 3. Maintenance Period
- C. Related work specified elsewhere:
 - 1. Section 02 4100 Demolition
 - 2. Section 32 2316 Excavation
- D. Guarantee
 - 1. Seeding
 - a. After final grading the Contractor shall guarantee a satisfactory stand of grass (10lbs/1,000 s.f.), and shall repair and re-seed any wash-outs or areas not covered with grass, at the end of sixty (60) days at no additional cost to the Owner.
 - b. The Contractor shall be responsible for the removal of weeds, tall grasses, rocks, etc. before seeding is completed.

PART 2 MATERIALS

2.1 FERTILIZER

- A. 18.6.12. slow release fertilizer

2.2 MATERIALS FOR SEEDING

- A. Agricultural limestone at seed manufacturer's recommended rate based on soils testing.
- B. Commercial fertilizer 23-7-7 or 24-6-6 analysis, urea based, slow release type nitrogen, used at seed manufacturer's recommended based on soils testing.
- C. Seed for "Seed and Straw" area shall be a mix of 80% K-31 Tall Fescue and 20% "Gulf" Annual or "Linn" Perennial Ryegrass. Seed at a rate of 10 lbs. per 1,000 s.f.
- D. Other specific commercial pre-mixed seed mixes that have a proven track record of success for the purpose and location will be considered when accompanied by a Request for Substitution.

PART 3 EXECUTION

3.1 SEEDING

- A. Seeding operations shall be performed when conditions are favorable to establish a strong stand of grass. When seeding in the fall, seeding shall be completed prior to October 1.
- B. Furnish all labor, materials, equipment and services necessary to seed all unpaved areas of the project site and at all areas disturbed by this project.
- C. Cultivate areas to be seeded by disking to a depth of four inches (4"). Remove all stones and rocks larger than one inch (1"), roots, sticks, construction debris and other extraneous materials.
- D. Apply lime and fertilizer at the rates designated and mix thoroughly into the soil to depth of four inches (4").
- E. Areas to be seeded shall then be fine graded to a smooth even surface with a loose, uniformly fine texture. Roll, rake and drag lawn areas, remove ridges and fill depressions, as required to meet the finish grades.
- F. Sow seed using a mechanical spreader or seeding machine calibrated to distribute the seed at the rate designated. Do not seed when wind velocities exceed five (5) miles per hour. Distribute seed evenly over the entire area by sowing equally in two (2) directions at right angles to each other.
- G. Rake seed lightly into the top ¼" of soil, roll lightly and water thoroughly with a fine spray.
- H. Protect newly seeded areas against erosion by spreading straw mulch after completion of the seeding operations. Spread straw mulch uniformly to form a continuous blanket not less than 1½" inch loose thickness. Sloped areas greater than 1:6 shall be protected against erosion by installing erosion control netting as approved by the Architect.
- I. Anchor straw mulch by spraying with an asphalt emulsion at the rate of 10 to 13 gallons per thousand square feet.
- J. The contractor may use hydroseeding in lieu of mechanical seeding. If hydroseeding is used, mix specified seed, fertilizer and pulverized mulch in water using equipment specifically designed for hydroseed applications. Mix into a uniformly blended, homogeneous slurry. Apply slurry uniformly to all areas requiring seeding at a rate of application required to obtain the specified seed sowing rate.
- K. Maintain seeded lawn areas by watering, fertilizing, weeding, mowing, trimming and other operations such as rolling, regarding and replanting as required to establish a smooth acceptable lawn, free of eroded or bare areas.
- L. All seeded lawn areas shall be maintained as outlined above for not less than sixty (60) days after the dates of Substantial Completion. If seeded in the fall and not given a full sixty (60) days of maintenance, or if not considered acceptable at that time, maintenance shall continue the following spring for up to an additional sixty (60) days.

3.2 CLEAN UP

- A. Remove all surplus materials and debris from the project site.
- B. Finally water all seeded areas before leaving site.

END OF SECTION 32 9219

SECTION 33 1000 – WATER UTILITIES

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 water-distribution piping and related components outside the building for **water service and fire-service mains**.

1.3 DEFINITIONS

- A. HDPE: High-Density Polyethylene Plastic
- B. PVC: Polyvinyl chloride plastic.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- B. Field quality-control test reports.
- C. Source Limitations: Obtain termite control products through one source from a single manufacturer for each product.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: water valves and specialties to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Regulatory Requirements:

1. Comply with state or local standards for potable-water-service piping, including materials, installation, testing, disinfection, and all requirements of any state Water Company.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including yard hydrants, according to the following:
 1. Ensure that valves are dry and internally protected against rust and corrosion.
 2. Protect valves against damage to threaded ends and flange faces.
 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrant if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.9 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated.
 1. Notify Owner no fewer than two days in advance of proposed interruption of service.
 2. Do not proceed with interruption of water-distribution service without Owner's written permission.

1.10 COORDINATION

- A. Coordinate connection to water main with state or local water providing company.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. PE, ASTM Pipe: ASTM D 2239, SDR No. 5.3, 7, or 9; with PE compound number required to give pressure rating not less than 200 psig (1380 kPa).
 - 1. Use PE Piping for 2" diameter piping and smaller
 - 2. Insert Fittings for PE Pipe: ASTM D 2609, made of PA, PP, or PVC with serrated male insert ends matching inside of pipe. Include bands or crimp rings.
 - 3. Molded PE Fittings: ASTM D 3350, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.
- B. PVC (C900 / C950)
 - 1. Use PVC Pipe for 4-inch to 24-inch diameter piping.

2.2 JOINING MATERIALS

- A. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.3 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to ends compatible with, piping to be joined.
 - 1. Dielectric-Flange Insulating Kits:
 - a. Description:
 - 1) Nonconducting materials for field assembly of companion flanges.
 - 2) Pressure Rating: 150 psig
 - 3) Gasket: Neoprene or phenolic
 - 4) Bolt Sleeves: Phenolic or polyethylene
 - 5) Washers: Phenolic with steel backing washers.
 - 2. Dielectric Nipples
 - a. Description
 - 1) Standard: IAPMO PS 66
 - 2) Electroplated steel nipple, complying with ASTM F 1545
 - 3) Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C)
 - 4) End Connections: Male threaded and grooved
 - 5) Lining: Inert and noncorrosive, propylene.

2.4 GATE VALVES

- A. AWWA, Cast-Iron Gate Valves:
 - 1. Nonrising-Stem, High-Pressure, Resilient-Seated Gate Valves
 - a. Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - 1) Standard: AWWA C509.

- 2) Minimum Pressure Rating: 250 psig (1725 kPa).
- 3) End Connections: Push on or mechanical joint.
- 4) Interior Coating: Complying with AWWA C550

2.5 GATE VALVE ACCESSORIES AND SPECIALTIES

- A. Tapping-Sleeve Assemblies:
1. Description: Sleeve and valve compatible with drilling machine.
 - a. Standard: MSS SP-60
 - b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type and pipe material being tapped and with recessed flange for branch valve.
 - c. Valve: AWWA, cast-iron, nonrising-stem, metal seated gate valve with one raise face flange mating tapping-sleeve flange.
- B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches (125 mm) in diameter.
1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
- C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.6 FLUSHING HYDRANTS

- A. Post-Type Flushing Hydrants:
1. Description: Nonfreeze and drainable, of length required for shutoff valve installation below frost line.
 - a. Pressure Rating: 150 psig (1035 kPa) minimum.
 - b. Outlet: One, with horizontal discharge.
 - c. Hose Thread: NPS 2-1/2 (DN 65), with NFPA 1963 external hose thread for use by local fire department, and with brass chain.
 - d. Barrel: Cast-iron or steel pipe with breakaway feature.
 - e. Valve: Bronze body with bronze-ball or plunger closure, and automatic draining.
 - f. Security: Locking device for padlock.
 - g. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.
 - h. Inlet: NPS 2 (DN 50) minimum.
 - i. Operating Wrench: One for each unit.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fitting may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground water-service piping NPS 3/4 to NPS 3 (DN 20 to DN 80) 1-inch to 2-inch shall be the following:
 - 1. PE, ASTM pipe; insert fittings for PE pipe; and clamped joints.

3.3 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 (DN 50) and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Underground Valves, NPS 3 (DN 80) and Larger: AWWA, cast-iron, nonrising-stem, resilient-seated gate valves with valve box.

3.4 PIPING INSTALLATION

- A. Make connections NPS 2 (DN 50) and smaller with drilling machine according to the following:
 - 1. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
- B. Install HDPE pipe according to ASTM D 2774 and ASTM F 645.
- C. Bury piping with depth of cover over top at least 48 inches (750 mm), with top at least 12 inches (300 mm) below level of maximum frost penetration, and according to the following:
 - 1. Under Driveways: With at least 36 inches (910 mm) cover over top
 - 2. In Loose Gravelly Soil and Rock: With at least 12 inches (300 mm) additional cover.
- D. Extend water-service piping and connect to water-supply source and building-water piping systems at outside face of building wall in locations and pipe sizes indicated.
 - 1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- E. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.5 JOINT CONSTRUCTION

- A. See Section 330500 “Common Work Results for Utilities” for basic piping joint construction.
- B. Make pipe joints according to the following:
 - 1. HDPE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer’s written instructions.

3.6 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorage and restrained-joint types that may be used to include the following:
 - 1. Concrete thrust blocks.
 - 2. Locking mechanical joints.
 - 3. Set-screw mechanical retainer glands.
 - 4. Bolted flanged joints.
 - 5. Heat-fused joints.
 - 6. Pipe clamps and tie rods.
- B. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.7 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

3.8 FLUSHING HYDRANT INSTALLATION

- A. Install post-type flushing hydrants with valve below frost line and provide for drainage. Support in upright position. Include separate gate valve or curb valve and restrained joints in supply piping.
- B. Install ground-type flushing hydrants with valve below frost line and provide for drainage. Install hydrant box flush with grade. Include separate gate valve or curb valve and restrained joints in supply piping.
- C. Install sampling stations with valve below frost line and provide for drainage. Attach weather-resistant housing and support in upright position. Include separate curb valve in supply piping.

3.9 CONNECTIONS

- A. Connect water-distribution piping to interior **domestic water and fire-suppression** piping.

3.10 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.11 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping.

3.12 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
 2. Use purging and disinfecting procedure prescribed by state jurisdiction or, if method is not prescribed, use procedure described in AWWA C651 or do as follows:
 - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chloride; isolate and allow to stand for 24 hours.
 - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
 - c. After standing time, flush system with clean potable water until no chlorine remains in water coming from system.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

END OF SECTION 331000

SECTION 33 3000 – SANITARY SEWERAGE UTILITIES

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. Also refer to:
 - 1. Section 31 1000 – Site Clearing
 - 2. Section 31 2000 – Earth Moving

1.2 SUMMARY

- A. Section includes:
 - 1. Pipe and fittings.
 - 2. Cleanouts.
 - 3. Encasement for piping.
 - 4. Manholes.

1.3 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.

1.4 SUBMITTALS

- A. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals, from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Architect, Construction Manager, and Owner no fewer than one week in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Owner's written permission.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC Gravity Sewer Piping:
 - 1. Pipe and Fittings: ASTM F 679 PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

2.2 CLEANOUTS

- A. Cast-Iron Cleanouts:
 - 1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
 - 2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.3 MANHOLES

- A. Standard Precast Concrete Manholes:
 - 1. Description: ASTM C 478 precast, reinforced concrete, of depth indicated, with provision for sealant joints.
 - 2. Diameter: 48 inches minimum unless otherwise indicated.
 - 3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
 - 4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
 - 5. Riser Sections: 4-inch minimum thickness, of length to provide depth indicated.
 - 6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
 - 7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
 - 8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
 - 9. Steps: Individual ASTM A 615, deformed, ½-inch steel reinforcing rods encased in ASTM D 4101, PP 12-inches wide and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls uniformly at 16-inch intervals max. Omit steps if total depth from floor of manhole to finished grade is less than 24-inches.
 - 10. Grade Rings: Reinforced-concrete rings, 8-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.
- B. Manhole Frames and Covers:
 - 1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser, with 4-inch- minimum-width flange and 26-inch diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to “SANITARY SEWER.”
 - 2. Material: ASTM A 48, Class 35 gray iron unless otherwise indicated.

2.4 CONCRETE

- A. General: Cast-in-place concrete complying with ACI 318, ACI 350/350R, and the following:
 - 1. Cement: ASTM C 150, Type ii
 - 2. Fine Aggregate: ASTM C 33, sand
 - 3. Coarse Aggregate: ASTM C 33, crushed gravel
 - 4. Water: potable
- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
 - 1. Reinforcing Fabric: ASTM A 185, steel, welded wire fabric, plain.
 - 2. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fitting for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - 3. Install piping with 36-inch cover unless otherwise noted.
 - 4. Install PVC gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
- G. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Join PVC gravity sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints for ASTM D 3034 for elastomeric-gasket joints.
 - 2. Join dissimilar pipe materials with nonpressure-type flexible couplings.
- B. Pipe couplings, expansion joints, and deflection fitting with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - 1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.4 MANHOLE INSTALLATION

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Form continuous concrete channels and benches between inlets and outlet.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.5 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.6 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
 - 2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
 - 3. Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
 - 4. Extra-Heavy-Duty, top-loading classification cleanout in roads.
- B. Set cleanout frames and covers in earth cast-in-place-concrete block, 24 by 24 by 6 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Division 22 Section "Sanitary Waste and Vent Piping."

- B. Make connections to existing piping and underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - 4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 CLOSING ABANDONED SANITARY SEWER SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below.
 - 1. Close open ends of piping with at least 8-inch thick, brick masonry bulkheads.
 - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes: Excavate around manhole as required and use either procedure below:
 - 1. Remove manhole and close open ends of remaining piping.
 - 2. Remove top of manhole down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade abandoned to Division 31 Section "Earth Moving."

3.9 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
 - 1. Use detectable warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.10 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 - 1. Submit separate report for each system inspection.
 - 2. Defects requiring correction include the following:

- a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice.
 4. Submit separate report for each test.
 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
 - a. Fill sewer piping and water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
 - b. Close openings in systems and fill with water.
 - c. Purge air and refill with water.
 - d. Disconnect water supply.
 - e. Test and inspect joints for leaks.
 6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
 - b. Option: Test concrete gravity sewer piping according to ASTM C 924.
 7. Manholes: Perform hydraulic test according to ASTM C 969.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.11 CLEANING

- A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 333000

SECTION 33 4100 – STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:
 - 1. Special fittings for expansion and deflection.
 - 2. Cleanouts.
 - 3. Drains.
 - 4. Precast concrete, cast-in-place concrete, or plastic junction boxes.

1.3 DEFINITIONS

- A. HDPE: High density polyethylene plastic.
- B. PVC: Polyvinyl chloride plastic.

1.4 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water. Pipe joints shall be at least silttight, unless otherwise indicated.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Special pipe fittings.
 - 2. Drains.
 - 3. Channel drainage systems.
- B. Shop Drawings: For the following:
 - 1. Manholes: Include plans, elevations, sections, details, and frames and covers.
 - 2. Catch Basins and Stormwater Inlets. Include plans, elevations, sections, details, and frames, covers, and grates.
 - 3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames and covers, and design calculations.
- C. Field quality-control test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Architect no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Architect's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

2.2 STEEL PIPE AND FITTINGS

- A. Corrugated-Steel Pipe and Fittings: ASTM A 760/A 760M, Type I with fittings of similar form and construction as pipe.
 - 1. Special-Joint Bands: Corrugated steel with O-ring seals.
 - 2. Standard-Joint Bands: Corrugated steel.
 - 3. Coating: Aluminum.

2.3 PVC PIPE AND FITTINGS

- A. PVC Cellular-Core Pipe and Fittings: ASTM F 891, Sewer and Drain Series, PS 50 minimum stiffness pipe with ASTM D 3034, SDR 35, socket-type fittings for solvent-cemented joints.
- B. PVC Sewer Pipe and Fittings, NPS 15 (DN 375) and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

- C. PVC Sewer Pipe and Fittings, NPS 18 (DN 450) and Larger: ASTM F 679, T-[1] [2] wall thickness, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.
- D. PVC Profile Gravity Sewer Pipe and Fittings: ASTM F 794 pipe, with bell-and-spigot ends; ASTM D 3034 fittings, with bell ends; and ASTM F 477, elastomeric seals.

2.4 CONCRETE PIPE AND FITTINGS

- A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76 (ASTM C 76M), with bell-and-spigot or groove and tongue ends and gasketed joints with ASTM C 443 (ASTM C 443M), rubber gaskets.
 - 1. Class III, Wall C.

2.5 NONPRESSURE-TYPE PIPE COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 - 1. For Concrete Pipes: ASTM C 443 (ASTM C 443M), rubber.
 - 2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 - 3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 4. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

2.6 CLEANOUTS

- A. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.7 MANHOLE STRUCTURES

- A. Standard Precast Concrete Manhole structures: ASTM C 478 (ASTM C 478M), pre-cast, reinforced concrete, of depth indicated, with provision for sealant joints.
 - 1. Diameter: 48 inches (1200 mm) minimum, unless otherwise indicated.
 - 2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
 - 3. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (102-mm) minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
 - 4. Riser Sections: 4-inch (102-mm) minimum thickness, and lengths to provide depth indicated.
 - 5. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.

6. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
 7. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
 8. Steps: deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into side-walls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 36 inches.
 9. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.
 10. Protective Coating: Plant-applied, coal-tar 10-mil (0.26-mm) minimum thickness applied to exterior surfaces.
 11. Manhole Frames and Covers: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (102-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
 - a. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.
 - b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all surfaces, unless otherwise indicated.
- B. Designed Precast Concrete Manholes: ASTM C 913; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for sealant joints.
1. Ballast: Increase thickness of one or more precast concrete sections or add concrete to manhole, as required to prevent flotation.
 2. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
 3. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
 4. Steps: 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 36 inches.
 5. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.
 6. Protective Coating: Plant-applied, coal-tar; 10-mil (0.26-mm) minimum thickness applied to exterior surfaces.
 7. Manhole Frames and Covers: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (102-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
 - a. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.
 - b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all surfaces, unless otherwise indicated.

- C. Cast-in-Place Concrete Manholes: Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.
1. Ballast: Increase thickness of concrete, as required to prevent flotation.
 2. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
 3. Steps: deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into side-walls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 36 inches.
 4. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.
 5. Manhole Frames and Covers: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (102-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
 - a. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.
 - b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all surfaces, unless otherwise indicated.

2.8 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:
1. Cement: ASTM C 150, Type II.
 2. Fine Aggregate: ASTM C 33, sand.
 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, with 0.45 maximum water-cementitious materials ratio.
1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.
- C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water-cementitious materials ratio.
1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.

2.9 CATCH BASINS

- A. Standard Precast Concrete Catch Basins: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints as shown on plan.
- B. Cast-in-Place Concrete, Catch Basins: Construct of reinforced concrete; designed according to ASTM C 890 for structural loading; of depth, shape, dimensions, and appurtenances indicated as shown on plan.
 - 1. Bottom, Walls, and Top: Reinforced concrete.
 - 2. Channels and Benches: Concrete.
 - 3. Steps: deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into side-walls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 36 inches.
- C. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.

2.10 STORMWATER INLETS

- A. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to utility standards.
- B. Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.
- C. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.
- D. Frames and Grates: Heavy-duty frames and grates according to utility standards.
- E. Combination Inlets: Vertical curb and horizontal gutter openings, of materials and dimensions indicated. Include heavy-duty frames and grates.
- F. Frames and Grates: Dimensions, opening pattern, free area, and other attributes indicated.

2.11 STORMWATER DETENTION STRUCTURES

- A. Cast-in-Place Concrete, Stormwater Detention Structures: Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.
 - 1. Ballast: Increase thickness of concrete, as required to prevent flotation.
 - 2. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch (150- to 229-mm) total thickness, that match 24-inch- (610-mm-) diameter frame and cover.

3. Steps: deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into side-walls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of structure to finished grade is less than 36 inches.
- B. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24-inch (610-mm) ID by 7- to 9-inch (178- to 229-mm) riser with 4-inch (102-mm) minimum width flange, and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering "STORM SEWER" cast into cover.

2.12 PIPE OUTLETS

- A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.
- B. Riprap Basins: Broken, irregular size and shape, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."
1. Average Size: NSSGA No. R-3, screen opening 2 inches (51 mm).
 2. Average Size: NSSGA No. R-4, screen opening 3 inches (76 mm).
 3. Average Size: NSSGA No. R-5, screen opening 5 inches (127 mm).
- C. Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size, graded stone.
- D. Energy Dissipaters: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. A-1, 3-ton (2700-kg) average weight armor stone, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 31 2000 Section "Earthwork."

3.2 PIPING APPLICATIONS

- A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
 - a. Unshielded flexible couplings for same or minor difference OD pipes.
 - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.

- c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
- 2. Use pressure-type pipe couplings for force-main joints.
- B. Special Pipe Fittings: Use for pipe expansion and deflection. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
- C. Gravity-Flow, Nonpressure Sewer Piping: Use pipe materials as shown on the Site Development Plans.

3.3 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
 - 3. Install corrugated steel piping according to ASTM A 798/A 798M.
 - 4. Install corrugated aluminum piping according to ASTM B 788/B 788M.
 - 5. Install HDPE corrugated sewer piping according to CPPA's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."
 - 6. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 7. Install PVC profile gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 8. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.4 PIPE JOINT CONSTRUCTION

- A. Basic pipe joint construction is specified in Division 2 Section "Piped Utilities - Basic Materials and Methods." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
- B. Join gravity-flow, nonpressure drainage piping according to the following:
 - 1. Join corrugated steel sewer piping according to ASTM A 798/A 798M.
 - 2. Join corrugated aluminum sewer piping according to ASTM B 788/B 788M.
 - 3. Join corrugated HDPE piping according to CPPA 100 and the following:
 - a. Use silttight couplings for Type 1, silttight joints.
 - b. Use soiltight couplings for Type 2, soiltight joints.
 - 4. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.
 - 5. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
 - 6. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
 - 7. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.5 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections according to ASTM C 891.
- C. Construct cast-in-place manholes as indicated.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

3.6 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

3.7 STORMWATER INLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of broken stone, as indicated.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

- E. Construct energy dissipaters at outlets, as indicated.

3.8 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318/318R.

3.9 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Division 15 Section "Storm Drainage Piping."

3.10 PAINTING

- A. Clean and prepare concrete manhole surfaces for field painting. Remove loose efflorescence, chalk, dust, grease, oils, and release agents. Roughen surface as required to remove glaze. Paint the following concrete surfaces as recommended by paint manufacturer:
 - 1. Cast-in-Place-Concrete Manholes: All exterior, except bottom.
 - 2. Precast Concrete Manholes: All exterior.
- B. Prepare ferrous frame and cover surfaces according to SSPC-PA 1 and paint according to SSPC-PA 1 and SSPC-Paint 16. Do not paint surfaces with foundry-applied, corrosion-resistant coating.

3.11 IDENTIFICATION

- A. Materials and their installation are specified in division 2 Section "Earthwork." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 - 1. Use warning tape or detectable warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.12 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (610 mm) of backfill is in place, and again at completion of Project.
 - 1. Submit separate reports for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.

- d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
- 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
- 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to authorities having jurisdiction.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 - 4. Submit separate report for each test.
 - 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
 - b. Option: Test plastic piping according to ASTM F 1417.
 - c. Option: Test concrete piping according to ASTM C 924 (ASTM C 924M).
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.13 CLEANING

- A. Clean interior of piping of dirt and superfluous materials.

END OF SECTION 334100