

SECTION 00 01 00

TITLE PAGE

ARCHITECT

WALLACE ARCHITECTS, LLC

**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: Harmony Affordable Housing Partners, LP

1901 N. Kickapoo Avenue, Shawnee, OK 74804

By: _____ Title: _____ Date: _____

CONTRACTOR: Mike D. Little Construction Company, Inc

1901 N. Kickapoo Avenue, Shawnee, OK 74804

By: _____ Title: _____ Date: _____

STATE AGENCY REPRESENTATIVE: (OHFA)

205 NW 63rd Street, Suite 140, Oklahoma City, OK 73116

By: _____ Title: _____ Date: _____

Wallace Project No. 3849

NPS # 40441 / OK # -19-00009

OHFA # 20-06-45

10/08/2021



**Marcus Garvey Harmony Redevelopment
Oklahoma City, Oklahoma**

ISSUE SET

**SECTION 00 01 09
ADDENDA AS ISSUED**

DOCUMENTS

1.01 WHEN APPLICABLE TO THIS CONTRACT, ATTACHED FOLLOWING THIS PAGE IS:

ADDENDA

ADDENDUM #: DATE: DESCRIPTION:



302 Campusview Drive, Suite 208
Columbia, MO 65201
573-256-7200



Addendum 1

**Marcus Garvey Harmony Redevelopment
Oklahoma City, OK
Wallace Job 3849
OFHA 20-06-45**

January 25, 2022

The following are deletions, additions and/or clarifications to the plans and shall be considered as if originally contained therein:

Landscape Drawings, prepared by Mark H. Myers Landscape Architect, (Revisions attached):

Drawings

LS1

- 1. Drawing Sheet provided to indicate site landscaping requirements and has been added to the Drawing Set per City comments.

LS2

- 1. Drawing Sheet is provided to indicate landscaping instructions and details and has been added to the Drawing Set per City comments.

Architectural Drawings, prepared by Wallace Architects, LLC (Revisions attached):

Drawings

0.0M

- 1. Current Issue/Revision Date fields have been updated for the related Drawing Sheets.

0.0

- 1. Current Issue/Revision Date fields have been updated for the related Drawing Sheets.

A1.0

- 1. Drawing Sheet has been revised to include a Key Site & Building Plan per City comments.

A1.1

1. Drawing Sheet has been revised to include a Key Site & Building Plan per City comments.

P1.2

1. Drawing Sheet has been provided to indicate domestic water and fire sprinkler water supply lines per City comments.

P1.3

1. Drawing Sheet has been provided to indicate domestic water and fire sprinkler water supply lines per City comments.

0.0R

1. Current Issue/Revision Date fields have been updated for the related Drawing Sheets.

A1.0R

1. Drawing Sheet has been revised to include a Key Site & Building Plan per City comments.

0.0CB

1. Current Issue/Revision Date fields have been updated for the related Drawing Sheets.

A1.0CB

1. Drawing Sheet has been revised to include a Key Site & Building Plan per City comments.
2. Drawing Sheet has been revised to indicate restroom Accessibility changes per City comments.
3. Drawing Sheet has been revised to included handrails on each side of stair per City comments.

A1.1CB

1. Drawing Sheet has been revised to include additional windows at second level residential units.
2. Drawing Sheet has been revised to included handrails on each side of stair per City comments.

A1.2CB

1. Drawing Sheet has been revised to indicate restroom maneuvering clearance changes per City comments.
2. Drawing Sheet has been revised to included handrails on each side of stair per City comments.

A3.0CB

1. Drawing Sheet has been revised to include additional windows at second level residential Units.

A4.2CB

1. Drawing Sheet has been revised to included handrails on each side of stair per City comments.
2. Drawing Sheet has been revised to included stair guardrail half-wall.

A6.0CB

1. Drawing Sheet has been revised to indicate restroom Accessibility changes per City comments.
2. Drawing Sheet has been revised to included handrails on each side of stair per City comments.

A6.1CB

1. Drawing Sheet has been revised to included handrails on each side of stair per City comments.

Mechanical, Electrical and Plumbing Drawings Clarifications, prepared by J Squared Engineering (Revisions attached):

1. Please see attached description of changes provided by J Squared Engineering, dated January 12, 2020.

Attachments:

1. The following 24" x 36" Landscape Drawing Sheets, prepared by Mark H. Myers, Landscape Architect are being issued for the first time (bearing a latest revision date of 01/20/2022):

LS1
LS2

2. The following 24" x 36" Architectural Drawing Sheets, prepared by Wallace Architects, LLC are being reissued (labeled as Addendum #1, clouded with a delta #1 and bearing a latest revision date of 01/25/2022):

0.0M
0.0
A1.0
A1.1
P1.2
P1.3
0.0R
A1.0R
0.0CB

A1.0CB
A1.1CB
A1.2CB
A3.0CB
A4.2CB
A6.0CB
A6.1CB

3. The following 8.5" x 11" MEP Narrative, Prepared by J Squared Engineering, per Drawings dated January 12, 2022 (1 page).
4. The following 24" x 36" MEP Drawing Sheets, prepared by J Squared Engineering, P.C., are being reissued (labeled as Addendum #1, clouded with a delta #1 and bearing a latest revision date of 1/12/22):

M101
EL101
EP101

END OF ADDENDUM 1



City of Oklahoma City, OK
Permitting Plan Review

Reference: Response to City of Oklahoma City comments
BLDC-2021-07732 (Bldg. 4) Markup Summary

Please see our response to review comments below.

General Comments

Reviewed By: Kevin Brown / Mike Wilson

1. **Comment 1: *Drawing EL101: Emergency egress lighting & illuminated exit signs required per Section 1013 including Tactile Exit Signs at required doors.***

Response: Egress lighting fixtures and exit lighting fixtures have been added to sheet EL101.

Additional Responses:

- Sheet M101, Return grilles moved to new all location.
- Sheet EP101, Receptacles moved to new wall location.

Please do not hesitate to contact us if we can be of any further assistance.

Sincerely,

Keaton Leisinger

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END OF SECTION

SECTION 00 11 21
INVITATION FOR SUB-CONTRACT BIDS

ISSUED BY:

Mike D. Little Construction Company, Inc

Address:

1901 N. Kickapoo Avenue
Shawnee, OK 74804

DATE: _____

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:

Marcus Garvey Harmony Redevelopment
1537 N.E. 24th Street
Oklahoma City, Oklahoma 73111

Sealed proposals will be received until _____ pm local standard time on the _____ day of _____, 2021 by Mike D. Little Construction Company, Inc, 1901 N. Kickapoo Avenue, Shawnee, OK 74804. Envelopes shall be clearly marked "Marcus Garvey Harmony Redevelopment - Proposal" and delivered to, or left with the receptionist.

Proposals will be opened in private.

Bid Documents may be obtained by contacting Mike D. Little Construction Company, Inc.

Bidders will be required to provide Bid security in the form of a Bid Bond in the amount of \$_____.

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, LLC and available for review by appointment. Call (573) 256-7200 to schedule appointments.

Wallace Architects, LLC, 302 Campusview Drive, Suite 208, Columbia MO, 65201

SIGNATURE

For: Mike D. Little Construction Company, Inc

By: _____

Signed: _____
(Authorized signing officer)

END OF SECTION

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

SUMMARY

1.01 DOCUMENT INCLUDES

- A. Invitation
 - 1. Bid Submission
 - 2. Intent
 - 3. Work Identified in 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
- C. Site Assessment
 - 1. Site Examination
- D. Qualifications
 - 1. Qualifications
 - 2. Subcontractors/Suppliers/Others
- E. Bid Submission
 - 1. Submission Procedure
 - 2. Bid Ineligibility
- F. Bid Enclosures/Requirements
 - 1. Security Deposit
 - 2. Insurance
 - 3. Bid Form Requirements
 - 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 multi-family residential renovation project located at 1537 N.E. 24th Street, Oklahoma City, Oklahoma 73111 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 demolition, general construction, mechanical, electrical, and civil 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. Contract Documents are identified as Project Number 3849, as prepared by Wallace Architects, LLC, and with contents as identified in the Table of Contents.

3.03 AVAILABILITY

- A. Bid Documents may be obtained by contacting Mike D. Little Construction Company, 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 also be viewed, by appointment only, at the office of the 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 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. General Requirements for Substitution Requests:
- B. Substitution Request Form:
- C. Review and Acceptance of Request:

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 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 Marcus Garvey Harmony Redevelopment, Oklahoma City, Oklahoma, 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 _____, 2021.

Signature(s)

By: _____

Title: _____

Business Address

SEAL:
(If bid is by a Corporation)

State License

No. _____

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

DOCUMENTS

1.01 APPLICABLE TO THIS CONTRACT, AND ATTACHED FOLLOWING THIS PAGE IS:

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

 **AIA** Document A310™ – 2010**Bid Bond****CONTRACTOR:***(Name, legal status and address)***SURETY:***(Name, legal status and principal place of business)***OWNER:***(Name, legal status and address)***BOND AMOUNT: \$****PROJECT:***(Name, location or address, and Project number, if any)*

Sample

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

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.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

Signed and sealed this day of ,

(Witness)

(Witness)

(Contractor as Principal)

(Seal)

(Title)

(Surety)

(Seal)

(Title)



Init.

/

SECTION 00 52 01

STANDARD AGREEMENT BETWEEN OWNER AND CONTRACTOR - AIA DOCUMENT A101-2017

DOCUMENTS

1.01 APPLICABLE TO THIS CONTRACT, AND ATTACHED FOLLOWING THIS PAGE IS:

**THE AMERICAN INSTITUTE OF ARCHITECTS
DOCUMENT NO. A101
STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR
--STIPULATED SUM--
2017 EDITION**

RELATED REQUIREMENTS

2.01 SECTION 00 72 00 - GENERAL CONDITIONS OF THE CONTRACT - AIA A201-2017.

2.02 SECTION 00 73 00 - SUPPLEMENTAL GENERAL CONDITIONS.

SUPPLEMENTARY CONDITIONS

END OF SECTION



AIA[®] Document A101[®] – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

| Sample

The Architect:
(Name, legal status, address and other information)

The Owner and Contractor agree as follows.

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.

The parties should complete A101@–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201@–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

Init.

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User Notes:

(3B9ADA4F)

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- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

- The date of this Agreement.
- A date set forth in a notice to proceed issued by the Owner.
- Established as follows:

(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

Init.

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User Notes:

(3B9ADA4F)

(Check one of the following boxes and complete the necessary information.)

Not later than () calendar days from the date of commencement of the Work.

By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
-----------------	-----------------------------

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor’s performance of the Contract. The Contract Sum shall be _____ Dollars and Zero Cents (\$ _____), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
------	-------

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement. (Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance
------	-------	---------------------------

§ 4.3 Allowances, if any, included in the Contract Sum: (Identify each allowance.)

Item	Price
------	-------

§ 4.4 Unit prices, if any: (Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)
------	-----------------------	-------------------------

§ 4.5 Liquidated damages, if any: (Insert terms and conditions for liquidated damages, if any.)

§ 4.6 Other: (Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than () days after the Architect receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner’s prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor’s responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner’s final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect’s final Certificate for Payment, or as follows:

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

- Arbitration pursuant to Section 15.4 of AIA Document A201–2017
- Litigation in a court of competent jurisdiction
- Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner’s convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner’s convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner’s representative:

(Name, address, email address, and other information)

§ 8.3 The Contractor’s representative:

(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

.5 Drawings

Number	Title	Date
--------	-------	------

.6 Specifications

Section	Title	Date	Pages
---------	-------	------	-------

.7 Addenda, if any:

Number	Date	Pages
--------	------	-------

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

Init.

AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

The Sustainability Plan:

Title	Date	Pages
-------	------	-------

Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
----------	-------	------	-------

.9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor’s bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*

(Printed name and title)

CONTRACTOR *(Signature)*

(Printed name and title)

SECTION 00 61 13
PERFORMANCE AND PAYMENT BOND - AIA DOCUMENT A312-2010

DOCUMENTS

1.01 APPLICABLE TO THIS CONTRACT, AND ATTACHED FOLLOWING THIS PAGE IS:

**THE AMERICAN INSTITUTE OF ARCHITECTS
DOCUMENT NO. A312
PERFORMANCE AND PAYMENT BOND
2010 EDITION**

 **AIA** Document A312™ – 2010**Payment Bond****CONTRACTOR:***(Name, legal status and address)***SURETY:***(Name, legal status and principal place of business)***OWNER:***(Name, legal status and address)***CONSTRUCTION CONTRACT**

Date:

Amount: \$ 0.00

Description:

(Name and location)

Sample

BOND

Date:

(Not earlier than Construction Contract Date)

Amount: \$

Modifications to this Bond:

None

See Section 18

CONTRACTOR AS PRINCIPALCompany: *(Corporate Seal)*

Signature:

SURETYCompany: *(Corporate Seal)*

Signature:

Name and

Title:

(Any additional signatures appear on the last page of this Payment Bond.)

Name and

Title:

*(FOR INFORMATION ONLY — Name, address and telephone)***AGENT or BROKER:****OWNER'S REPRESENTATIVE:***(Architect, Engineer or other party:)***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.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- .1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- .2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____
Signature: _____
(Corporate Seal)

SURETY

Company: _____
Signature: _____
(Corporate Seal)

Name and Title: _____
Address: _____

Name and Title: _____
Address: _____



AIA[®] Document A312[™] – 2010

Performance Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

CONSTRUCTION CONTRACT

Date:

Amount: \$ 0.00

Description:

(Name and location)

Sample

BOND

Date:

(Not earlier than Construction Contract Date)

Amount: \$

Modifications to this Bond:

None

See Section 16

CONTRACTOR AS PRINCIPAL

Company: *(Corporate Seal)*

Signature: _____

Name and

Title:

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:**SURETY**

Company: *(Corporate Seal)*

Signature: _____

Name and

Title:

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

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.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- .3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 **Balance of the Contract Price.** The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 **Construction Contract.** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 **Contractor Default.** Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____ *(Corporate Seal)*
Signature: _____

Name and Title: _____
Address: _____

SURETY

Company: _____ *(Corporate Seal)*
Signature: _____

Name and Title: _____
Address: _____

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SECTION 00 72 00

GENERAL CONDITIONS OF THE CONTRACT - AIA DOCUMENT A201-2017

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

2017 EDITION

SUPPLEMENTARY CONDITIONS

2.01 SECTION 00 73 00 - SUPPLEMENTAL GENERAL CONDITIONS.



AIA® Document A201® – 2017

General Conditions of the Contract for Construction

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

Sample

THE OWNER:
(Name, legal status and address)

THE ARCHITECT:
(Name, legal status and address)

TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
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- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT
- 15 CLAIMS AND DISPUTES

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.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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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 or proposal 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. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 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.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 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 retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and 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 the 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 suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, 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 suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

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 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 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.

§ 2.3.2 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.

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

§ 2.3.4 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.

§ 2.3.5 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.

§ 2.3.6 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.

§ 2.4 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.

§ 2.5 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 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 default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for 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. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

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 its 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 2.3.4, 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 submit 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, subject to Section 15.1.7, 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. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be 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 notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative 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 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 approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 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

§ 3.5.1 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.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 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 14 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 that an equitable adjustment be made 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, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim 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 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 notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice 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 and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably 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, or fails to provide submittals in accordance with the approved 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.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and

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 how 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 the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect 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 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 required to provide professional services in violation of applicable law.

§ 3.12.10.1 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 be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately 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 and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and 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.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 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, 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, or patching shall be restored to the condition existing prior to the cutting, fitting, or 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 construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its 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 and 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 the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with 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 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 an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the 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 Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 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.

§ 4.2 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

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 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)

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4.

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

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 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, lawsuits, attorney's 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 visit 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 the 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, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice 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 for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, 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 that the Contractor, by these Contract 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; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

§ 5.4.3 Upon 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 term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 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 any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its 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 or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has 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 notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work 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. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 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 that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor 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. The Contractor shall proceed promptly with changes in the Work, 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 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .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, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 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.

§ 7.3.7 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.

§ 7.3.8 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 may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

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, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 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 (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended 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

§ 9.1.1 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.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent 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. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and 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 supplier, unless such Work has been performed by others whom the Contractor intends to pay.

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

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that 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 (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

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§ 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 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, (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 suppliers 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 either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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

§ 9.5.4 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 supplier 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 Contractor shall reflect such payment on its next Application 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 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 and suppliers 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 or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to 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 or provided by 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, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 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' 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 shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

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

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

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will 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.

§ 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; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and 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 the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the 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 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, (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, (3) a written statement that the Contractor knows of no 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, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and 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, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance 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 the lien, claim, security interest, or encumbrance, 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, corrected, 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 the 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;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a 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, a Subcontractor, or a Sub-subcontractor; 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 implement, 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 the owners and users of adjacent sites and utilities of the safeguards.

§ 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. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or

indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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

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

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the 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 and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. 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 notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's 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 the material or substance or who are to perform the task of removal or safe containment of the 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 by the amount of the Contractor's reasonable additional costs of shutdown, 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 hazardous 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 hazardous 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 reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances 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 reimburse 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 Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 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.

§ 11.1.4 **Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 **Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 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; (2) the Architect and Architect's consultants; and (3) Separate Contractors, 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 those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 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, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement 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 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any

dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

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, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before 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 any 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 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 2.5.

§ 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 of the Owner or Separate Contractors, whether completed or partially completed, 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, excluding that jurisdiction's choice of law rules. 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 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 the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 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.

§ 13.3.2 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 thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 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 tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 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.

§ 13.4.4 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.

§ 13.4.5 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.

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

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties 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.

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, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, 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 reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, 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' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work 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' 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 or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .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 reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner 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' 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 under 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 notice from the Owner of such termination for the Owner's convenience, the Contractor shall

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

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

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, a change in the Contract Time, 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. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the 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 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by 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 under this Section 15.1.3.1 shall 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.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 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.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 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.

§ 15.1.6.2 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.

§ 15.1.7 Waiver of 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 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, 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. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a 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 the 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 receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, 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 15.1.7, 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 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 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. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. 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 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party 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 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party 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 those of 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 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 Oklahoma Housing Finance Agency (OHFA). 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, OHFA, 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 OHFA.

1.03 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 OHFA 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 OHFA, and such consent can only be given if there are no major outstanding issues or no pending Change Orders.

1.04 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", 2017 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 Oklahoma Housing Finance Agency (OHFA), 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, Mechanical, and any other such permits and/or licenses as required by the local authorities.
- 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 Environmental Site Assessment Report (Phase 1), 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. Cast Underlayment.
 - 2. Masonry units, mortar materials, and accessories.
 - 3. Fabricated metal items, hangers, ledges, and shapes.
 - 4. Rough Carpentry; grade sustantiation for dimension lumber, and fasteners.
 - 5. Finish Carpentry; trim profiles.
 - 6. Thermal Protection.
 - 7. Weather Barriers
 - 8. Roofing Materials and accessories.
 - 9. Siding and Soffit Materials.
 - 10. Firestopping.
 - 11. Joint Protection.
 - 12. Wood Doors.
 - 13. Windows.
 - 14. Finish Hardware.
 - 15. Gypsum Board.
 - 16. Resilient Flooring and accessories.
 - 17. Paints, Stains, and Coatings.
 - 18. Signage.
 - 19. Toilet and Bathroom Accessories.
 - 20. Postal Specialties.
 - 21. Closet and Storage Shelving.

- 22. Residential Appliances.
- 23. Playground Equipment
- 24. Window Treatments.
- 25. Residential Cabinets and Countertops.
- 26. Plumbing Equipment, Fixtures, and accessories.
- 27. HVAC Systems and accessories.
- 28. Electrical Systems, equipment, and fixtures.
- 29. Life Safety Systems.

2.03 SELECTION AND REVIEW OF MATERIALS

- A. Where materials or equipment require the review of the Architect and/or Historic Preservation Consultant, secure such review before procurement.
- B. Where colors or patterns require the approval of the Historic Preservation Consultant, 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, microwave, and washers and dryers.
 - 4. Siding and Soffit materials.
 - 5. Gutters and Downspouts.
 - 6. Roofing 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 ENERGY AUDIT TESTING

- A. Perform testing only as required by local authorities for compliance with the International Energy Conservation Code (IECC- current edition).

3.03 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.

3.04 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

**SECTION 01 00 10
GEOTECHNICAL REPORT**

DOCUMENTS

1.01 APPLICABLE TO THIS CONTRACT, AND ATTACHED FOLLOWING THIS PAGE IS:

**GEOTECHNICAL REPORT
Standard Testing and Engineering, LLC
48 Pages Total
06/ 04/ 2021**

SUBSURFACE EXPLORATION

Proposed Harmony Lofts

1537 NE 24th St.

Oklahoma City, OK

PROJECT NO. 2130-0271



CORPORATE OFFICE • OKLAHOMA CITY
3400 N Lincoln Blvd • Oklahoma City, OK 73105
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June 4, 2021

Mike Little Construction
1907 N Kickapoo Ave.
Shawnee, OK 74804

Attn: Mr. Bill Thurman
Project Manager

Re: Subsurface Exploration
Proposed Harmony Lofts
1537 NE 24th St.
Oklahoma City, OK

Dear Mr. Thurman:

Standard Testing & Engineering, LLC (Standard Testing) is pleased to present the report covering the subsurface exploration for the subject project. This study was authorized by the receipt of the signed "Agreement for Services" contract, dated April 23rd, 2021.

Standard Testing conducted a geotechnical investigation at the site of the new Proposed Harmony Lofts project in Oklahoma City, OK. This report contains the detailed results of the geotechnical investigation, including foundation recommendations, pavement recommendations, and construction considerations.

The subsurface soils consist of approximately 15 feet of clay with various amounts of sand and gravel, and sand with various amounts of clay overlying weathered shale and shale rock and exhibit low plastic to high plastic characteristics. The estimated potential vertical rise of the soil is 1.2 inches.

Foundation recommendations include: (1) Shallow Footings or (2) Drilled Pier Foundation or (3) Ribbed Mat Foundation.

We trust that the results and recommendations contained herein will permit adequate economical design and construction of the proposed structure. Unless you specify otherwise, we will keep samples obtained from these borings in our Oklahoma City laboratory for the next thirty (30) days.

We appreciate the opportunity to assist on this project. Please call on us if we can be of further service.

Respectfully submitted,
STANDARD TESTING & ENGINEERING, LLC

Guillermo Lopez
Geotechnical Consultant

Roy Khalife, P.E.
Geotechnical Engineer

Project No. 2130-0271
Account No. 0230MIK01

SUBSURFACE EXPLORATION

Proposed Harmony Lofts
1537 NE 24th St.
Oklahoma City, OK

PROJECT NO. 2130-0271

PREPARED FOR

Mike Little Construction
1907 N Kickapoo Ave.
Shawnee, OK 74804

PREPARED BY

STANDARD TESTING & ENGINEERING, LLC
3400 N. Lincoln Blvd.
Oklahoma City, OK 73105
Certificate of Authorization No. 7933, Expiration 6/30/2021
(405) 528-0541

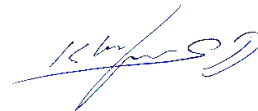
Prepared By:



Guillermo Lopez
Geotechnical Consultant



Reviewed By:



Roy Khalife, P.E.
Geotechnical Engineer

I certify my e-signature for the study entitled "Subsurface Exploration."

Dated 6/4/2021

June 4, 2021

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Section 1 INTRODUCTION

1.1 Authorization

This report presents the results of a subsurface exploration performed by Standard Testing & Engineering, LLC (Standard Testing) in accordance with the proposal (P-2021-070R) prepared for Mr. Bill Thurman, dated April 22nd, 2021, and identified as Standard Testing project number 2130-0271. This geotechnical study was authorized by the receipt of the signed "Agreement for Services" contract, dated April 23rd, 2021.

1.2 Purpose and Scope

A geotechnical investigation was performed for the purpose of (1) determining the subsurface conditions, (2) evaluating the bearing capacity and plasticity characteristics of the soils, and (3) making recommendations concerning the earthwork, pavement, and foundation systems for the facilities.

Nine (9) exploratory borings (building borings (A1-A2, B1-B2, C1-C2), and pavement borings P-1 through P-3) were drilled to a depth ranging from 5 to 20 feet. The boring depths and types of testing were performed according to the scope of work proposed by Standard Testing and accepted by Mr. Michael Little, Owner of Mike Little Construction. Narrative descriptions of our findings and recommendations are contained in the body of this report. A site and boring location plan, the boring logs, the soil profile, and a summary sheet of laboratory test results are included in the Appendices of this report.

1.3 Project Location and Description

It is understood that the Harmony Lofts are proposed to be constructed at 1537 NE 24th St. in Oklahoma City, OK. Maximum column loads for the proposed facility are unknown while we are preparing this geotechnical report. The project consists of a new community building, new apartment buildings A, B, and C, and new parking areas.

If the project is not as described or has changed, Standard Testing must be notified in order to reevaluate the recommendations for the project.

Section 2

FIELD EXPLORATION

2.1 Drilling Information

The field exploration work was performed between the 3rd and 10th of May, 2021. Conditions at the site were investigated with nine (9) borings at the locations indicated on the site and boring location plan, included in Appendix "A." The boring surface elevations were measured with respect to a Temporary Benchmark (TBM) established at the F.F. of existing building. The Temporary Benchmark (TBM) location is also shown in the site and boring location plan in Appendix "A." Boring surface elevations, rounded to the nearest foot, are reported on the individual boring logs, included in Appendix "A."

The benchmark has an assigned relative elevation of 100.0 feet. Building boring depths range from 15 to 20 feet within the facility's footprint, and pavement boring depths were 5 feet within the pavement areas. For accurate sampling, cuttings were observed continuously during drilling with specific samples being taken at distinct lithologic changes. The equipment used, field tests performed, and soil samples taken are discussed below.

2.2 Equipment Used

Nine (9) borings were drilled with a truck-mounted CME-55 rotary drilling unit equipped with 3.25" I.D. X 7.25" O.D. hollow stem augers (HSA). Standard penetration tests (SPT) used a 1.375" ID split spoon sampler driven by an automatic hammer utilizing a 140 lb. weight falling 30 inches.

2.3 Testing and Sampling Performed

Standard penetration tests were performed in order to estimate the shear strengths of the soils in their natural state. The test was conducted as specified by ASTM D1586, "Penetration Test and Split-Barrel Sampling of Soils." The in-situ bearing strength is related to the N-value from this test. "N" is the number of blows required to drive a split-spoon sampler twelve inches, after a 6-inch seating, into undisturbed soil. The soil samples recovered in the split-spoon barrel were removed from the sample tool in the field, visually classified, and labeled according to boring number and depth. Results of the standard penetration tests are denoted at their respective depths on the boring logs.

Thin-walled tube samples were collected as specified by ASTM D1587, "Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes."

Depths of individual split spoon (standard penetration tests), thin-walled tube, and grab samples are indicated on the boring logs included in Appendix "B." All samples were labeled

and sealed in water tight, protective containers and returned to the laboratory for further evaluation and testing.

2.4 Subsurface Conditions

The soils encountered consist of clay with various amounts of sand and gravel, and sand with various amounts of clay overlying weathered shale and shale rock. The cohesive soils were found to be soft to very stiff in consistency and the cohesionless soils were found to have medium dense relative density. Rock material (i.e., defined by standard penetration test refusal) was encountered in the indicated borings at the relative elevation shown in the following table:

Table 1: Relative Elevation of Rock Material

Boring No.	Surface Elevation (feet)	Rock Depth (feet)	Rock Elevation (feet)	Rock Material
A-1	99.0	15.0	84.0	Shale
A-2	99.0	15.0	84.0	Shale
B-1	98.0	15.0	83.0	Shale
B-2	95.0	15.0	80.0	Shale
C-1	92.0	11.0	81.0	Shale
C-2	90.0	10.0	80.0	Shale

2.5 Groundwater

During drilling and at completion of drilling operations, groundwater was encountered in the indicated borings at a depth shown in the elevation of groundwater table. Presence of water should be anticipated in any excavation. Water travelling through soil (subsurface water) is often unpredictable and may be present at shallow depths. Due to the seasonal changes in groundwater and the unpredictable nature of groundwater paths, groundwater levels will fluctuate. Therefore, it is necessary during construction to be observant for groundwater seepage in excavations in order to assess the situation and make necessary changes. We cannot assume responsibility for difficulties experienced during construction or for future operational problems due to elevation or volume of water encountered.

Table 2: Relative Elevation of Groundwater

Boring No.	Surface Elevation (feet)	While Drilling – Depth (feet)	Elevation (feet)	After Drilling – Depth (feet)	Elevation (feet)
A-1	99.0	18.0	81.0	17.0	82.0
A-2	99.0	5.0	94.0	Dry	-
B-1	98.0	4.0	94.0	15.0	83.0
B-2	95.0	5.0	90.0	Dry	-
C-1	92.0	15.5	76.5	17.0	75.0
C-2	90.0	13.5	76.5	17.5	72.5

Section 3**LABORATORY TESTING**

Laboratory testing was performed in order to determine the plasticity characteristics of the subsurface materials as well as confirm the soil classifications.

3.1 Tests Performed

- Moisture content tests were performed on split spoon, thin-walled tube, and bag samples, in accordance with ASTM D2216, to determine the in-situ moisture conditions.
- Density tests were performed on intact split spoon, and thin-walled tube samples in accordance with ASTM D7263 Method A.
- Atterberg limits tests were performed on split spoon, thin-walled tube, and bag samples to determine the plasticity characteristics and swell potential of the soil. The tests were performed in accordance with ASTM D4318.
- Sieve analyses were performed on split spoon, thin-walled tube, and bag samples, in accordance with ASTM D2487, for aid in soil classification. These soils were classified according to the Unified Soil Classification System (USCS) and the American Association of State Highway and Transportation Officials (AASHTO) soil classification system.
- Unconfined compressive strength tests were conducted on thin-walled tube soil samples in accordance with ASTM D2166. The unconfined compressive strength as determined by this test, along with the results of the standard penetration test, is used to estimate the in-situ shear strength of the various soils encountered. The graphs in Appendix "D" depict the behavior of the tested soil under compression without confinement. The unconfined compressive strengths of the soils samples are presented on the boring logs and in the "Summary of Laboratory Test Results" table in Appendix "D."

3.2 Laboratory Summary

General descriptions of the encountered soils together with visual and laboratory classifications and numerical values of the test results are on the boring logs and soil profile included in Appendix "B." A "Summary of Test Results" is included in Appendix "D."

Section 4**ENGINEERING EVALUATION AND RECOMMENDATIONS****4.1 Existing Site Conditions**

Figure 1: Google Earth Aerial View, Sept. 2020

Based on aerial imagery available from Google Earth®, it appears that the project site was covered with trees, vegetation and existing buildings prior and during September of 2020. It is our understanding that certain existing buildings and pavement will be demolished and removed from the project area prior to construction. We are not aware if fill material was imported to the site and we were not provided compaction documentation of such fill.

If fill or debris (concrete footing, abandoned utilities, etc.,) are encountered during construction, fill materials and any debris should be removed and replaced with inert fill as described in the Earthwork Recommendations section of this report. A representative of Standard Testing should observe the exposed grade in these areas following overexcavation and prior to placement of new fill when applicable.

4.2 Soil Conditions

A geotechnical concern at this site is the presence of expansive soils. The soils encountered in this investigation consist of clay with various amounts of sand and gravel, and sand with various amounts of clay overlying weathered shale and shale rock. The cohesive soils were found to be soft to very stiff in consistency and the cohesionless soils were found to have

medium dense relative density. These near surface soils exhibit low plastic to high plastic characteristics. Rock material (i.e., defined by standard penetration test refusal) was encountered in all building borings. The plasticity characteristics of the soils encountered indicate that these soils are active for consideration of soil expansion on foundation design. The plasticity index (PI) of a soil indicates a soil's potential to shrink or swell with changes in its moisture content. The near-surface soils at this site generally display high plasticity characteristics and were found in a slightly moist to very moist condition. Atterberg limits test results indicate that on-site plastic soils have PI's up to 32. These soils should be considered active and should be expected to undergo significant volume change upon moisture variation.

These soils are expected to undergo expansion upon moisture increase and, conversely, contraction upon moisture decrease. Oklahoma is well known for its heaving clays and the foundation problems associated with soil expansion and uplift pressures. These soil characteristics accompanied with the seasonal variability in soil moisture content caused by the regional climatic conditions often result in foundation and structural damage. Accordingly, the swelling characteristic of the soil is a primary concern and the Potential Vertical Rise (PVR) becomes an important factor in the foundation design of the proposed facility.

The maximum PVR value computed for this site is 1.2 inches. The procedure used to predict the PVR was developed by Standard Testing based on AASHTO test method T258 and modified to incorporate our experience with actual Oklahoma soils. The displacement associated with the PVR is a relatively long-term effect, associated with significant moisture changes in the soil, and applies to free surface conditions. A maximum PVR of 0.75 inch or less is generally considered tolerable for most structures. These soils should be removed from underneath the slabs and replaced with inert fill as specified in the Earthwork Recommendations Section of this report.

4.3 Seismic Site Class

Based on the results of our investigation, this site is classified as Seismic Site Class C. This recommendation is based on the criteria given in Table 20.3-1 of the ASCE 7-16, entitled "Site Class Definitions." According to ASCE 7-16, if the subsurface data is not known for the full 100-foot depth, then engineering judgment may be used to classify the site. Based on the shallow depth of rock at the site, and the assumption that rock continues in the subsurface past 100 feet in depth, the Seismic Site Class is assumed C. If any boring should indicate that rock material is not present beneath the depth, then Seismic Site Class D should be used.

4.4 Laboratory Testing Results

Unconfined Compressive Strength of Soil Test Results

Unconfined compressive strength tests were conducted on thin-walled tube soil samples in accordance with ASTM D2166 testing method. The results are presented in the following table and are also presented in Appendix "D."

Table 3: Unconfined Compressive Strength Test Results

Boring No.	Depth (feet)	Moisture Content (%)	Dry Density (pcf)	Max. Stress, q_u (psf)	Strain at Max. Stress (%)
A-1	3.0-5.0	20.4	109.8	632	9.7
A-2	3.0-5.0	22.0	104.3	1,749	11.3

4.5 Earthwork Recommendations

Building Pad Construction

A critical geotechnical consideration at this site is the swelling soils. If slab-on-grade construction is to be used for the building floor at this site, construction of an inert fill building pad is advisable. The amount of ground surface movement that can be tolerated by the structure should be evaluated by the designer (a value of 0.75 inch or less may be used for most structures) and the corresponding amount of removal and replacement or over ground fill should be performed as indicated in the following options:

Option 1: Cut and Fill

- Remove the required amount of existing soil (see following table) and replace that soil with inert fill, meeting all requirements given herein,

Table 4: Cut and Fill Building Pad Requirements

Depth of Removal and Replacement Soil (feet)*	Estimated Potential Vertical Rise (PVR) (inches)
0.0	1.2
2.0	0.8
3.0	0.6

*Below existing site grade

or

Option 2: Fill Only

- Place the required amount or more of inert fill (see following table), meeting all requirements given herein, over the native soils.

Table 5: Over Ground Inert Fill Building Pad Requirements

Depth of Over Ground Inert Fill Building Pad (feet)**	Estimated Potential Vertical Rise (PVR) (inches)
0.0	1.2
2.0	0.8
3.0	0.6

**Above existing site grade

Only low plasticity on-site soils or imported inert fill should be used for fill under structure. Inert fill should meet the following requirements:

Inert Fill Requirements

Amount finer than 2-inch sieve	100%
Amount finer than No. 200 Sieve	12% minimum and, if $PI \leq 7$, 60% maximum
Liquid Limit	35 maximum
Plasticity Index (PI)	5 to 15

Subgrade Preparation

The existing subgrade should be:

- Stripped of topsoil, vegetation, pavement, fills and any other deleterious materials,
- Over-excavated to the required depth to reduce PVR to a level appropriate for the structural system to be used referring to the cut and fill building pad requirements and overground inert fill building pad requirements tables and extended to at least five (5) feet beyond building footprint,
- Proofrolled, including removing and replacing any soft material which exhibits permanent subgrade deformation exceeding 0.5 inch when traversed by a loaded truck with a rear axle load of approximately 16,000 lbs./axle, and
- Tested for moisture and density and, if deficient, scarified to a depth of 8 inches, moisture conditioned and compacted to 95 percent or more of standard Proctor maximum dry density (ASTM D698).

Removal of soft subgrade should not exceed a 3-foot depth below final top of subgrade elevation, nor extend below the static groundwater elevation. If such a depth is reached without encountering stable subgrade conditions, 12 inches of ODOT Type A aggregate base should

be placed in the bottom of the over-excavated area and suitable fill material placed and compacted to bring the subgrade to design elevation.

Compaction Requirements

All fill in the structural areas should be:

- Compacted to at least 95 percent of standard Proctor maximum dry density (ASTM D698) at a moisture content within -2% to +2% of the optimum.
- Compacted to at least 95 percent of modified Proctor maximum dry density (ASTM D1557) at a moisture content near optimum for ODOT Type A aggregate base.
- Placed in lifts not to exceed eight (8) inches in compacted thickness.
- Tested for field density for each lift of fill at frequencies of every 1,500 sq. ft. in areas under structure and 2,500 sq. ft. in areas under pavement. For utility trenches, test field density at frequencies of 100 linear foot of trench and at frequencies of 50 linear foot of any utility underneath pavement or other structure.

Moisture should be maintained up until the placement of concrete in structural areas to prevent shrinkage (and subsequent post-construction swell) of the soil.

Drainage

The ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than six (6) inches vertical fall in the first ten (10) feet measured perpendicular to the face of each wall. Trees and large bushes for landscaping should not be permitted within this 10-foot zone adjacent to the building. General site slopes, drainage swales, or storm drains shall be constructed to provide 1.0 percent slope, or more, along drainage paths which serve to discharge storm water from the site. If surface soil should be left exposed (e.g., flower beds) near the structure foundation, then it is suggested that efforts be taken to maintain such areas at a constant moisture in order to avoid swell/shrinkage of the soil that will affect the foundation system.

4.6 Foundation Recommendations

Considering the soils encountered and based on the test results of this exploration, the following foundation design parameters are recommended for the indicated foundation systems:

Footing Foundation System

Shallow foundations (e.g. spot or continuous cast-in-place concrete footings) may be used to support the new structures at this site. Footings must be placed a minimum of 2.0 feet below finished grade to provide adequate protection from frost action. Footings may be used with allowable net bearing capacity of up to 2,000 psf for square spot footings and 1,500 psf for continuous footings on native soils or compacted inert fills, respectively, and 3,000 psf on 2.0 feet of properly compacted ODOT Type A as described in the Earthwork Recommendations Section of this report. Footings should have a width of at least 16 inches. The allowable net bearing capacity of shallow foundation should be reduced based on the footing size as shown in Figure 2.

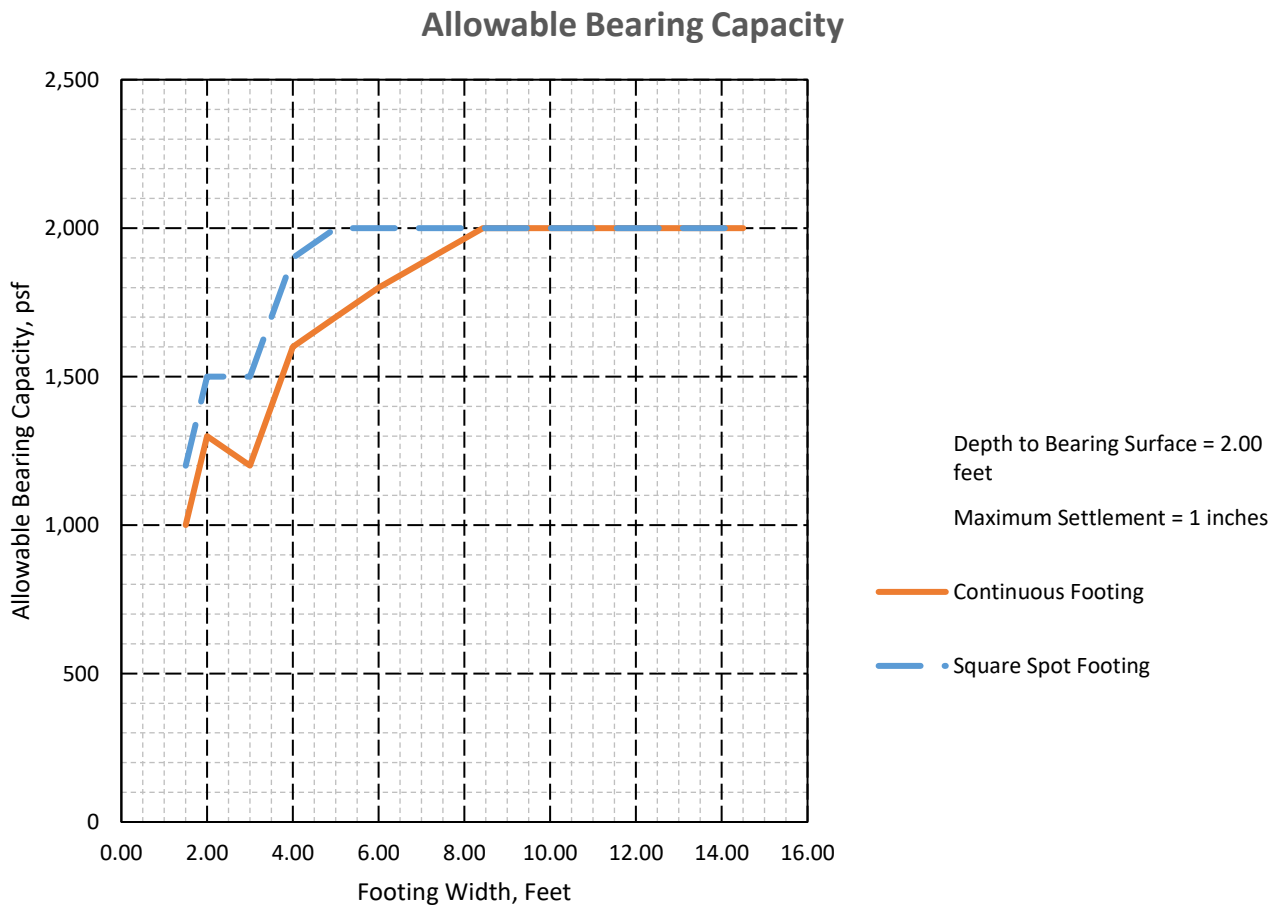


Figure 2: Allowable Bearing Capacity with Native/Inert Fill Soils and Footing Size

Continuous footings and spot footings are expected to undergo no more than 1.0-inch settlement when designed for the recommended bearing pressure when constructed on existing soil or no more than 5 feet of properly compacted inert fill. Standard Testing shall be

provided with final grading plans and structural loads in order to re-evaluate our recommendations if deemed necessary.

It is however imperative that all footings for each building are constructed on similar material to minimize the possibility of differential settlement.

Subgrade Preparation within Footing Area

Due to the presence of soft subgrade soils with low bearing capacities, encountered at the location of boring A-1, we recommend the following steps:

- Bearing Capacity should be verified by performing a Dynamic Cone Penetrometer (DCP) test or a Static Cone Penetrometer (SCP) at the bottom of the footings where loose soils are encountered
- If the above methods show the loose subgrade soils within the new footing area does not meet the specified bearing capacity, the loose subgrade soils should be over-excavated a minimum depth of 2 feet below bottom of new shallow footings;
- The exposed excavated soils should be compacted by using Jumping Jack or equivalent equipment,
- Either ODOT Type A aggregate base or inert fills or on-site low PI soils (PI between 5 and 15) should then be placed over up to the bottom of new footings.

Moisture should be maintained up prior to pouring concrete.

Pier Foundation System

Structures may be designed to be supported by drilled cast-in-place concrete piers founded 3.0 feet or more below the depths indicated in the "Relative Elevation of Rock Material" table provided in Section 2.4 of this report. Using this type of foundation, each column is supported on a single drilled pier and the building walls are placed on grade beams supported by a series of piers. Loads applied to the piers are transmitted to the rock partially through skin friction along the sides of the pier and partially through end bearing pressure.

All drilled piers should:

- Extend at least 3.0 feet or at least one (1) pier diameter, whichever is deeper, beyond the elevation indicated in the "Elevation of Rock Material" table provided in Section 2.4 of this report,
- Have an aspect ratio (length/diameter) between three (3) and thirty (30),
- Have a spacing between individual piers of three diameters or more (clear spacing),

- Be adequately reinforced with the reinforcement extending into the grade beams and/or pier caps, and
- Have a diameter of at least 18 inches.

Piers may be proportioned using an allowable net end bearing capacity of 11,000 psf and an allowable skin friction capacity of 800 psf for that portion of the pier in direct contact with the Shale rock. The allowable net bearing capacity and allowable skin friction capacity both include a factor of safety of 3.0. Uplift of the piers can be resisted by using the same skin friction values plus for the pier weight (i.e. 150 pcf x Pier Area x length of Pier). Maximum service load vertical displacement of piers designed in this manner is expected to be on the order of displacement of the pier base diameter.

Drilled shafts may require casing or slurry-drilling methods. Concrete should be placed in pier holes as soon as practicable after completion of drilling to prevent weathering of the bearing stratum and relaxation of horizontal ground stresses.

If groundwater is encountered during pier excavation and cannot be dewatered, concrete may be placed by tremie-pipe method so as to assure no contamination of the fresh concrete by groundwater or drilling fluids. A sufficient head of plastic concrete should be maintained within the casing at all times during its extraction in order to overcome the hydrostatic groundwater pressure outside the casing.

Ribbed Mat Foundation System

Considering the swelling soils encountered, the test results of this exploration and our understanding of the project, a post-tensioned ribbed mat would provide an appropriate foundation for this structure.

Reinforced or post-tensioned ribbed mats provide a foundation system composite with the floor. The inherent rigidity of the ribbed mat allows it to span across differential movements of the subgrade. A reinforced or post-tensioned ribbed mat may be used over a uniformly prepared subgrade consisting of natural soils or fill as long as the appropriate differential movements of the subgrade are considered in the design of the mat for moment, shear, and differential deflection. The design methodology that we recommend is the procedure detailed in "Design of Post-Tensioned Slabs-on-Ground," PTI DC10.1-08 third edition with 2008 supplement, by the Post-Tensioning Institute (PTI).

If a uniform thickness, post-tensioned slab is desired in lieu of the ribbed mat, the 2008 edition of the "Design of Post-Tensioned Slabs-on-Ground" published by PTI includes design and

construction provisions for such foundation system. The PTI document requires that the foundation first be designed as a ribbed mat to satisfy moment, shear, stiffness, and differential deflection requirements given in the design procedure and then converted to an equivalent uniform thickness foundation using a conversion equation. The ribbed mat design must also satisfy the limitations on beam spacing, depth, and width listed in section 4.5.2 of the PTI document. The ribbed mat design may then be converted to an equivalent uniform thickness foundation by using a slab thickness which provides gross section stiffness equivalent to that of the ribbed mat design. This is accomplished by setting the gross moment of inertia of the uniform thickness slab about its centroid (i.e., one-twelfth the slab width times the cube of the slab thickness) equal to the gross moment of inertia of the ribbed mat about its centroid and solving for the slab thickness. Additionally, uniform thickness foundations should be limited in thickness to not less than 7.5 inches unless a continuous rib conforming to the requirements in section 4.5.2.2 and 4.5.2.3 of the PTI document is provided at the entire perimeter of the foundation.

A conventionally reinforced or post-tensioned ribbed mat may be used over a uniformly prepared subgrade. For this foundation alternative, the proofrolling and subgrade preparation recommendations given in the Earthwork Recommendations Section of this report must be followed to provide a uniform subgrade, but the removal and replacement of the subgrade soils currently on the site to reduce heave potential is not necessary. The inherent rigidity of the ribbed mat gives it the ability to distribute loads over a much wider area and mitigates the potential for excessive heave and/or settlement of the foundation. A ribbed mat may be designed using the following parameters:

Table 6: Ribbed Mat Design Parameters

Parameter	Estimated Value
Bearing Capacity (on ribs only)	1,500 psf (native material) 2,000 psf (compacted inert fill)*
Modulus of Elasticity of Subgrade, E_s	150,000 psf (native material) 300,000 psf (compacted inert fill)*
Slab Subgrade Friction Coefficient, F_f	0.75 (native material) 1.0 (compacted inert fill)*
Modulus of Subgrade Reaction, k_s	100 pci (native material) 140 pci (compacted inert fill)*
Moisture Variation Distance, e_{in}	8.5 ft. (center lift) 4.4 ft. (edge lift)
Differential Soil Movement, Y_m	1.06 in (center lift) 1.57 in (edge lift)

*Compacted inert fill extending at least 2 feet below bearing elevation

4.7 Concrete Slabs

Concrete slabs-on-grade for floors should be constructed as follows:

- The subgrade, inert fill, and/or soil building pad should be prepared as described in the Earthwork Recommendations section of this report.
- Four (4) inches or more of granular base, meeting the following requirements, should be placed over the subgrade:
 - passing the 1.5 inches sieve.....100 %
 - passing the #200 sieve.....15 % or less
 - plasticity index.....6 or less
- At the time of concrete placement, the granular base should be moist, but free of any standing water.
- The concrete slab should be placed a minimum of four (4) inches thick in lightly loaded areas and up to six (6) inches thick in heavily loaded areas and should not be tied into the footings, stemwalls, or structural frame. If it is necessary to tie the concrete slab into the foundation walls, exterior walls, and/or pitwalls, the slab should be jointed no more than 10 to 15 feet from the point of the restraint (ACI 360R-10, Section 14.7). Other control joints should be provided, each way, at a spacing of 24 to 36 times the slab thickness but no more than 18 feet. Refer to ACI 360R-10, Section 6.1.3 and Figure 6.6 for additional guidance on joint spacing.

If floor coverings susceptible to moisture damage by moist floor conditions (capillary moisture) are to be used, a vapor retarder consisting of one or more polyethylene or polypropylene fabric reinforcement layers with one or more bonded polyethylene film layers, at least 10 mils in total thickness, should be placed below the slab. The vapor retarder should be lapped 6 inches and taped at joints and fitted around all service openings. Section 5.2.3.2 of ACI 302.1R-15 provides the most current industry recommendations for use and placement of vapor retarders. Figure 5.2.3.2, in ACI 302.1R-15, provides guidance for determining whether to place the vapor retarder above or below the "granular material" below the slab.

Concrete slabs can be designed using a modulus of subgrade reaction, k_s , of 140 pci for compacted inert fill described in the Earthwork Recommendations Section of this report.

4.8 Pavement Recommendations

Subgrade Preparation

Prior to the placement of fill or preparation of pavement subbase:

- The natural subgrade should be stripped of all topsoil, vegetation, fills and any other deleterious materials.
- The parking and drive areas should then be graded and shaped to facilitate drainage, with a minimum slope of 1/8 inch per foot.
- Next, the subgrade should be proofrolled, including removing and replacing any soft material which exhibits permanent subgrade deformation exceeding 0.5 inch when traversed by a loaded truck with a rear axle load of approximately 16,000 lbs./axle. Removal of soft subgrade should not exceed a 3-foot depth below final top of subgrade elevation, nor extend below the static groundwater elevation. If such a depth is reached without encountering stable subgrade conditions, 12 inches of ODOT Type A aggregate base should be placed in the bottom of the overexcavated area and suitable fill material placed and compacted to bring the subgrade to design elevation.
- Once the subgrade has been satisfactorily proofrolled, the surface layer of the subgrade shall be scarified to a depth of 6 inches.

Pavement Sections

We estimate the CBR value of the near surface soils as 3.0 based on the borings. This would correspond to a modulus of subgrade reaction, k_s , of 100 pci, and a resilient modulus, M_r , of 3,000 psi.

Pavement sections were evaluated based on the AASHTO 1993 guidelines with the following assumptions. If traffic loads are greater than used in the analysis, Standard Testing must be notified in order to reevaluate the recommendations.

- Design Period = 20 years
- Reliability Level = 85% (flexible and rigid)
- Initial Serviceability Index = 4.5 (flexible and rigid)
- Terminal Serviceability Index = 2.0 (flexible and rigid)
- Combined Standard Error (S_0) = 0.5 (flexible) and 0.4 (rigid)
- Light duty (car parking) total design ESALs (W_{18}) = 99,000 (flexible) and 150,000 (rigid)
- Heavy duty (truck parking) total design ESALs (W_{18}) = 348,000 (flexible) and 500,000 (rigid)

We recommend that the following pavement sections be used:

Table 7: Pavement Sections

Pavement Type	Light Duty (inches)	Heavy Duty (inches)
<u>Flexible Pavement</u>		
Surface Course (S4)	2.0	2.0
Intermediate Course (S3)	-	2.5
Base Course (S3)	4.0	2.5
Lime Stabilized Subgrade	8.0	8.0
<u>Rigid Pavement</u>		
Portland Cement Concrete	6.0	7.0
Lime Stabilized Subgrade	8.0	8.0

* A full mix design will be required to estimate the amount of Lime required in the treated subgrade mixture.

All access lanes subject to delivery trucks, fuel trucks, refuse pickup trucks, or fire trucks should consist of a heavy-duty rigid section.

Materials and Construction

All materials and construction for base should be in accordance with the latest iteration of the Oklahoma Department of Transportation (ODOT), "Standard Specifications for Highway Construction," and the latest Special Provisions adopted by ODOT to supplement the Standard Specifications. ODOT Type "A" aggregate base should be compacted to not less than 95 percent modified Proctor maximum dry density (ASTM D1557). Compacted/treated subgrade should be compacted to not less than 95% of the standard Proctor maximum dry density (ASTM D698) within -2 to +2 percentage points of the corresponding optimum moisture content. Compacted/treated subgrade should extend the full width of the pavement section (i.e., including curb and gutter).

Concrete for paving should have a modulus of rupture, M_r , of at least 550 psi (compressive strength of approximately 3,500 psi or more), should be air entrained with 4 to 7 percent air, should have a cementitious materials content of at least 564 pcy, and should have a maximum water to cementitious materials ratio of 0.45. The concrete mix design submittal should adequately address the criteria of ACI 301, section 4, including documentation of strength test results. Control joints should be saw cut at least one-eighth (0.125) inch wide and one-quarter of pavement thickness deep as soon as possible after concrete reaches final set (i.e., approximately 8 to 12 hours after placing the concrete), cleaned by high pressure air jet, and sealed with a suitable pavement joint sealing material to prevent intrusion of surface water into the pavement base. Control joints should be spaced as indicated in the following table:

Table 8: Recommended Transverse Joint Spacings

Concrete Thickness (inches)	Maximum Joint Spacing (feet)
6.0	15.0
7.0	15.0

Section 5**BASIS FOR RECOMMENDATIONS****5.1 General Comments**

The recommendations and conclusions contained in this report are based on the borings drilled and tests performed. We would point out that there may be variations in material properties over the site and would caution that there may be unknown conditions in existence which differ seriously from those encountered by the test borings. Such conditions, if indeed they exist at all, cannot be, and have not been, accounted for in this report. Therefore, the descriptions, recommendations, and conclusions contained herein should be considered as generalized, applying only to the immediate vicinity of the borings.

5.2 Limitations

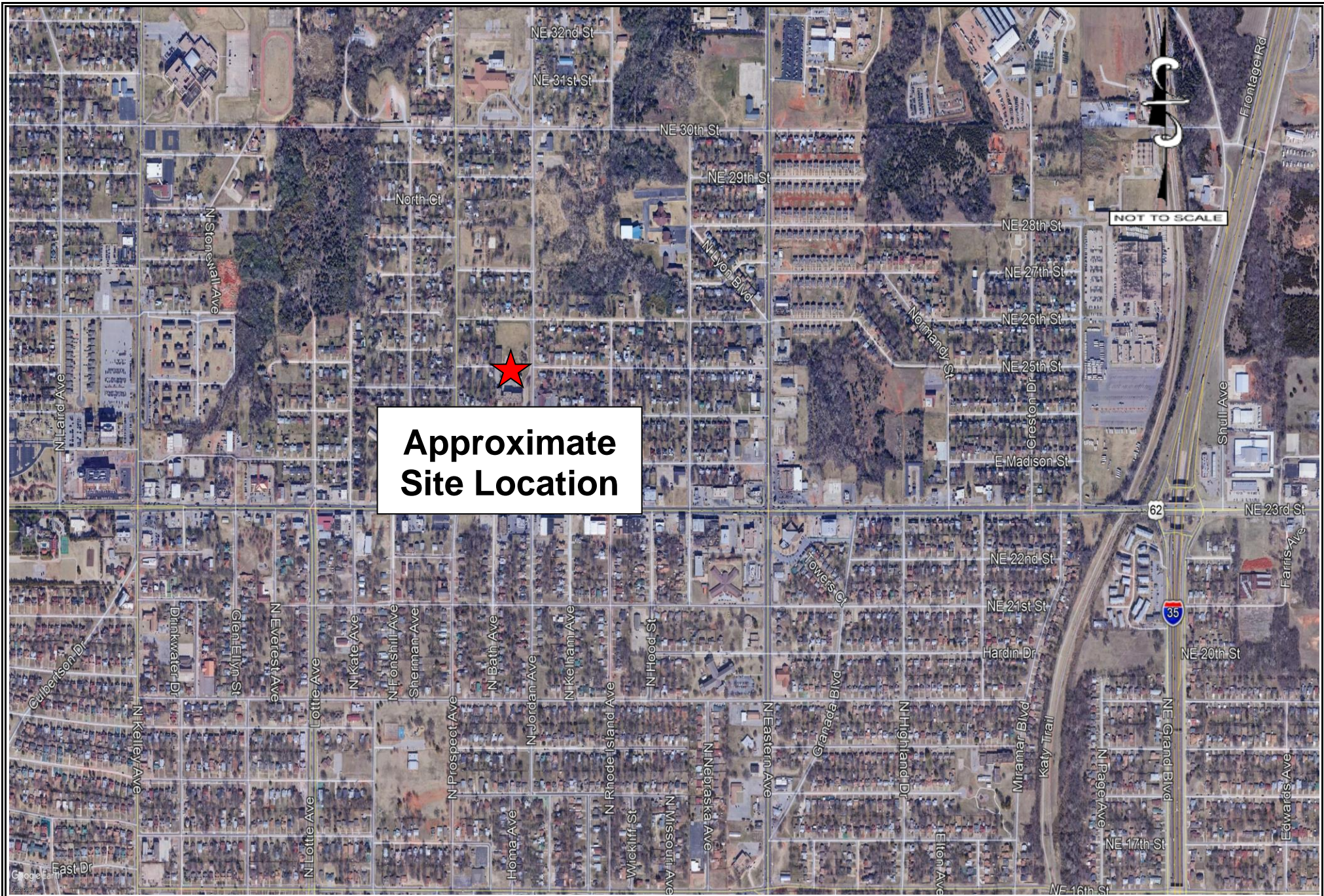
Since this report is being prepared in advance of much of the detailed design, the finalized soil and structure parameters (i.e., floor elevation, structural system and loading, vertical movement tolerance, etc.) may differ from the ones considered during the preparation of this report. If such a design variance is substantial, Standard Testing would request the opportunity to review the plans and specifications of the proposed facility for applicability to the soil conditions in this report, and assurance of consistency with its intent.

It is recommended that Standard Testing be retained for testing and observation during earthwork and foundation construction phases, to help determine that the design requirements are fulfilled. It is also recommended that Standard Testing's pier inspector be present during the pier drilling operations to verify the hardness of the support soil stratum and the proper depth of embedment.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical practice.

APPENDIX A

Vicinity Map
Site and Boring Location Plan

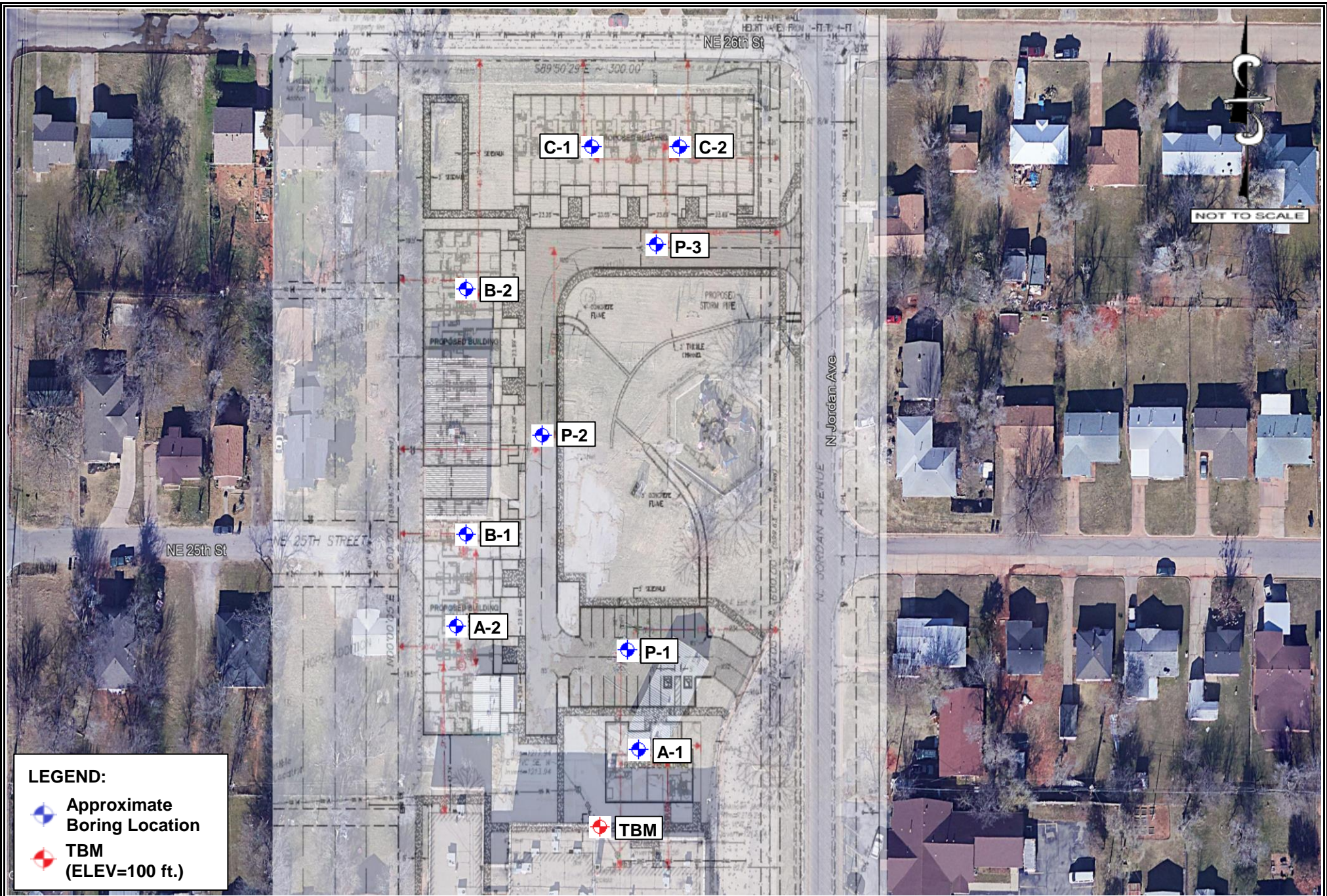


**Approximate
Site Location**

Vicinity Map

Project Name: Proposed Harmony Lofts
Project Location: 1537 NE 24th St., Oklahoma City, OK
Project No.: 2130-0271





Site and Boring Location Plan

Project Name: Proposed Harmony Lofts
 Project Location: 1537 NE 24th St., Oklahoma City, OK
 Project No.: 2130-0271

APPENDIX B

Boring Logs

Soil Profile

Definition of Descriptive Terms

BORING LOG A-1
(1 of 1)

PROJECT NAME: Proposed Harmony Lofts
PROJECT NUMBER: 2130-0271
PROJECT LOCATION: Oklahoma City, OK
CLIENT: Mike Little Construction

DEPTH (FT) ELEVATION (FT)	GRAPHIC LOG	USCS	SAMPLER SYMBOLS		SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS (N)	POCKET PENETROMETER (tsf)	RECOVERY % / RQD	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	UCS (psf)	#200 SIEVE (%)	ATTERBERG LIMITS	
			Grab	ST										RC	LL-PL-PI
			MATERIAL DESCRIPTION												
0			CONCRETE 2"												
			Dk. Brn. LEAN CLAY W/ SAND		X	A				16.9					
			Reddish Brn. Soft		X	B	1-1-1 (2)			23.5	101				
5			V. Moist, High Plasticity, Stiff			C			79	20.4	110	632			
		CL			X	D	3-4-5 (9)		94	20.8			79.8	47-15-32	
10			V. Stiff			E				21.1					
					X	F	8-10-15 (25)			15.4					
15			(ROCK) Reddish Brn. SANDY SHALE			G	50/4.00"			7.8					
			Soft Rock												
20			Hard Rock			H	50/1.50"								
			Bottom of borehole at 20.2 feet												

WATER LEVELS			ELEVATIONS / LOCATIONS			DRILLING				
WD		18'	GROUND ELEVATION: 99.0			DRILL START:	5/3/2021	LOGGER:	R.J.	
AD		17'	TBM: F.F. of existing building			DRILLED END:	5/3/2021	DRILLER:	R.J.	
24 Hrs		-	GPS: 35 29.729'N, 97 29.031'W			DRILL RIG:	CME 55	HOLE SIZE:	7.25"	
> 24 Hrs		-	STA: -	OFFSET: -		DRILL METHOD:	H.S.A.			

BORING LOG A-2
(1 of 1)

PROJECT NAME: Proposed Harmony Lofts
PROJECT NUMBER: 2130-0271
PROJECT LOCATION: Oklahoma City, OK
CLIENT: Mike Little Construction

DEPTH (FT) ELEVATION (FT)	GRAPHIC LOG	USCS	SAMPLER SYMBOLS		SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS (N)	POCKET PENETROMETER (tsf)	RECOVERY % / RQD	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	UCS (psf)	#200 SIEVE (%)	ATTERBERG LIMITS
			Grab	ST										RC
0			ASPHALT 2"		Grab	A				19.6				
			Dk. Brn. SANDY LEAN CLAY W/ GRAVEL Firm		SS	B	2-3-2 (5)		100	24.4	102			
95		CL	V. Moist, Moderate Plasticity		ST	C			88	22.0	104	1749	59.0	34-16-18
5			Reddish Brn. VERY WEATHERED SANDY SHALE V. Soft Rock		SS	D	4-12-21 (33)		83	17.7	108			
90					Grab	E				14.5				
10					SS	F	10-14-25 (39)		83	15.2				
85														
15			(ROCK) Gray Brn. SANDY SHALE Med. Hard Rock			G	50/2.00"			9.9				
			Auger Refusal Bottom of borehole at 15.2 feet											
80														
20														
75														
25														
70														
30														

WATER LEVELS			ELEVATIONS / LOCATIONS		DRILLING			
WD		5'	GROUND ELEVATION: 99.0		DRILL START:	5/3/2021	LOGGER:	R.J.
AD		Dry	TBM: F.F. of existing building		DRILLED END:	5/3/2021	DRILLER:	R.J.
24 Hrs		-	GPS: 35 29.745'N, 97 29.058'W		DRILL RIG:	CME 55	HOLE SIZE:	7.25"
> 24 Hrs		-	STA: -	OFFSET: -	DRILL METHOD:	H.S.A.		

BORING LOG B-1
(1 of 1)

PROJECT NAME: Proposed Harmony Lofts
PROJECT NUMBER: 2130-0271
PROJECT LOCATION: Oklahoma City, OK
CLIENT: Mike Little Construction

DEPTH (FT) ELEVATION (FT)	GRAPHIC LOG	USCS	SAMPLER SYMBOLS		SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS (N)	POCKET PENETROMETER (tsf)	RECOVERY % / RQD	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	UCS (psf)	#200 SIEVE (%)	ATTERBERG LIMITS
			Grab	ST										RC
0			ASPHALT 2"		Grab	A				30.6				
95		CL	Brn. LEAN CLAY W/ SAND Moist, Moderate Plasticity, Stiff		SS	B	4-3-6 (9)		61	20.7	106		84.6	40-17-23
5			Reddish Brn. VERY WEATHERED SANDY SHALE V. Soft Rock		ST	C			96	16.0				
90					SS	D	9-18-21 (39)		83	14.2	118			
10					Grab	E				17.4				
85					SS	F	18-10-25 (35)		94	15.5				
15			(ROCK) Reddish Brn. SANDY SHALE Med. Hard Rock		TC	G	50/3.00"		100	17.2				
80					RC	H	50/1.00"							
20			Hard Rock Bottom of borehole at 20.1 feet											
75														
25														
70														
30														

WATER LEVELS			ELEVATIONS / LOCATIONS		DRILLING			
WD		4'	GROUND ELEVATION: 98.0		DRILL START:	5/4/2021	LOGGER:	R.J.
AD		15'	TBM: F.F. of existing building		DRILLED END:	5/4/2021	DRILLER:	R.J.
24 Hrs		-	GPS: 35 29.754'N, 97 29.057'W		DRILL RIG:	CME 55	HOLE SIZE:	7.25"
> 24 Hrs		-	STA: -	OFFSET: -	DRILL METHOD:	H.S.A.		

BORING LOG B-2
(1 of 1)

PROJECT NAME: Proposed Harmony Lofts
PROJECT NUMBER: 2130-0271
PROJECT LOCATION: Oklahoma City, OK
CLIENT: Mike Little Construction

DEPTH (FT)	ELEVATION (FT)	GRAPHIC LOG	USCS	SAMPLER SYMBOLS		SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS (N)	POCKET PENETROMETER (tsf)	RECOVERY % / RQD	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	UCS (psf)	#200 SIEVE (%)	ATTERBERG LIMITS	
				Grab	ST										RC	LL-PL-PI
				MATERIAL DESCRIPTION												
0	95			(Short Grass)												
				Dk. Brn. CLAYEY SAND Med. Dense		X	A				20.4					
						X	B	2-7-6 (13)		72	15.3	112				
						X	C				15.7					
5	90		SC	V. Moist, Low Plasticity Reddish Brn. VERY WEATHERED SANDY SHALE V. Soft Rock		X	D	31-50/1.00"		100	9.8	122		44.9	25-15-10	
							E									
10	85					X	F	17-22-24 (46)		89						
							G	50/4.00"		100						
15	80			(ROCK) Reddish Brn. SANDY SHALE Soft Rock		X	H	36-50/5.00"		100						
20	75															
				Bottom of borehole at 21.0 feet												
25	70															
30	65															

WATER LEVELS			ELEVATIONS / LOCATIONS		DRILLING			
WD		5'	GROUND ELEVATION: 95.0		DRILL START:	5/10/2021	LOGGER:	B.H.
AD		Dry	TBM: F.F. of existing building		DRILLED END:	5/10/2021	DRILLER:	B.H.
24 Hrs		-	GPS: 35 29.779'N, 97 29.058'W		DRILL RIG:	CME 55	HOLE SIZE:	7.25"
> 24 Hrs		-	STA: -	OFFSET: -	DRILL METHOD:	H.S.A.		

BORING LOG C-1
(1 of 1)

PROJECT NAME: Proposed Harmony Lofts
PROJECT NUMBER: 2130-0271
PROJECT LOCATION: Oklahoma City, OK
CLIENT: Mike Little Construction

DEPTH (FT)	ELEVATION (FT)	GRAPHIC LOG	USCS	SAMPLER SYMBOLS		SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS (N)	POCKET PENETROMETER (tsf)	RECOVERY % / RQD	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	UCS (psf)	#200 SIEVE (%)	ATTERBERG LIMITS
				Grab	ST										
				MATERIAL DESCRIPTION											
0				(Short Grass)											
90				Dk. Brn. SANDY LEAN CLAY Stiff	Grab	A					23.3				
				Sl. Moist, Moderate Plasticity	SS	B	2-5-7 (12)		67	15.2	111				
5			CL		Grab	C				10.6				63.4	30-13-17
85				Reddish Brn. VERY WEATHERED SHALE W/ SAND V. Soft Rock	SS	D	8-15-19 (34)		83	13.5	123				
10					Grab	E				13.2					
80				(ROCK) Reddish Brn. SHALE Soft Rock	SS	F	18-50/6.00"		100	8.6					
15				Hard Rock	Grab	G	50/1.00"		100	16.5					
75					SS	H	50/5.00"		100						
20				Soft Rock											
70				Bottom of borehole at 20.4 feet											
25															
65															
30															

WATER LEVELS			ELEVATIONS / LOCATIONS		DRILLING			
WD		15.5'	GROUND ELEVATION: 92.0		DRILL START:	5/10/2021	LOGGER:	B.H.
AD		17'	TBM: F.F. of existing building		DRILLED END:	5/10/2021	DRILLER:	B.H.
24 Hrs		-	GPS: 35 29.795'N, 97 29.038'W		DRILL RIG:	CME 55	HOLE SIZE:	7.25"
> 24 Hrs		-	STA: -	OFFSET: -	DRILL METHOD:	H.S.A.		

BORING LOG C-2
(1 of 1)

PROJECT NAME: Proposed Harmony Lofts
PROJECT NUMBER: 2130-0271
PROJECT LOCATION: Oklahoma City, OK
CLIENT: Mike Little Construction

DEPTH (FT)	ELEVATION (FT)	GRAPHIC LOG	USCS	SAMPLER SYMBOLS		SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS (N)	POCKET PENETROMETER (tsf)	RECOVERY % / RQD	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	UCS (psf)	#200 SIEVE (%)	ATTERBERG LIMITS	
				Grab	ST										RC	LL-PL-PI
				MATERIAL DESCRIPTION												
0	90			(Short Grass)	Grab	A					23.2					
				Dk. Brn. LEAN CLAY V. Stiff	SS	B	2-6-16 (22)		89	20.2	103					
				Reddish Brn.	ST	C				14.6						
5	85		CL	Sl. Moist, Moderate Plasticity	SS	D	6-11-13 (24)		89	16.8	113		95.5	43-24-19		
					Grab	E				9.1						
				(ROCK) Reddish Brn. SHALE Hard Rock	ST	F	50/1.50"		100	11.8						
15	75			Med. Hard Rock	ST	G	50/3.00"			20.7						
20	70				ST	H	31-50/3.00"									
				Bottom of borehole at 20.8 feet												
25	65															
30	60															

WATER LEVELS			ELEVATIONS / LOCATIONS			DRILLING				
WD		13.5	GROUND ELEVATION: 90.0			DRILL START:	5/10/2021	LOGGER:	B.H.	
AD		17.5	TBM: F.F. of existing building			DRILLED END:	5/10/2021	DRILLER:	B.H.	
24 Hrs			GPS: 35 29.795'N, 97 29.024'W			DRILL RIG:	CME 55	HOLE SIZE:	7.25"	
> 24 Hrs			STA:	OFFSET:		DRILL METHOD:	H.S.A.			

BORING LOG P-1
(1 of 1)








PROJECT NAME: Proposed Harmony Lofts
PROJECT NUMBER: 2130-0271
PROJECT LOCATION: Oklahoma City, OK
CLIENT: Mike Little Construction





DEPTH (FT)	ELEVATION (FT)	GRAPHIC LOG	USCS	SAMPLER SYMBOLS		SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS (N)	POCKET PENETROMETER (tsf)	RECOVERY % / RQD	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	UCS (psf)	#200 SIEVE (%)	ATTERBERG LIMITS
				Grab	ST										RC
				MATERIAL DESCRIPTION											
0				(Short Grass)											
90			CL	Dk. Brn LEAN CLAY Reddish Brn. V. Moist, Moderate Plasticity	X	A					15.0				
					X	B					22.4			85.7	35-17-18
5					X	C					23.0				
				Bottom of borehole at 5.0 feet											
85															
10															
80															
15															
75															
20															
70															
25															
65															
30															

WATER LEVELS			ELEVATIONS / LOCATIONS			DRILLING			
WD		Dry	GROUND ELEVATION: 92.0			DRILL START:	5/10/2021	LOGGER:	B.H.
AD		Dry	TBM: F.F. of existing building			DRILLED END:	5/10/2021	DRILLER:	B.H.
24 Hrs			GPS: 35 29.742'N, 97 29.031'W			DRILL RIG:	CME 55	HOLE SIZE:	7.25"
> 24 Hrs			STA:	OFFSET:		DRILL METHOD:	H.S.A.		

BORING LOG P-2
(1 of 1)

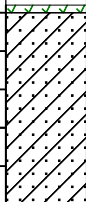
PROJECT NAME: Proposed Harmony Lofts
PROJECT NUMBER: 2130-0271
PROJECT LOCATION: Oklahoma City, OK
CLIENT: Mike Little Construction





DEPTH (FT) ELEVATION (FT)	GRAPHIC LOG	USCS	SAMPLER SYMBOLS		SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS (N)	POCKET PENETROMETER (tsf)	RECOVERY % / RQD	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	UCS (psf)	#200 SIEVE (%)	ATTERBERG LIMITS
			 Grab  ST  RC  SS  TC  HA	LL-PL-PI										
			MATERIAL DESCRIPTION											
0			ASPHALT 2"											
95		CH	Dk. Brn. FAT CLAY W/ SAND Moist, High Plasticity		X	A				22.9			81.6	51-19-32
					X	B				20.5				
5					X	C				15.8				
90			Bottom of borehole at 5.0 feet											
10														
85														
15														
80														
20														
75														
25														
70														
30														
65														

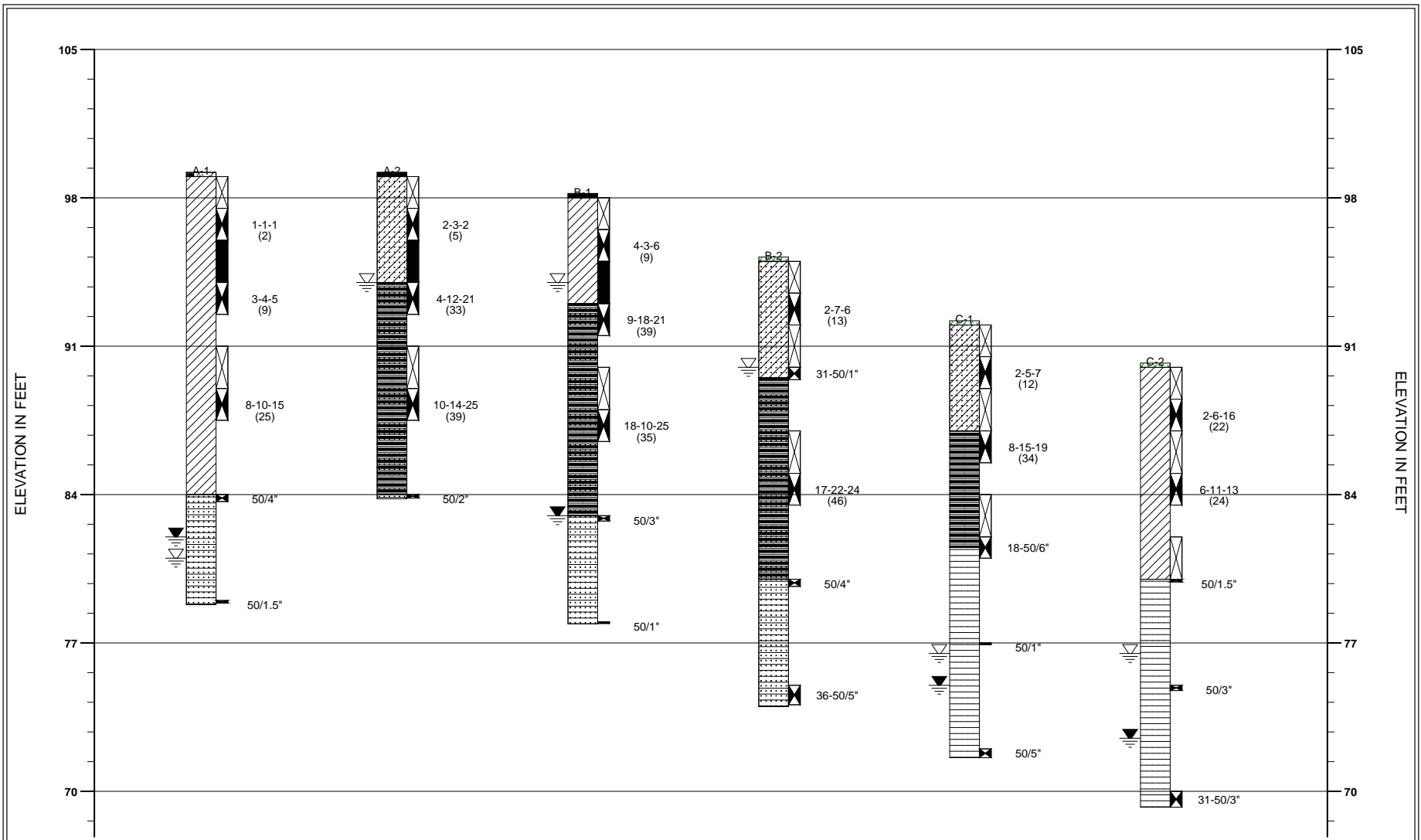
WATER LEVELS			ELEVATIONS / LOCATIONS		DRILLING			
WD		Dry	GROUND ELEVATION: 96.0		DRILL START:	5/4/20221	LOGGER:	R.J.
AD		Dry	TBM: F.F. of existing building		DRILLED END:	5/4/2021	DRILLER:	R.J.
24 Hrs			GPS: 35 29.764°N, 97 29.046°W		DRILL RIG:	CME 55	HOLE SIZE:	7.25"
> 24 Hrs			STA:	OFFSET:	DRILL METHOD:	H.S.A.		










BORING LOG P-3
(1 of 1)


PROJECT NAME: Proposed Harmony Lofts
PROJECT NUMBER: 2130-0271
PROJECT LOCATION: Oklahoma City, OK
CLIENT: Mike Little Construction

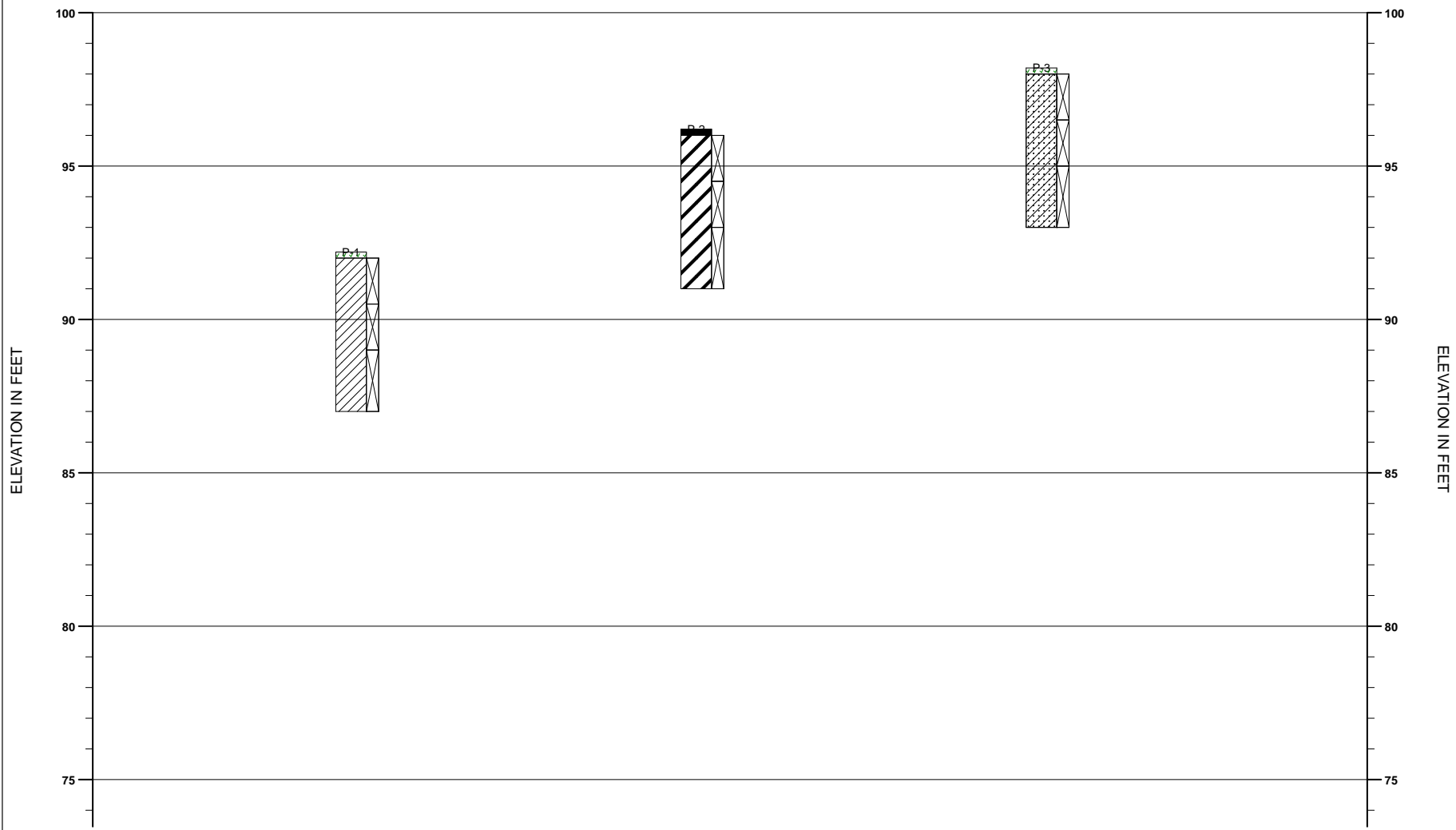
DEPTH (FT) ELEVATION (FT)	GRAPHIC LOG	USCS	SAMPLER SYMBOLS			SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS (N)	POCKET PENETROMETER (tsf)	RECOVERY % / RQD	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	UCS (psf)	#200 SIEVE (%)	ATTERBERG LIMITS
			Grab	ST	RC										LL-PL-PI
			MATERIAL DESCRIPTION												
0			(Short Grass)												
95		CL	Reddish Brn. SANDY LEAN CLAY Moist, Moderate Plasticity	X	A					27.5					
				X	B					18.7			57.5	35-17-18	
5				X	C					13.1					
			Bottom of borehole at 5.0 feet												
90															
10															
85															
15															
80															
20															
75															
25															
70															
30															






WATER LEVELS			ELEVATIONS / LOCATIONS			DRILLING			
WD		Dry	GROUND ELEVATION: 98.0			DRILL START:	5/10/2021	LOGGER:	B.H.
AD		Dry	TBM: F.F. of existing building			DRILLED END:	5/10/2021	DRILLER:	B.H.
24 Hrs			GPS: 35 29.785°N, 97 29.028°W			DRILL RIG:	CME 55	HOLE SIZE:	7.25"
> 24 Hrs			STA:	OFFSET:		DRILL METHOD:	H.S.A.		




- | | | |
|---|---|---|
|  Concrete |  Sandy Lean Clay |  Shale |
|  Lean Clay |  Weathered Sandy Shale | |
|  Sandy Shale |  Topsoil | |
|  Asphalt |  Weathered Shale | |

 <p>STANDARD TESTING AND ENGINEERING COMPANY <i>Since 1951</i></p>	SOIL PROFILE
	Proposed Harmony Lofts PROJECT NO. 2130-0271
HORIZONTAL SCALE:	VERTICAL SCALE: 1"=7'



-  Topsoil
-  Lean Clay
-  Asphalt
-  Fat Clay
-  Sandy Lean Clay

 <p>STANDARD TESTING AND ENGINEERING COMPANY <i>Since 1951</i></p>	SOIL PROFILE
	Proposed Harmony Lofts
	PROJECT NO. 2130-0271
HORIZONTAL SCALE:	VERTICAL SCALE: 1"=5'

DEFINITION OF DESCRIPTIVE TERMS

Consistency of Cohesive Soils (at moisture content near plastic limit):

- Very Soft - Easily penetrated 4" to 6" by fist; tall core will sag under its own weight.
- Soft - Easily molded by fingers.
- Firm - Can be penetrated 2" to 3" by thumb with moderate effort, imprinted with fingers.
- Stiff - Readily indented by thumb but penetrated only with great effort.
- Very Stiff - Readily indented by thumbnail, imprinted very slightly with pressure from fingers.
- Hard - Indented with difficulty by thumbnail, cannot be imprinted with fingers.

Density of Cohesionless Soils:

- Very Loose - less than 4 SPT "N" value corrected for overburden.
- Loose - 5 to 10 SPT "N" value corrected for overburden.
- Medium Dense - 11 to 30 SPT "N" value corrected for overburden.
- Dense - 31 to 50 SPT "N" value corrected for overburden.
- Very Dense - 51 to 50/6" SPT "N" value corrected for overburden.
- Hard - less than 6" penetration in 50 SPT "N" blows corrected for overburden (cemented).

Hardness of Rock:

- Very Soft - can be scratched readily by fingernail
- Soft - can be grooved readily by knife or pick
- Medium - can be grooved 0.05" deep by firm pressure of knife
- Moderately Hard - can be scratched by knife
- Hard - can be scratched by knife or pick only with difficulty
- Very Hard - cannot be scratched by knife or sharp pick

Other Terms Descriptive of Consistency:

- Brittle - Ruptures with little deformation
- Friable - Crumbles or pulverizes easily.
- Elastic - Returns to original length after small deformation.
- Spongy - Is very porous, loose and elastic.
- Sticky - Adheres or sticks to tools or hands.

In-Situ Moisture Descriptions:

- Dry - powdery
- Slightly Moist - water not readily absorbed by paper
- Moist - water readily absorbed by paper
- Very Moist - water condenses on sample tray
- Wet - water drips from sample

Degree of Plasticity When Moist to Very Moist:

- Nonplastic - cannot be rolled into a ball
- Trace of Plasticity - can be rolled into a ball but not into a 1/8" thread
- Low Plasticity - barely holds its shape when rolled into a 1/8" thread
- Fairly Low Plasticity - 1/8" thread quickly ruptures when bent
- Medium Plasticity - 1/8" thread withstands considerable deformation without rupture.
- Fairly High Plasticity - difficult to rupture a 1/8" thread by bending.
- High Plasticity - can be kneaded without rupture; greasy texture.

Abbreviations:

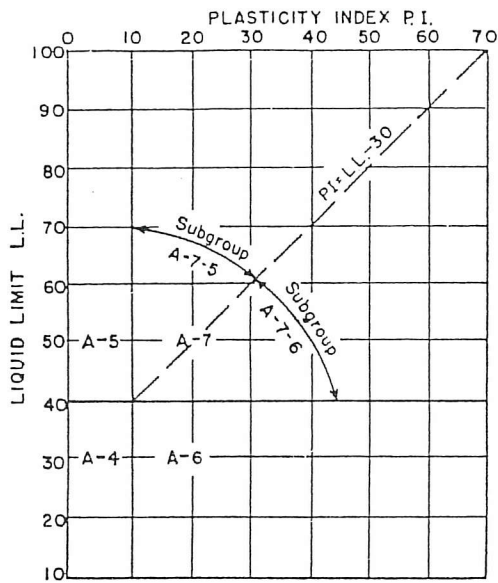
- | | | |
|----------------|---------------|--------------|
| V. - Very | Dk. - Dark | Blk. - Black |
| Tr. - Trace | Lt. - Light | Brn. - Brown |
| Fl. - Fairly | Med. - Medium | |
| Sl. - Slightly | | |

APPENDIX C

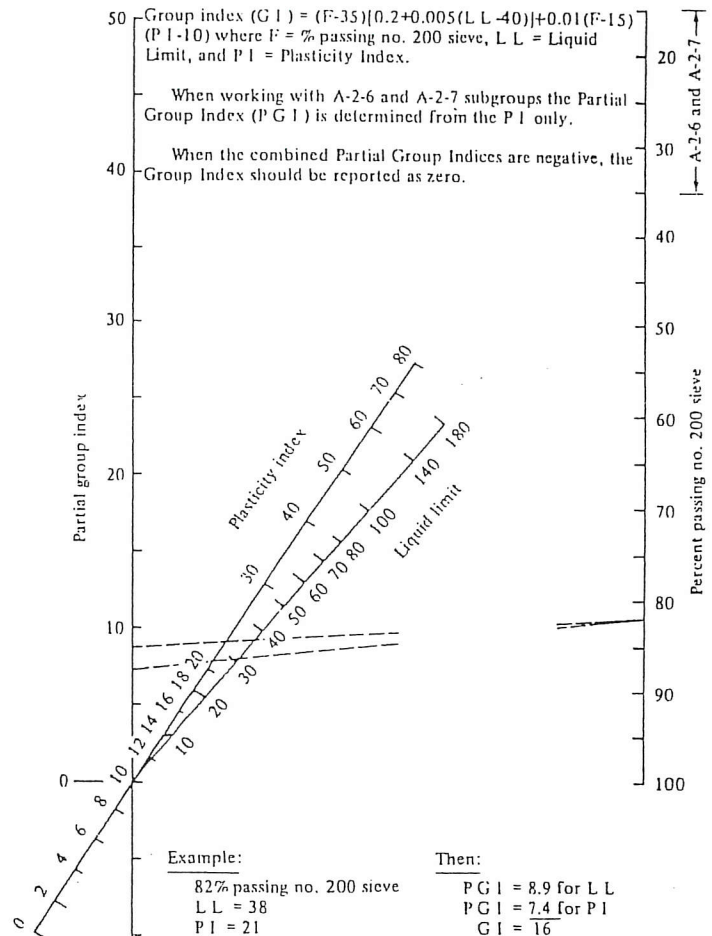
**AASHTO Soil Classification System
Unified Soil Classification System**

Soil Classification System — American Association of State Highway and Transportation Officials

The tables and charts given below are from AASHTO Designation: M 145-83, The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes. More detailed information as to the background and application of the system may be obtained from the report.



Liquid-limit and plasticity-index ranges for the A-4, A-5, A-6 and A-7 subgrade groups.



Group index chart

Classification of Soils and Soil-Aggregate Mixtures (with Suggested Subgroups)

General classification	Granular materials (35 per cent or less passing No. 200)						Silt-clay materials (More than 35 per cent passing No. 200)				
	A-1		A-3	A-2			A-4	A-5	A-6	A-7	
Group classification	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5; A-7-6
Sieve analysis: Per cent passing: No. 10 No. 40 No. 200	50 max. 30 max. 15 max.	— 50 max. 25 max.	— 51 min. 10 max.	— — 35 max.	— — 35 max.	— — 35 max.	— — 35 max.	— — 36 min.	— — 36 min.	— — 36 min.	— — 36 min.
Characteristics of fraction passing No. 40: Liquid limit Plasticity index	— 6 max.	—	— NP	40 max. 10 max.	41 min. 10 max.	40 max. 11 min.	41 min. 11 min.	40 max. 10 max.	41 min. 10 max.	40 max. 11 min.	41 min. 11 min.*
Usual types of significant constituent materials	Stone fragments, gravel and sand		Fine sand	Silty or clayey gravel and sand				Silty soils		Clayey soils	
General rating as subgrade	Excellent to good						Fair to poor				

*P.I. of A-7-5 subgroup is equal to or less than L.L. minus 30. P.I. of A-7-6 subgroup is greater than L.L. minus 30

UNIFIED SOIL CLASSIFICATION (Including Identification and Description)							
Major Divisions		Group Symbols	Typical Names	Field Identification Procedures (Excluding particles larger than 3 inches and basing fractions on estimated weights)	Information Required for Describing Soils	Laboratory Classification Criteria	
1	2	3	4	5	6	7	
Coarse-grained Soils More than half of material is larger than No. 200 sieve size. The No. 200 sieve size is about the smallest particle visible to the naked eye.	Gravels More than half of coarse fraction is larger than No. 4 sieve size. (For visual classification, the 1/4-in size may be used as equivalent to the No. 4 sieve size)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.	Wide range in grain sizes and substantial amounts of all intermediate particle sizes.	For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Give typical name; indicate approximate percentages of sand and gravel, maximum size, angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbol in parentheses. Example: Silty sand, gravelly; about 20% hard, angular gravel particles 1/2-in. maximum size; rounded and subangular sand grains coarse to fine; about 15% nonplastic fines with low dry strength, well compacted and moist in place; alluvial sand; (SM).	$C_u = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for GW Atterberg limits below "A" line or PI less than 4 Atterberg limits above "A" line or PI greater than 7 Above "A" Line with PI between 4 and 7 are borderline cases requiring use of dual symbols	
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.	Predominantly one size or a range of sizes with some intermediate sizes missing.			
		GM	Silty gravels, gravel-sand-silt mixtures.	Nonplastic fines or fines with low plasticity (for identification procedures see ML below).			
		GC	Clayey gravels, gravel-sand-clay mixtures.	Plastic fines (for identification procedures see CL below).			
		SW	Well-graded sands, gravelly sands, little or no fines.	Wide range in grain size and substantial amounts of all intermediate particle sizes.			
		SP	Poorly-graded sands, gravelly sands, little or no fines.	Predominantly one size or a range of sizes with some intermediate sizes missing.			
	Sands More than half of coarse fraction is smaller than No. 4 sieve size. (For visual classification, the 1/4-in size may be used as equivalent to the No. 4 sieve size)	Clean Sands (Little or no fines)	SM	Silty sands, sand-silt mixtures.	Nonplastic fines or fines with low plasticity (for identification procedures see ML below).	$C_u = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for SW Atterberg limits below "A" line or PI less than 4 Atterberg limits above "A" line or PI greater than 7 Limits plotting in hatched zone with PI between 4 and 7 are borderline cases requiring use of dual symbols	
			SC	Clayey sands, sand-clay mixtures.	Plastic fines (for identification procedures see CL below).		
		Sands with Fines (Appreciable amount of fines)					
Fine-grained Soils More than half of material is smaller than No. 200 sieve size. The No. 200 sieve size is about the smallest particle visible to the naked eye.	Silt and Clays Liquid limit less than 50				Identification Procedures On Fractions Smaller than No. 40 Sieve Sizes Dry Strength (Crushing characteristics) Dilatancy (Reaction to shaking) Toughness (Consistency near PL) Give typical name, indicate degree and character of plasticity, amount and maximum size of coarse grains, color in wet condition, odor if any, local or geologic name, and other pertinent descriptive information; and symbol in parentheses. For undisturbed soils add information on structure, stratification, consistency in undisturbed and remolded states, moisture and drainage conditions. Example: Clayey silt, brown, slightly plastic, small percentage of fine sand, numerous vertical root holes, firm and dry in place, loess, (ML).		
		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.	None to slight		Quick to slow	None
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.	Medium to high		None to very slow	Medium
	Silt and Clays Liquid limit greater than 50	OL	Organic silts and organic silty clays of low plasticity.	Slight to medium		Slow	Slight
		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.	Slight to medium		Slow to none	Slight to Medium
		CH	Inorganic clays of high plasticity, fat clays.	High to very high		None	High
		OH	Organic clays of medium to high plasticity, organic silts.	Medium to high		None to very slow	Slight to medium
Highly Organic Soils		PI	Peat and other high organic soils.	Readily identified by color, odor, spongy feel and frequently by fibrous texture.			

(1) **Boundary Classifications:** Soils possessing characteristics of two groups are designated by combinations of group symbols. For example GW-GC, well-graded gravel-sand mixture with clay binder. (2) All sieve sizes on this chart are U.S. Standard

FIELD IDENTIFICATION PROCEDURES FOR FINE-GRAINED SOILS OR FRACTIONS

These procedures are to be performed on the minus No. 40 sieve size particles, approximately 1/64 in. For field classification purposes, screening is not intended, simply remove by hand the coarse particles that interfere with the tests.

<p>Dilatancy (Reaction to shaking) After removing particles larger than No. 40 sieve size, prepare a pat of moist soil with a volume of about one-half cubic inch. Add enough water if necessary to make the soil soft but not sticky. Place the pat in the open palm of one hand and shake horizontally, striking vigorously against the other hand several times. A positive reaction consists of the appearance of water on the surface of the pat, which changes to a livery consistency and becomes glossy. When the sample is squeezed between the fingers, the water and glass disappear from the surface, the pat stiffens, and finally it cracks or crumbles. The rapidity of appearance of water during shaking and of its disappearance during squeezing assist in identifying the character of the fines in a soil. Very fine clean sands give the quickest and most distinct reactions whereas a plastic clay has no reaction. Inorganic silts, such as a typical rock flour show a moderately quick reaction.</p>	<p>Dry Strength (Crushing Characteristics) After removing particles larger than No. 40 sieve size, mold a pat of soil to the consistency of putty, adding water if necessary. Allow the pat to dry completely by oven, sun, or air drying, and then test its strength by breaking and crumbling between the fingers. This strength is a measure of the character and quantity of the colloidal fraction contained in the soil. The dry strength increases with increasing plasticity. High dry strength is characteristic for clays of the CH group. A typical inorganic silt possesses only very slight dry strength. Silty fine sands and silts have about the same slight dry strength, but can be distinguished by the feel when powdering the dried specimen. Fine sand feels gritty, whereas a typical silt has the smooth feel of flour.</p>	<p>Toughness (Consistency near plastic limit) After removing particles larger than the No. 40 sieve size, a specimen of soil about one-half inch cube in size is molded to the consistency of putty. If too dry, water must be added and if sticky, specimen should be spread out in a thin layer and allowed to lose some moisture by evaporation. Then the specimen is rolled out by hand on a smooth surface or between the palms into a thread about one-eighth inch in diameter. The thread is then folded and rerolled repeatedly. During this manipulation the moisture content is gradually reduced and the specimen stiffens, finally loses its plasticity, and crumbles when the plastic limit is reached. After the thread crumbles, the pieces should be lumped together and slight kneading action continued until lump crumbles. The tougher the thread near the plastic limit and the stiffer the lump when it finally crumbles, the more potent is the colloidal clay fraction in the soil. Weakness of the thread at plastic limit and quick loss of coherence of the lump below the plastic limit indicate either inorganic clay of low plasticity, or materials such as kaolin-type clays and organic clays which occur below the A-line. Highly organic clays have a very weak and spongy feel at the plastic limit.</p>
--	--	---

Use grain-size curve in identifying the fractions as given under field identification

Determine percentages of gravel and sand from grain size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size) coarse-grained soils are classified as follows:

$$C_u = \frac{D_{60}}{D_{10}}$$
 Greater than 4

$$C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$
 Between 1 and 3
 Not meeting all gradation requirements for GW
 Atterberg limits below "A" line or PI less than 4
 Atterberg limits above "A" line or PI greater than 7
 Above "A" Line with PI between 4 and 7 are **borderline** cases requiring use of dual symbols

$$C_u = \frac{D_{60}}{D_{10}}$$
 Greater than 6

$$C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$
 Between 1 and 3
 Not meeting all gradation requirements for SW
 Atterberg limits below "A" line or PI less than 4
 Atterberg limits above "A" line or PI greater than 7
 Limits plotting in hatched zone with PI between 4 and 7 are **borderline** cases requiring use of dual symbols

PLASTICITY INDEX

LIQUID LIMIT PLASTICITY CHART
For laboratory classification of fine-grained soils

Adopted by Corps of Engineers and Bureau of Reclamation January 1952

APPENDIX D

Summary of Laboratory Test Results



SUMMARY OF LABORATORY TEST RESULTS

Client: Mike Little Construction

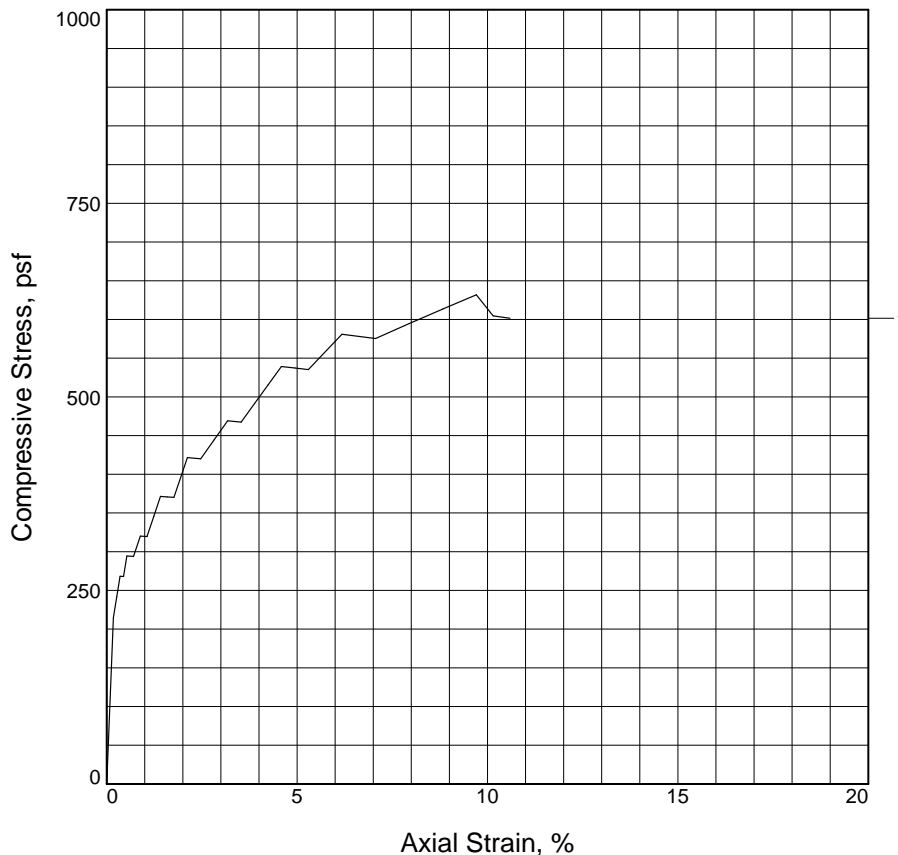
Date: 6/3/2021

Project: Proposed Harmony Lofts

Project No.: 2130-0271

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)	Dry Density (pcf)	Atterberg Limits (% Moisture)			Sieve Analysis (% Passing)					Soil Classification		UCT	
					LL	PL	PI	#4	#10	#40	#100	#200	USCS	AASHTO	Stress (psf)	Strain (%)
A-1																
	A	0.0-1.5	16.9													
	B	1.5-3.0	23.5	101												
	C	3.0-5.0	20.4	110											632	9.7
	D	5.0-6.5	20.8		47	15	32	100	98	96	94	79.8	CL	A-7-6(25)		
	E	8.0-10.0	21.1													
	F	10.0-11.5	15.4													
G	15.0-15.3	7.8														
A-2																
	A	0.0-1.5	19.6													
	B	1.5-3.0	24.4	102												
	C	3.0-5.0	22.0	104	34	16	18	84	81	76	70	59.0	CL	A-6(8)	1749	11.3
	D	5.0-6.5	17.7	108												
	E	8.0-10.0	14.5													
	F	10.0-11.5	15.2													
G	15.0-15.2	9.9														
B-1																
	A	0.0-1.5	30.6													
	B	1.5-3.0	20.7	106	40	17	23	100	100	99	98	84.6	CL	A-6(19)		
	C	3.0-5.0	16.0													
	D	5.0-6.5	14.2	118												
	E	8.0-10.0	17.4													
	F	10.0-11.5	15.5													
G	15.0-15.3	17.2														
B-2																
	A	0.0-1.5	20.4													
	B	1.5-3.0	15.3	112												
	C	3.0-5.0	15.7													
	D	5.0-5.6	9.8	122	25	15	10	94	88	81	71	44.9	SC	A-4(1)		

UNCONFINED COMPRESSION TEST



Stage	1		
Unconfined strength, psf	632		
Undrained shear strength, psf	316		
Failure strain, %	9.7		
Strain rate, in./min.	0.052		
Water content, %	20.4		
Wet density, pcf	132.1		
Dry density, pcf	109.8		
Saturation, %	100.0		
Void ratio	0.5585		
Specimen diameter, in.	2.61		
Specimen height, in.	5.67		
Height/diameter ratio	2.17		

Description:

LL = PL = PI = Assumed GS= 2.74 Type:

Project No.: 2130-0271

Date Sampled:

Remarks:

Client: Mike Little Construction

Project: Proposed Harmony Lofts

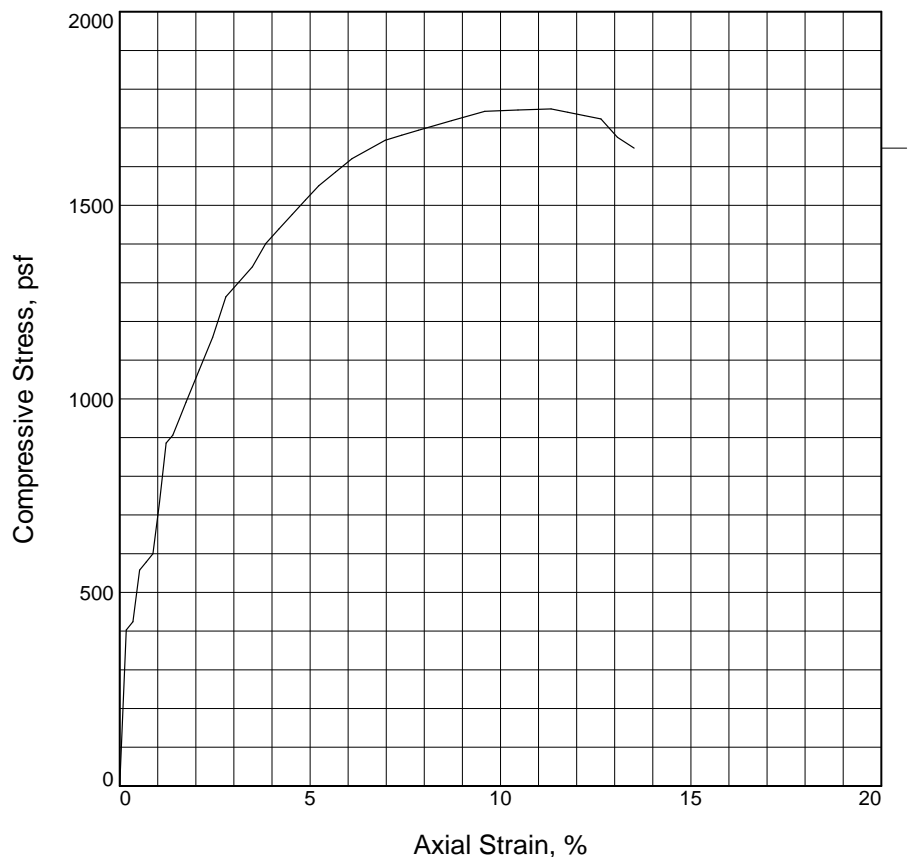
Source of Sample: A-1 **Depth:** 3.0-5.0

Sample Number: C

Figure _____



UNCONFINED COMPRESSION TEST



Stage	1		
Unconfined strength, psf	1749		
Undrained shear strength, psf	875		
Failure strain, %	11.3		
Strain rate, in./min.	0.052		
Water content, %	22.0		
Wet density, pcf	127.3		
Dry density, pcf	104.3		
Saturation, %	99.5		
Void ratio	0.5857		
Specimen diameter, in.	2.86		
Specimen height, in.	5.74		
Height/diameter ratio	2.01		

Description: SANDY LEAN CLAY W/ GRAVEL

LL = 34 **PL = 16** **PI = 18** **Assumed GS= 2.65** **Type:**

Project No.: 2130-0271

Date Sampled:

Remarks:

Client: Mike Little Construction

Project: Proposed Harmony Lofts

Source of Sample: A-2 **Depth:** 3.0-5.0

Sample Number: C

Figure _____



**SECTION 01 00 11
PHASE I ENVIRONMENTAL SITE ASSESSMENT**

DOCUMENTS

1.01 APPLICABLE TO THIS CONTRACT, AND ATTACHED FOLLOWING THIS PAGE IS:

PHASE I ENVIRONMENTAL SITE ASSESSMENT

(PENDING)

SECTION 01 00 12
PART 2 HISTORIC PRESERVATION CERTIFICATION APPLICATION

DOCUMENTS

1.01 APPLICABLE TO THIS CONTRACT, AND ATTACHED FOLLOWING THIS PAGE IS:

PART 2 HISTORIC PRESERVATION CERTIFICATION APPLICATION
Building Preservation, LLC
44 Pages Total
06/ 11/ 2019

HISTORIC PRESERVATION CERTIFICATION APPLICATION
PART 2 – DESCRIPTION OF REHABILITATION

9-16-2021



Instructions: This page must bear the applicant's original signature and must be dated. The National Park Service certification decision is based on the descriptions in this application form. In the event of any discrepancy between the application form and other, supplementary material submitted with it (such as architectural plans, drawings and specifications), the application form takes precedence. A copy of this form will be provided to the Internal Revenue Service.	NPS Project Number 40441
--	------------------------------------

1. **Historic Property Name** Harmony School
Street 1537 Northeast 24th Street
City Oklahoma City County Oklahoma State OK Zip 73111-3212
Name of Historic District or National Register property Harmony School
 Listed individually in the National Register of Historic Places; date of listing 12/2/2019
 Located in a Registered Historic District; name of district _____
 Part 1 – Evaluation of Significance submitted? Date submitted 3/28/2019 Date of certification 6/11/2019

2. **Project Data** (for phased projects, data entered in this section must be totals for entire project)
Date of building 1930 Estimated total rehabilitation costs (QRE) \$3,801,577
Number of buildings in project 1 historic, 4 new Floor area before / after rehabilitation 22,307 / 57,580 with new sq ft
Start date (estimated) Aug 30, 2021 Use(s) before / after rehabilitation Vacant school/ Apartments
Completion date (estimated) Jan 2, 2023 Number of housing units before / after rehabilitation 0 / 40 with new
Application includes phase(s) 1 of 1 phases Number of low-moderate income housing units before / after rehabilitation 0 / 40
 Intend to elect IRS 60-month phased rehabilitation

3. **Project Contact** (if different from applicant)
Name Deb Sheals Company Building Preservation, LLC
Street 29 S. 9th Street Suite 210 City Columbia State MO
Zip 65201-4884 Telephone 573-874-3779 Email Address debsheals@gmail.com

4. **Applicant**
I hereby attest that the information I have provided is, to the best of my knowledge, correct. I further attest that [check one or both boxes, as applicable]:
 I am the owner of the above-described property within the meaning of "owner" set forth in 36 CFR § 67.2 (2011), and/or
 if I am not the fee simple owner of the above described property, the fee simple owner is aware of the action I am taking relative to this application and has no objection, as noted in a written statement from the owner, a copy of which (i) either is attached to this application form and incorporated herein, or has been previously submitted, and (ii) meets the requirements of 36 CFR § 67.3(a)(1) (2011).
For purposes of this attestation, the singular shall include the plural wherever appropriate. I understand that knowing and willful falsification of factual representations in this application may subject me to fines and imprisonment under 18 U.S.C. § 1001, which, under certain circumstances, provides for imprisonment of up to 8 years.
Name Norman Seaberg Signature (Sign in ink) *Norman Seaberg* Date 3/17/2021
Applicant Entity Harmony Affordable Housing Partners, LP SSN _____ or TIN _____
Street 1901 North Kickapoo Ave. City Shawnee State OK
Zip 74804-2736 Telephone 405-615-1313 Email Address normanseaberg@hotmail.com
 Applicant, SSN, or TIN has changed since previously submitted application.

NPS Official Use Only

- The National Park Service has reviewed the Historic Preservation Certification Application – Part 2 for the above-named property and has determined that:
- the rehabilitation described herein is consistent with the historic character of the property and, where applicable, with the district in which it is located and that the project meets the Secretary of the Interior's Standards for Rehabilitation. This letter is a preliminary determination only, since a formal certification of rehabilitation can be issued only to the owner of a "certified historic structure" after rehabilitation work is complete.
 - the rehabilitation or proposed rehabilitation will meet the Secretary of the Interior's Standards for Rehabilitation if the attached conditions are met.
 - the rehabilitation described herein is not consistent with the historic character of the property or the district in which it is located and that the project does not meet the Secretary of the Interior's Standards for Rehabilitation.

Date _____ National Park Service Authorized Signature (Sign in ink) _____

NPS conditions or comments attached

**Historic Preservation
Certification Application-Part 2**

Part 2, page 2
September 16, 2021

Project Number: 40441

NPS Office use only

Harmony School

Name

1537 Northeast 24th Street Oklahoma City, OK 73111-3212

Address

Project Summary and Phase Schedule

Harmony School is in a modest residential neighborhood east of the state capitol. The school is individually listed in the National Register of Historic Places under Criteria A and C in the areas of Education, Ethnic Heritage: Black, and Architecture. It served as a public elementary school until 2003, and it has been vacant since ca. 2013. The period of significance begins with its construction in 1928, and ends in 1963, when the Oklahoma City Board of Education was first ordered to desegregate schools in the city.

The school was constructed in three phases (See plan pages 3, 18 and 19.) In 1928, Unit 1 was placed in service. (See photo 3.) The school was expanded westward ca. 1930 with the addition of two large bays (Unit 2, see photo 8). The final expansion, which consisted of a new auditorium on the west end of the building, was completed ca. 1949. (See photo 10.)

The project will convert the long-vacant school into affordable housing. Exterior masonry will be cleaned as needed, and the current windows, which were installed ca. 1990, will be replaced with historic replica windows that are modeled after those seen in historic photos. There will be no additions or other changes to the existing form of the school building. Modern (non-contributing) support buildings that are located behind the school will be replaced with a small new multi-purpose building and new row housing. Inside the school, the historic stairs and corridors will be retained, and almost all existing classroom entrances will become apartment entrances to preserve original interior patterns of fenestration. The former classrooms and offices will contain new apartments, and the auditorium and stage will be used as a community room and fitness center.

[1.] Architectural feature Site and Additions Approximate date of feature ca. 1928-1949

Describe existing feature and its condition:

The school occupies the east end of a city block in a modest residential neighborhood. The property is bounded on the south by Northeast 24th Street, the east by North Jordan Avenue, and the north by Northeast 26th Street. The west boundary adjoins residential lots. Most nearby properties contain modest houses built in the first half of the 20th century. A one-story brick church across Jordan Street to the east was built in the last half of the 20th century. Sidewalks edge all three streets, and a small tree line marks the west property line.

The wide school building sits near the south edge of the lot, facing south to Northeast 24th Street. There is a small front parking lot to the southwest and a larger one in the southeast corner of the lot. Both are paved, with driveways leading to NW 24th Street. The larger parking lot includes a wide driveway off N. Jordan Street. Cyclone fencing encloses the land north of the school. A simple flagpole in the front lawn appears to be original. (See historic photo on drawing page 18.)

There are three smaller non-contributing support buildings and a paved area just north of the school building. Each of the support buildings is one-story, with vertical metal siding and a metal roof. They all appear to have been temporary classroom buildings when the school was last in use; some may have been moved to the site. The far north end of the lot contains an open lawn, and a small playground sits near the midpoint of the eastern boundary.

The playground and all three support buildings date to the late 20th century or early 21st century; all are counted as non-contributing resources in the National Register listing (See plan page 3.)

Photo no. 1-38 Drawing no. 2, 3, 20-23

Describe work and impact on existing feature:

- Modern outbuildings will be removed.
- There will be no additions or changes to the footprint of the historic building.

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Site, continued

- A small multi-purpose building and three new apartment buildings will be constructed north of the school. (See plan page 3.) The multipurpose building will be near the back wall of the school. It will be two stories, with brick walls and a flat roof. The apartments will be along the north (back) and the west side of the property, to leave the core of the back lot open. They will all be single-story with brick walls and hipped roofs that have asphalt shingle roofing. (See plan pages 20-23.)
- The existing parking lots, driveways and sidewalks will be retained and repaired as needed. A small new parking lot north of the multipurpose building will be accessed via a new drive that runs in front of the new apartment buildings.
- The flagpole will be retained and repaired as needed.
- The existing playground will be upgraded. (Much of the equipment has been vandalized or destroyed in recent months.)
- A concrete pad will be installed near the northwest corner of the lot to house prefabricated storm shelters (plan page 23), and there will be a small trash enclosure west of the multi-purpose building. The trash enclosure will have brick walls.
- New black coated chain link fencing will be installed along the west and north property lines.

[2.] Architectural feature Roof, Gutters and Downspouts Approximate date of feature ca. 1928-1990s Describe existing feature and its condition:

All sections of the school have nearly flat roofs that are edged by short brick parapet walls. They are filled with modern HVAC equipment. The roof of the main school building slopes gently to the north, with scuppers and downspouts located at regular intervals along the north wall (photo 16). The tar and gravel roofing system is in poor condition.

The roof of the auditorium drains to scuppers and downspouts located on the east and west walls.

Most painted sheet metal scuppers and downspouts appear to be original, a few downspouts on the back wall are less than 20 years old (e.g. photo 25). They are all in fair to poor condition.

Photo no. 1-3, 8-12, 16-30 Drawing no. 2, 10-11

Describe work and impact on existing feature:

- Existing HVAC equipment on the roof will be removed and the holes will be infilled. Built-up roofing and any deteriorated decking will be removed. New insulation and white TPO roofing will be installed.
- New rooftop condensers will be added in various locations, they will be set back from the edge of the roof for minimal public visibility.
- Scuppers and downspouts will be repaired or replaced as needed to ensure water drains away from the building; all will be repainted a dark color. Any new components will match the size and profiles of the existing units.

[3.] Architectural feature Exterior Walls Approximate date of feature ca. 1928-1949 Describe existing feature and its condition:

All sections of the school building have variegated red brick walls, and stone or cast concrete roof coping. Unit 1 at east end of the school, which is the oldest, has accents of dark brown brick (Photos 7-9.) Unit 2 and auditorium have comparable wall cladding, but that part of the building is accented with cast stone inserts and soldier courses of variegated brick. (Photos 8-10.)

The masonry is in good condition overall. Mortar joints in general are in fair to good shape. A few areas on the north wall have light-colored modern mortar joints as well as some degraded early joints. There is some discoloration of the stone and brick.

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Exterior Walls, continued.

The front and back walls of Units 1 and 2 have large louvered vents inset in the brick walls between the first and second floors. The vents are original; the masonry openings are in good shape, but the vents themselves are in just fair to poor condition.

Photo no. 1-33 Drawing no. 12-13

Describe work and impact on existing feature:

- Wall surfaces will be cleaned with non-ionic detergent and low pressure (200-350 psi) water spray and hand scrubbing with bristle brushes as needed, and care will be taken to avoid introducing water into the interior of the wall. **No wire brushes or sandblasting will be used.**
- Any failing mortar will be removed to a depth of approximately one inch, and unsound bricks will be replaced as needed. Any new bricks used for repairs will match existing in size, texture and color. Any failed mortar joints will be repointed with Type N repointing mortar. **New joints will match existing joints in size, depth, color, and profile.** All work will be done in accordance with Preservation Briefs #1 and #2.
- All louvered vents will be retained; the louvers will be repaired and repainted or replaced with new metal covers that have the same size and type of type of louver. Most of the openings will be sealed from within.
- One new ventilation grill will be added to the upper west wall of Unit 2, above the roof of the auditorium link.

[4.] Architectural feature Windows

Approximate date of feature ca. 1990

Describe existing feature and its condition:

There are no historic sashes in place. All window openings contain brown aluminum windows and panning that appear to date to the early 1990s. Most of the original window frames and interior casing, however, are intact, and most are in fair condition. (Inset photo right.)

Photo no. 1-32 Drawing no. 12-13, 15-17

Describe work and impact on existing feature:

- All 1990s aluminum components will be removed. The historic mullions, frames and interior casing will be retained and repaired.
- New aluminum windows that have historically appropriate profiles will be installed within the existing frames, as per plans (Drawing pages 15-17.) The new windows will have muntin patterns that match those shown in historic photos. (Drawing pages 18, 19.) Any Low-E glass will have a color neutrality and daylight transmittance of at least 70%. The proposed new windows are the Quaker H650 Series Single Hung.
- There will be no window screens.



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[5.] Architectural feature Signs and Exterior Lighting Approximate date of feature ca. 1928-1990s

Describe existing feature and its condition:

There is only one sign on the building at present. An original stone nameplate is set into the front (south) wall, above the main entrance. It reads HARMONY.

There are only a few exterior lighting fixtures: a pair of historic wall-mounted lights that flank the south entrance to the auditorium wing (photo 5), an early or original single socket fixture mounted to the underside of canopy by the west auditorium doorway (photo 13), and one modern wall light over a newer doorway on the north wall, (photo 21). The early fixtures are all in ruins.

Modern pole lights illuminate the parking lots. (See photo 1.)

Photo no. Best: 1, 5, 11, 21 (General: 1-33) Drawing no. 3, 14, 24

Describe work and impact on existing feature:

- The HARMONY nameplate will be retained.
- New brick monument signs will be added to the northeast and southeast corners of the property, per plans.
- At the south doorway to the auditorium, the historic fixtures will be replaced with new fixtures that are the same size and general configuration as the existing fixtures will be installed.
- All other doorways will receive new wall- or ceiling-mounted exterior lights to meet code requirements.
- Parking lots will all be lighted with new pole mounted lights.

[6.] Architectural feature Exterior Doors & Transoms Approximate date of feature ca. 1928-1990s

Describe existing feature and its condition:

There are nine exterior doorways in the school; only two contain historic doors.

- The front (south) wall has two wide doorways. The doorway below the HARMONY nameplate is recessed and topped with a large transom. The transom is covered, and the transom sash is missing. The doors are modern flat steel doors. (See photo 39.) The south doorway near the auditorium is set into an arched stone surround. The top of the surround appears to have always been infilled, since the ceiling inside is too low to accommodate a window in that location. The current doorway has a small transom that is covered, plus two steel doors like those on the main entrance. (See photo 11.)
- There are three exterior doorways in the auditorium: two on the north and one on the west. All three are topped with early or original 10-light wood transoms (photo 68), and each is sheltered by a small original exterior canopy (photo 14). The one on the west contains early wood doors that are missing muntins and are in very poor condition. Each north doorway contains a pair of modern flat steel doors.
- The north wall of the school has an original single doorway in the auditorium link (photo 17), a modern single doorway that was added in a former window opening (photo 21), and a recessed historic double doorway near the east end of the building that opens to one of the main hallways (photo 26). All those doorways have modern flat metal doors; none have transoms. The east side wall of the school contains one wide arched opening that contains a recessed entryway. That east entryway has a large historic arched wood transom that has eighteen lights (photo 65 inset right). It is intact, and in fair to poor condition. The east doorway also contains a pair of early or original wood doors (see photo 64 and the historic photo on drawing pages 18 and 19.) The doors are missing their original muntins and glazing and are in poor to very poor condition.



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Exterior Doors and Transoms, cont.

Photo no. Best: 31, 64-65, 68 (General: 4, 10-17, 21, 24-31, 39, 64-69) Drawing no. 12-13

Describe work and impact on existing feature:

- In the east doorway, the transom will be retained and restored. A new one- or two-light exterior storm window may be added for energy efficiency and protection of the historic transom sash. The east doors will be replaced with new painted steel doors that match those seen in the historic photos. Each door will have 15 lights. Those doors will not be operable, and they will not have hardware.
- The transoms in the auditorium will also be retained and restored. New one- or two-light exterior storm windows may be added for energy efficiency and protection of the historic transom sashes.
- The transom opening over the main south entrance will receive a new aluminum transom sash that is the same model and color as the proposed replacement windows.
- The south doorways and the formal entrance on the east end of the north wall will receive new wide-stile three-quarter light doors that have a paint-like finish and muntins. The remaining exterior doorways will receive new steel doors that have no lights, for security purposes. Those solid doors will have applied panel molding, per plans. (Plan pages 12 and 13).

[7.] Architectural feature Interior Stairs, 1st and 2nd Floors Approximate date of feature ca. 1928-1949

Describe existing feature and its condition:

There are two open staircases between the first and second floors. One is in the original (east) part of the building and the other is next to the auditorium in the west end. The east staircase dates to 1928, and the west staircase to ca. 1949. (Inset photo right is the east stair, and photos 106 and 107 show the west stair.) There is also a short intermediate staircase in the east-west hall on the second floor (photo 20).

All three staircases have original poured concrete steps, with concrete risers and modern textured vinyl nosing and treads. The east staircase has a round plaster or concrete newel post, and a half wall that is topped with a wood handrail. The adjacent walls are plastered. The west staircase also has a half wall for a handrail, along with glazed tile (SGT) wainscoting and painted plaster walls. The intermediate stair has a central pipe handrail.

All stair components are in fair to good condition.

Right: East stair hall, looking north.



Photo no. 41, 70-72, 106-107 Drawing no. 4-5,7-8

Describe work and impact on existing feature:

All three existing stairways will be retained and repaired.

- Handrails will be sanded and resealed as needed.
- All painted surfaces will be scraped, sanded, and repainted.
- The worn vinyl treads and nosing pieces will be replaced with new dark-colored components that have comparable profiles.

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[8.] Architectural feature Floorplans (1st and 2nd Floors) Approximate date of feature ca. 1928-1949

Describe existing feature and its condition:

A wide double-loaded corridor runs east-west on the first and second floors of the building. There is also a shorter cross hall on each floor, which accesses the east staircase and the north and south entrances. The corridors are flanked with classrooms and a few offices, and there is also a cafeteria on the first floor. The classrooms include some early built-in cabinets. Almost of all those cabinets have modern doors; some have early casing. Most are in fair to poor condition.

The floorplan has seen few changes aside from the offices, which appear to have been reconfigured several times. There is also a newer partition on the east end of the second-floor hallway (photo 73). The second-floor hallway has several shallow cabinets that have early or original casing and modern doors (photo 83). Those cabinets may have been coat racks or open shelving when new.

The auditorium wing includes a small vestibule that links the school with the large auditorium at the west end of the building. The vestibule also contains the west staircase. There is a raised stage and a deep backstage area in the south end of the auditorium. The stage is reached by short flights of wood steps (inset photo right). The area beneath the stage is used for table and chair storage; it is accessed via a hatch in the stage floor and short cabinet doors that open to a steep ramp. The rest of the auditorium is one large open room.



Photo no. Best: 41, 70-72, 106-107 (General: 39-107) Drawing no. 4-9

Describe work and impact on existing feature:

- There will be very few changes to the corridors. The east end of the main hallway on the second floor will be reconfigured slightly as shown on plan pages 7-8.
- New apartments will be added on either side of the hallways as shown in the attached plans. Most apartment entrances will be in existing doorways to preserve existing patterns of fenestration. Only two entrances per floor will be in new openings. Those classroom doorways and transoms that are not used will be infilled from the apartment side and faced with fixed doors and transoms in the hallways. Inoperable doors will not have hardware.
- The plan of the stage and the front part of the auditorium will remain as-is. Two new rooms will be added at the back of the auditorium, as shown on the plans.
- Built-in mailboxes will be added near the front door.

[9.] Architectural feature Interior Finishes. Approximate date of feature ca. 1928-ca. 1990s

Describe existing feature and its condition:

- **Ceilings and HVAC Ducts:** Almost all ceilings on the first floor of the school have modern suspended 2'x4' acoustical tile ceilings that are in poor to very poor condition. Only the second-floor hallway and some bathroom ceilings are uncovered; those ceilings are in fair condition, albeit covered with wire molding and conduit. The suspended grid systems are approximately 2'-1" below the original plaster ceilings in the classrooms, and 2'-6" lower in the first-floor hallway. The original plaster ceilings above them are in poor condition, due to damage from HVAC ducts and the mounting brackets for the ACT grids. Within the classrooms, the drop ceilings extend below the tops of the window openings (e.g. photo 58).

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Interior finishes, cont.

The auditorium has a modern suspended 2'x4' tile system that is just over 14' above the finish floor (AFF). That ceiling system is approximately 4' below the original ceilings of the auditorium and backstage areas (see photo 67).

- **Walls:** All original walls are faced with painted plaster. The walls of the auditorium wing feature glazed tile wainscot with plaster above (photo 66.) Newer walls in some of the offices are of painted gypboard. Most rooms in Units 1 and 2 have integral poured concrete cove bases; many of those are also topped with modern vinyl cove as well (e.g., photos 57 and 101).
- **Doors and Transoms:** Very few of the doors in the school appear to be historic. Almost all classroom entrances have tall, cased openings that include historic doorways and transoms (e.g., photo 57). The classroom doorways contain late 20th century flush wood doors that have single narrow lights. The transoms have all been covered over; some still have a wood sash in place (e.g., photos 53 and 55). There are very few early doors in place anywhere in the building. Two early or original closet doors on the second floor are of varnished wood, with two panels each (photos 74 and 76). One of those doors is missing its top panel due to vandalism.
- **Sidelights:** A few hall doorways are bordered by high square windows and casing that form large sidelights. (e.g., photos 59, 62-63, and 71). Some of the sidelights have been covered over with solid materials.
- **Casing and Trim:** Original casing in the school generally consists of wide flat boards edged with squared back bands (e.g., photo 53). That trim is used around doorways and cabinets, including recessed cabinets in the hallways and classrooms (photo 71). Windows have flat casing without back bands, as well as wide flat mullion covers and narrow aprons. Window aprons continue past some windows to form wide chair rails within the classrooms (photo 58). The corridor walls on both floors have narrow rectilinear chair rail that appears to be modern.
- **Flooring:** The first floor has tile or exposed concrete floors throughout (photos 59 and 103). Some of the rooms may have been carpeted at one point. The second-floor classrooms have wood flooring over concrete. All those wood floors are covered with modern carpet. The wood flooring is in poor condition. Many areas have sustained heavy water damage, with buckled and rotted floorboards (photo 101). The auditorium has asbestos tile flooring that is in fair condition.

Photo no. 49-107 Drawing no. 5, 6, 8, 9, 14

Describe work and impact on existing feature:

- **Ceilings and HVAC Ducts:** The suspended tile ceilings will be replaced with higher painted gypboard ceilings in the corridors and the units. New plumbing and HVAC equipment will be located out of view above the finished ceilings. Sprinkler pipes will be surface-mounted and painted to match adjacent surfaces.
Corridor ceilings will be 10' AFF. Unit ceilings will be 10'-11", with some lower soffits in secondary spaces. (Plan pages 6 and 9.)
The auditorium and backstage will receive a new 2'x2' suspended acoustical tile ceiling system that is 2' higher than the existing 2'x4' tiles, approximately 16' AFF.
- **Walls:** Existing plaster walls that are retained will be repaired and repainted. Exterior walls will not be furred. Surface-mounted conduit or wire molding will be used on historic walls to limit damage to plaster. All new walls will have lightly textured gypboard.

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Interior finishes, cont.

- **Doors and Transoms:** All doorways will have new two-panel doors that are comparable to the surviving historic doors in the second-floor classroom. Transoms above classroom entrances will be retained. Transoms will have single sashes with clear or frosted glass and will have a light-colored backing on the room side that is fire resistant. (See wall sections on plan page 14.) Any new doorways in the hallways will have flat casing that is slightly different to distinguish them from historic doorways, and they will not have transoms. Existing classroom doorways that are not used will be infilled from the apartment side and faced with fixed two-panel doors and transoms in the hallways. The fixed doors will not have hardware.
- **Sidelights:** The sidelights will be retained on the hallway side of the walls and covered with rated walls on the other. The sidelights will have clear or frosted glass, with a light-colored backing that is fire resistant.
- **Millwork:** Existing door and window casing will be cleaned, restained, and sealed as needed. New millwork will be stained or painted. Door casing for new doorways will be approximately the same width and thickness as the existing casing but will not have a back band. Baseboards will be flat and approximately the same height as the poured concrete cove base used on historic walls. All kitchens will have new wall-mounted and base cabinets and new countertops. All bathrooms will have new vanity cabinets and countertops.
- **Flooring:** Both hallways will have polished concrete flooring. Units will have vinyl plank flooring. The vinyl plank on the second floor will have a brown wood grain pattern that emulates the existing wood floors. The pattern for the flooring in the first-floor units will be like that of the existing tiles. The auditorium will have new square vinyl tiles laid in a pattern comparable to what is in the auditorium now (photo 68).

[10.] Architectural feature Basement Approximate date of feature ca. 1928

Describe existing feature and its condition:

The basement is a utilitarian space, with concrete walls, floors, and ceilings. It contains two early boilers. A narrow concrete stair off the first-floor hallway (photo right) provides interior access, and a second recessed exterior stair is reached via a doorway on the north wall. The exterior stair opening is edged with modern cyclone fencing.

Photo no. inset right, 23 Drawing no. 13

Describe work and impact on existing feature:

The boilers will be removed, and the basement will be cleaned and painted as needed. It will continue to serve as a utility area. Both staircases will be retained. The exterior staircase will be edged by a new 42" painted metal railing. The outside doorway will have a new painted metal door.

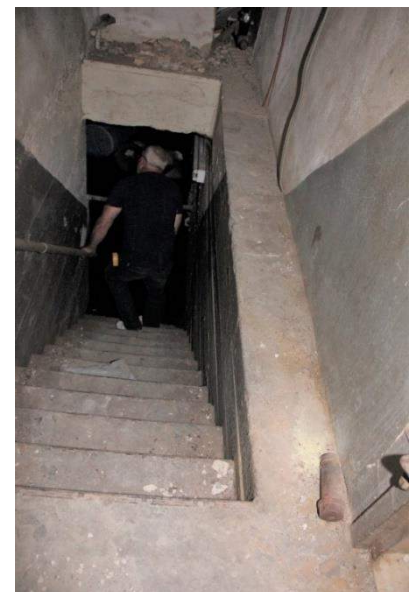
[11.] Architectural feature Mechanical Systems Approximate date of feature ca. 1928-1990s

Describe existing feature and its condition:

None of the current electrical, plumbing and HVAC systems meet modern load requirements or building codes. There is no sprinkler system.

The roof of the building is filled with large obsolete HVAC units.

Photo no. -- Drawing no. 3, 6, 9-11



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Describe work and impact on existing feature:

- All-new electrical, plumbing, sprinklers, and HVAC systems will be installed to meet modern code requirements. Almost all new mechanical components will be concealed.
- Compact HVAC and dehumidifying units will be mounted above lowered ceilings or within finished soffits.
- Wiring and plumbing will be kept out of view wherever possible. Unit ceilings will be dropped no more than 4 inches throughout to provide room for new wiring and minor piping. Wire molding and or conduit will be used on historic walls to minimize damage to the plaster.
- A sprinkler system will be added to all parts of the building. The pipes will be exposed and painted to match the surrounding surfaces.
- The old condensing units will be removed from the roof, and associated openings will be patched and repaired. Smaller new units will be added, per drawing page 11.
- Utility meters will be on the north wall near the auditorium, and back-up generators will be installed in a small, fenced enclosure north of the school and west of the multi-purpose building. (See plan page 3.)

[12.] Architectural feature Hazardous Materials Approximate date of feature ca. 1928-1970s

Describe existing feature and its condition:

The building has lead paint and asbestos-containing materials. Radon gas may also be present.

Photo no. ____--____ Drawing no. ____--____

Describe work and impact on existing feature:

- Lead paint on important historic features millwork will be chemically removed or encapsulated. Modern materials that contain lead will be removed.
- Asbestos-containing materials will also be removed or encapsulated, and measures will be taken to capture and/or redirect any radon gas through new concealed vent piping.

Harmony School - Part 2 Photos
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3/9/2019
Harmony School_Pt2_0001.JPG



12/16/2020
Harmony School_Pt2_0002.JPG



3/9/2019
Harmony School_Pt2_0003.JPG



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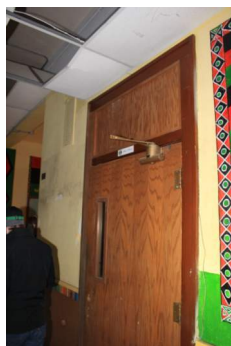
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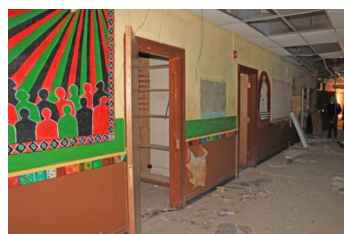
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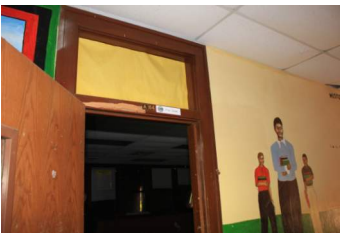
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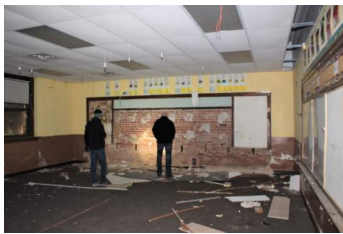
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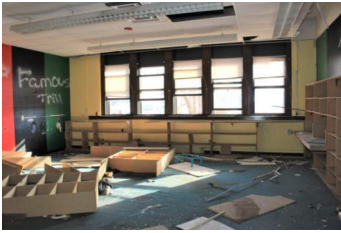


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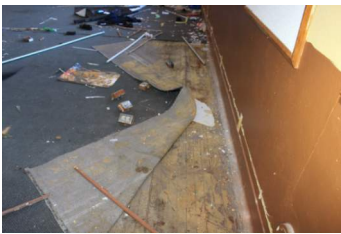
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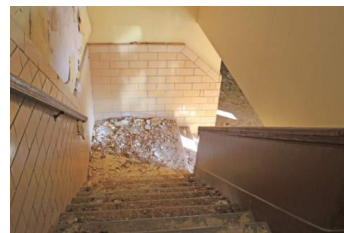
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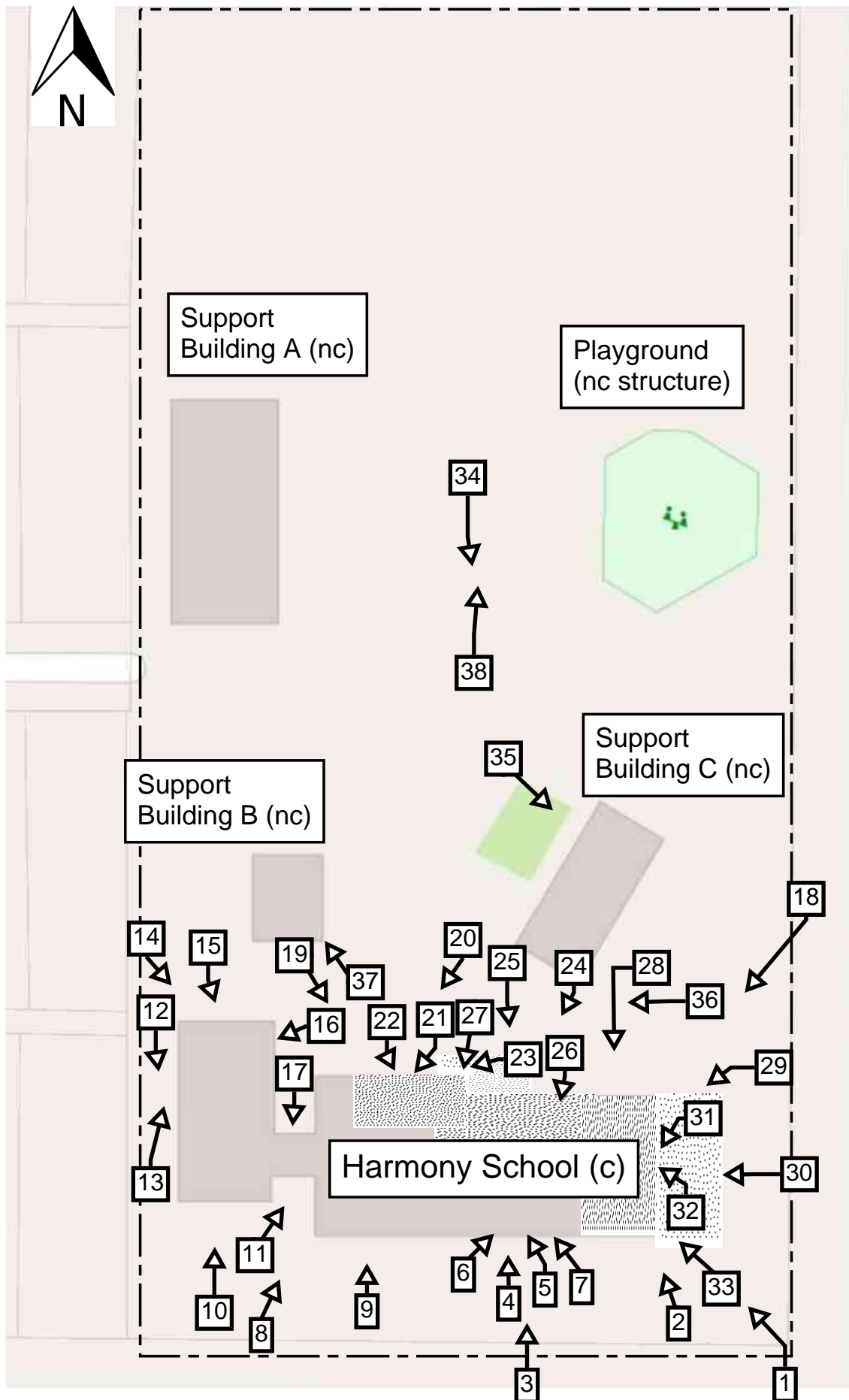


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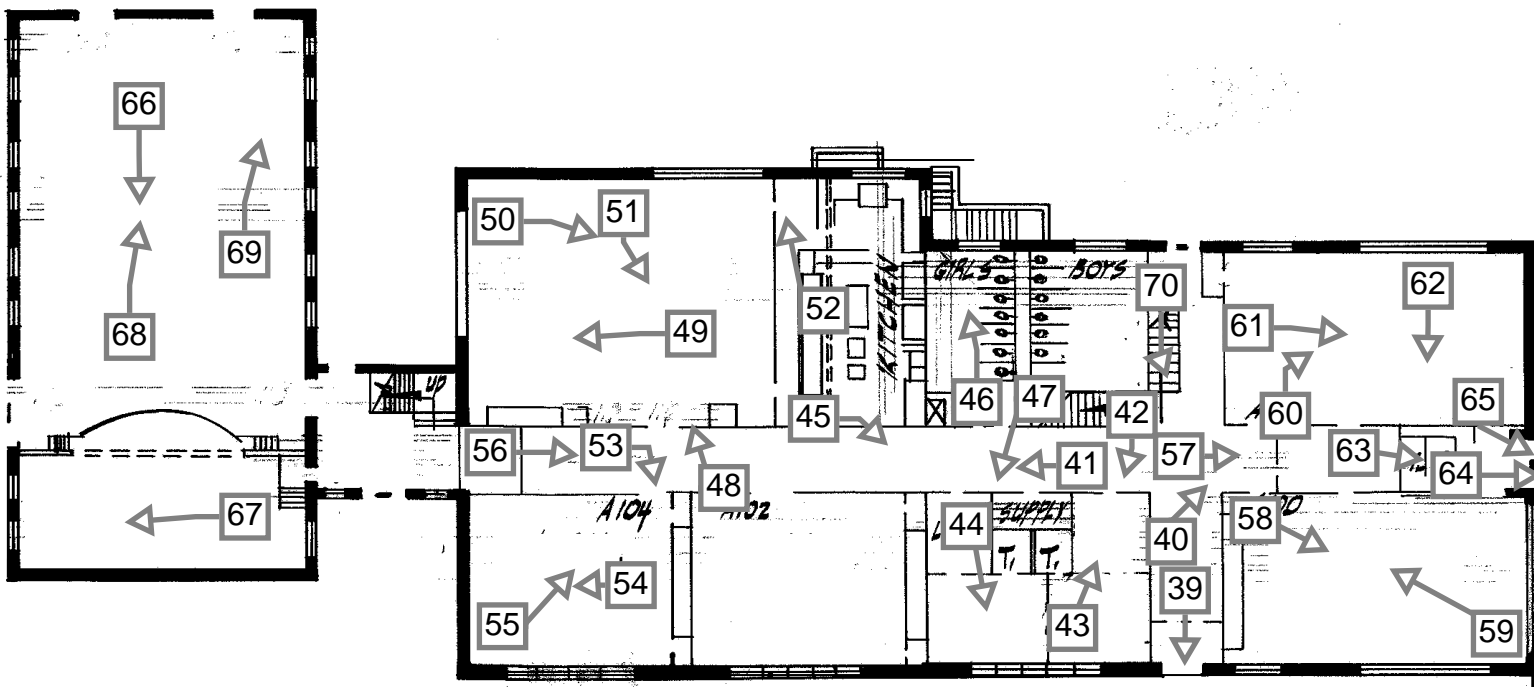


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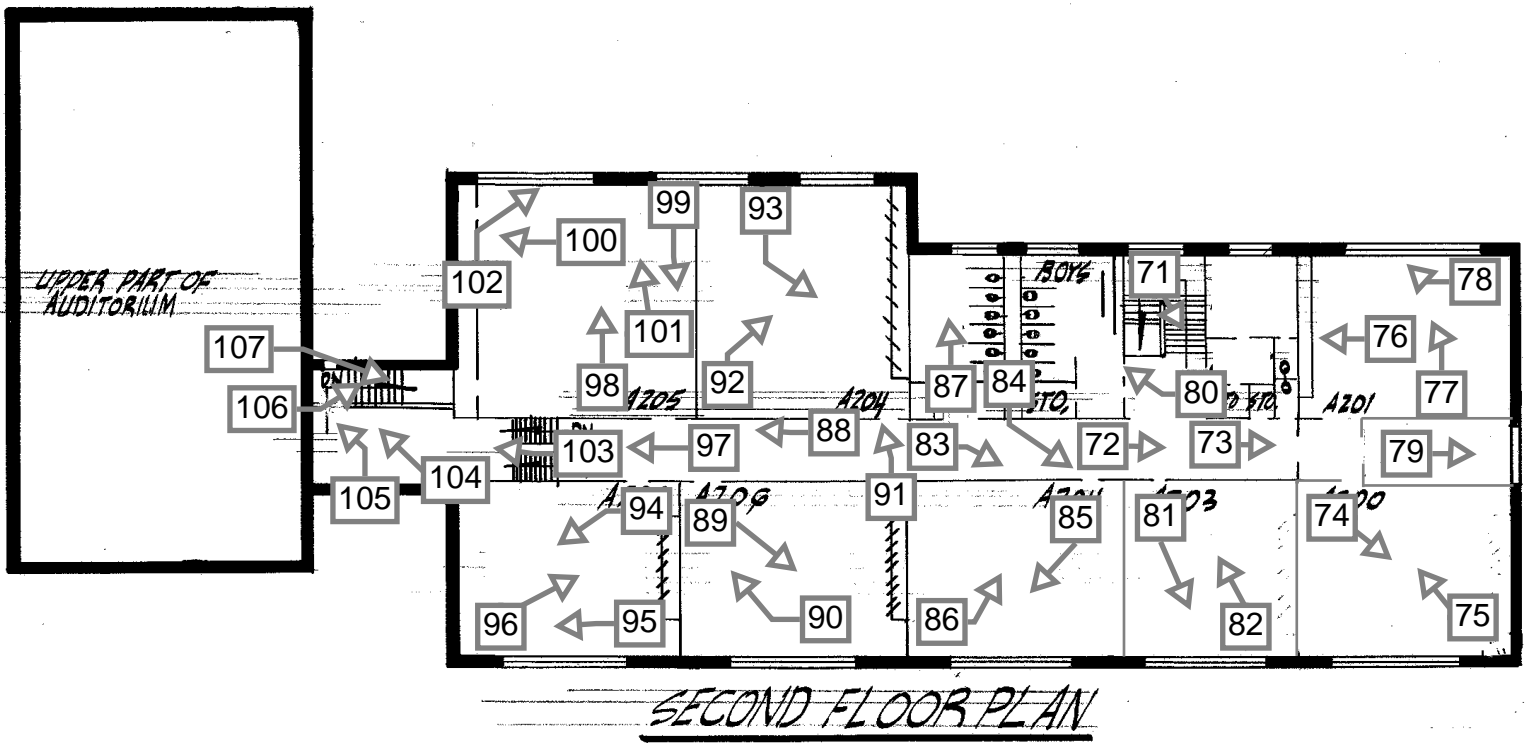
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FIRST FLOOR PLAN



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Historic Tax Credit Application September 16, 2021

Harmony School
1537 Northeast 24th Street
Oklahoma City, Oklahoma 73111

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Project Contact: **Deb Sheals**



Building Preservation, LLC

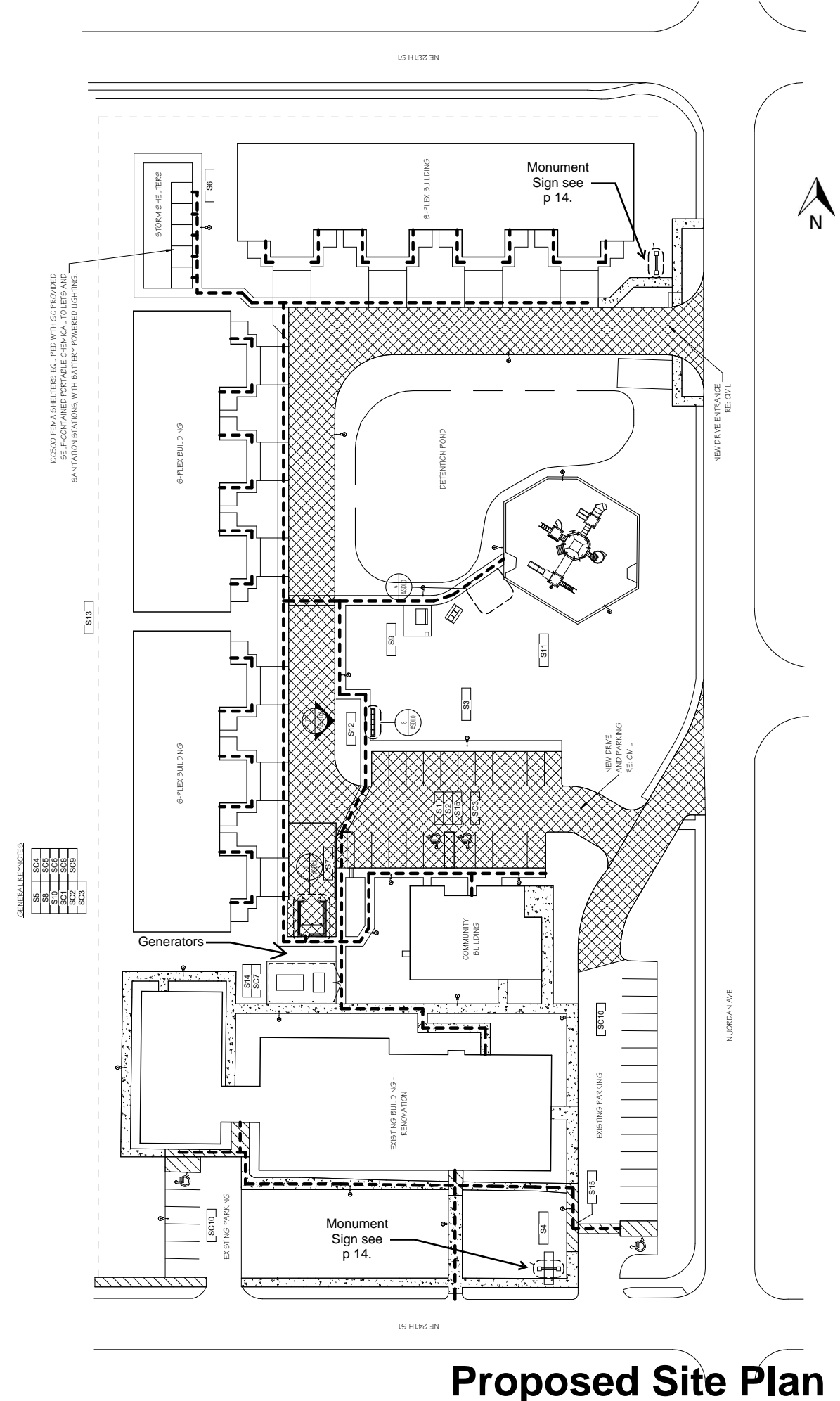
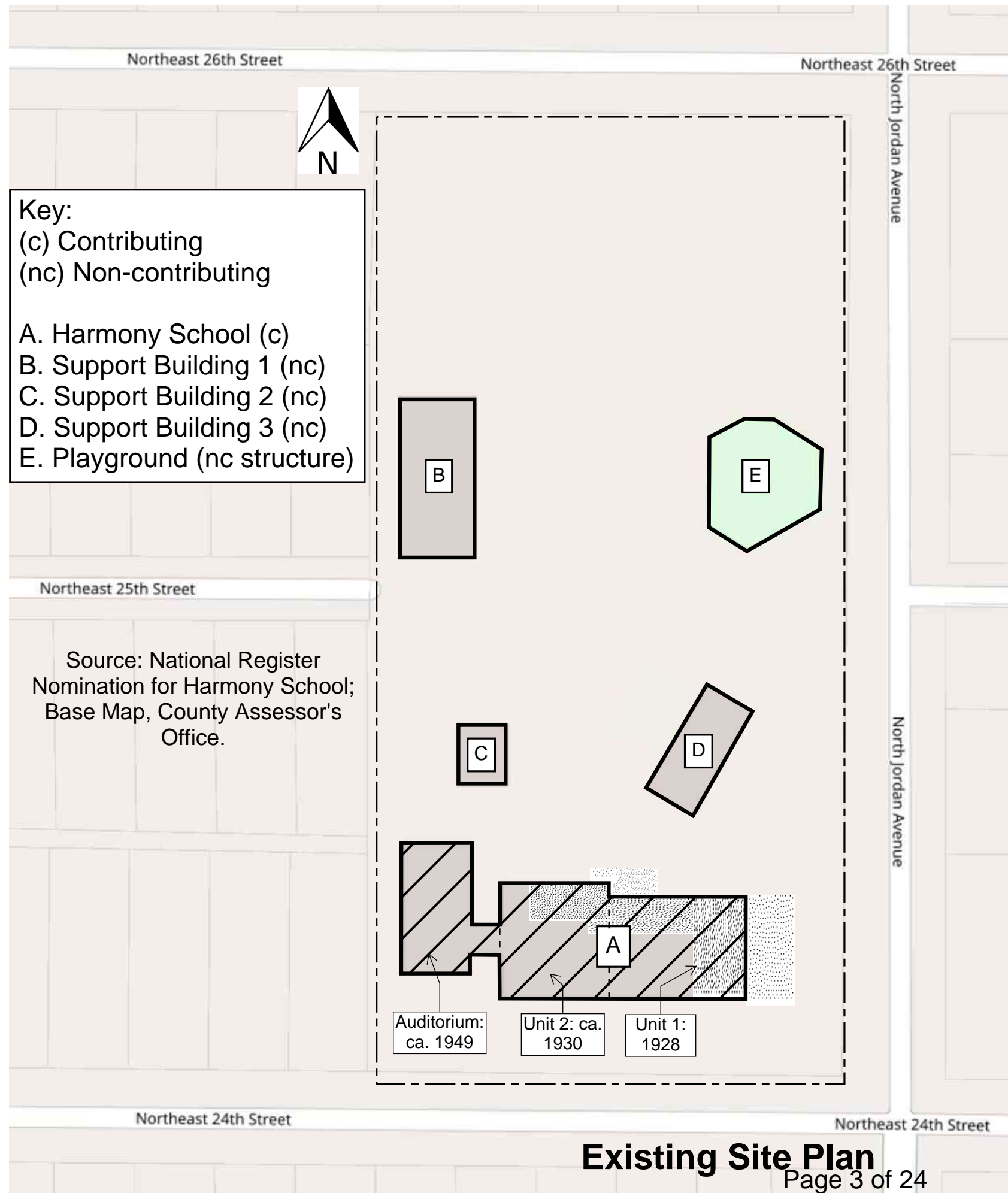
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573.874.3779 debsheals@gmail.com

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ARCHITECTS L.L.C.

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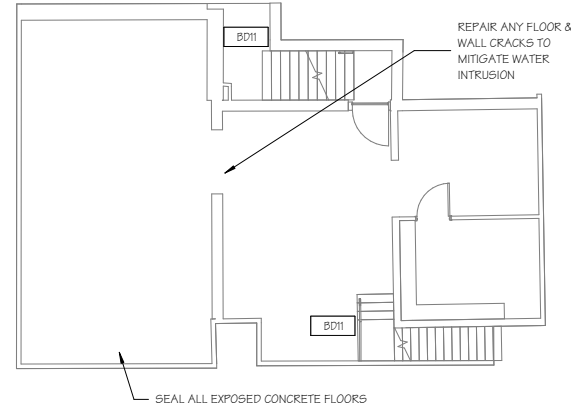
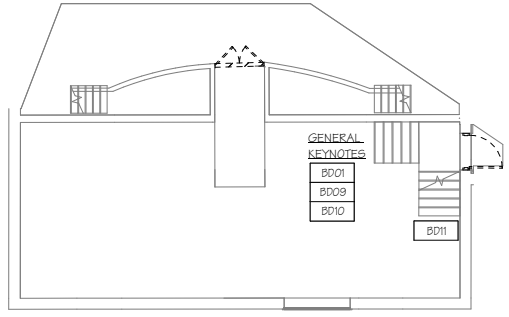




NOTES:
 CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND MEASUREMENTS.
 MITIGATE ANY HAZARDOUS MATERIALS (ASBESTOS, LEAD-BASED PAINT, ETC.) THAT IS IDENTIFIED IN THE OWNER PROVIDED ENVIRONMENTAL REPORT.

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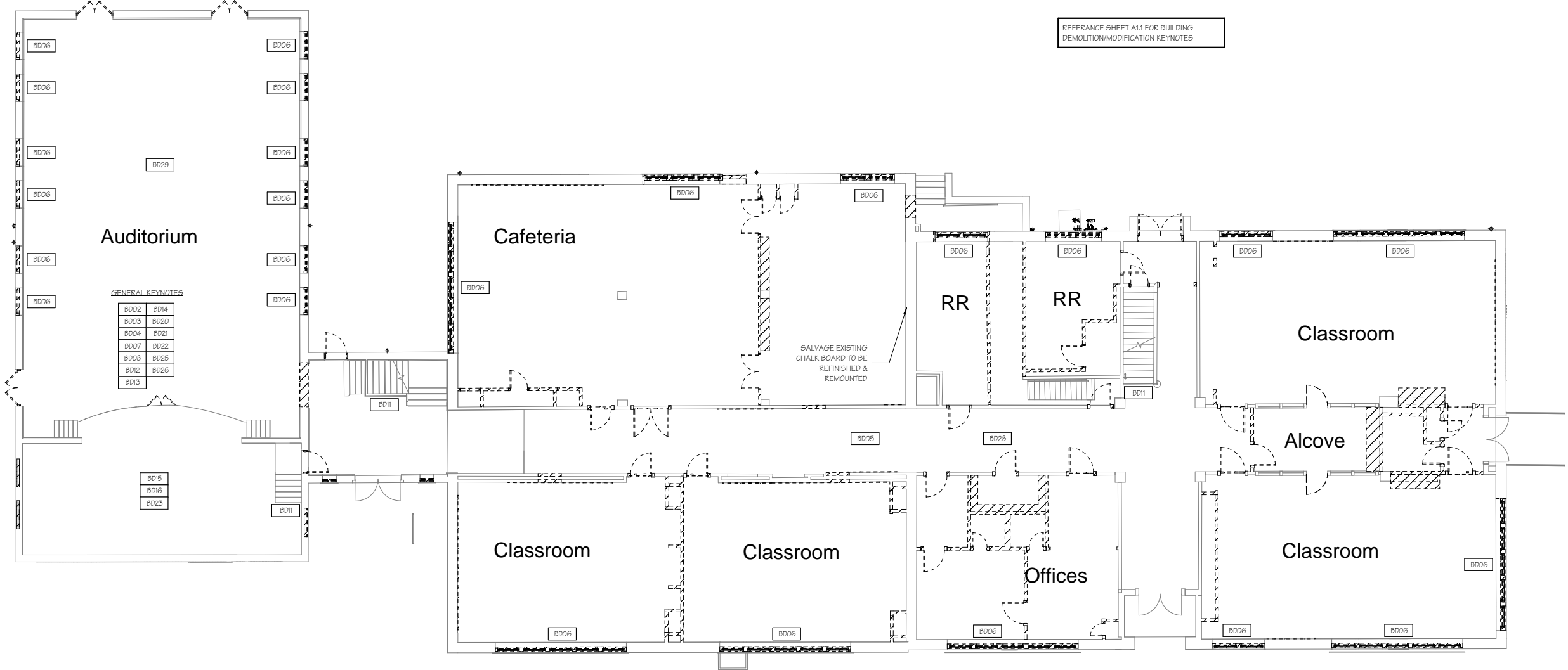
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- = EXISTING DOORS
- = WINDOWS, WALLS, PLUMBING FIXTURES, KITCHEN MILLWORK, ETC. TO BE REMOVED. SEE WINDOW SCHEDULE FOR EXTENT OF WINDOW DEMOLITION REQUIRED.
- = DOORS TO BE REMOVED
- = NEW CONCRETE
- = NEW WINDOWS, PLUMBING FIXTURES, KITCHEN MILLWORK, ETC.
- = NEW WALLS
- = NEW DOORS



BASEMENT DEMO PLAN

1 A1.0 SCALE: 1/8" = 1'-0"

REFERENCE SHEET A1.1 FOR BUILDING DEMOLITION/MODIFICATION KEYNOTES



FIRST FLOOR DEMO PLAN

2 A1.0 SCALE: 1/8" = 1'-0"

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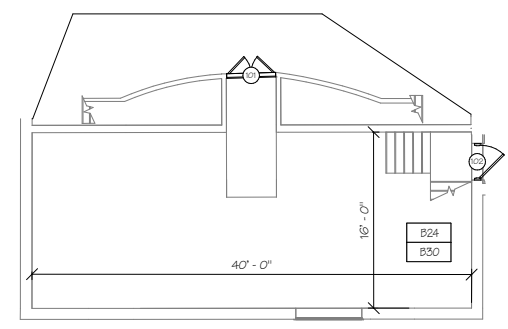
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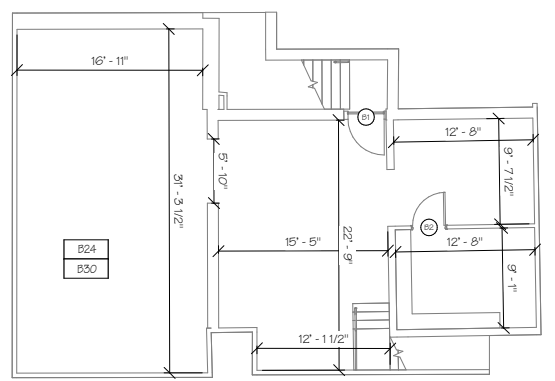
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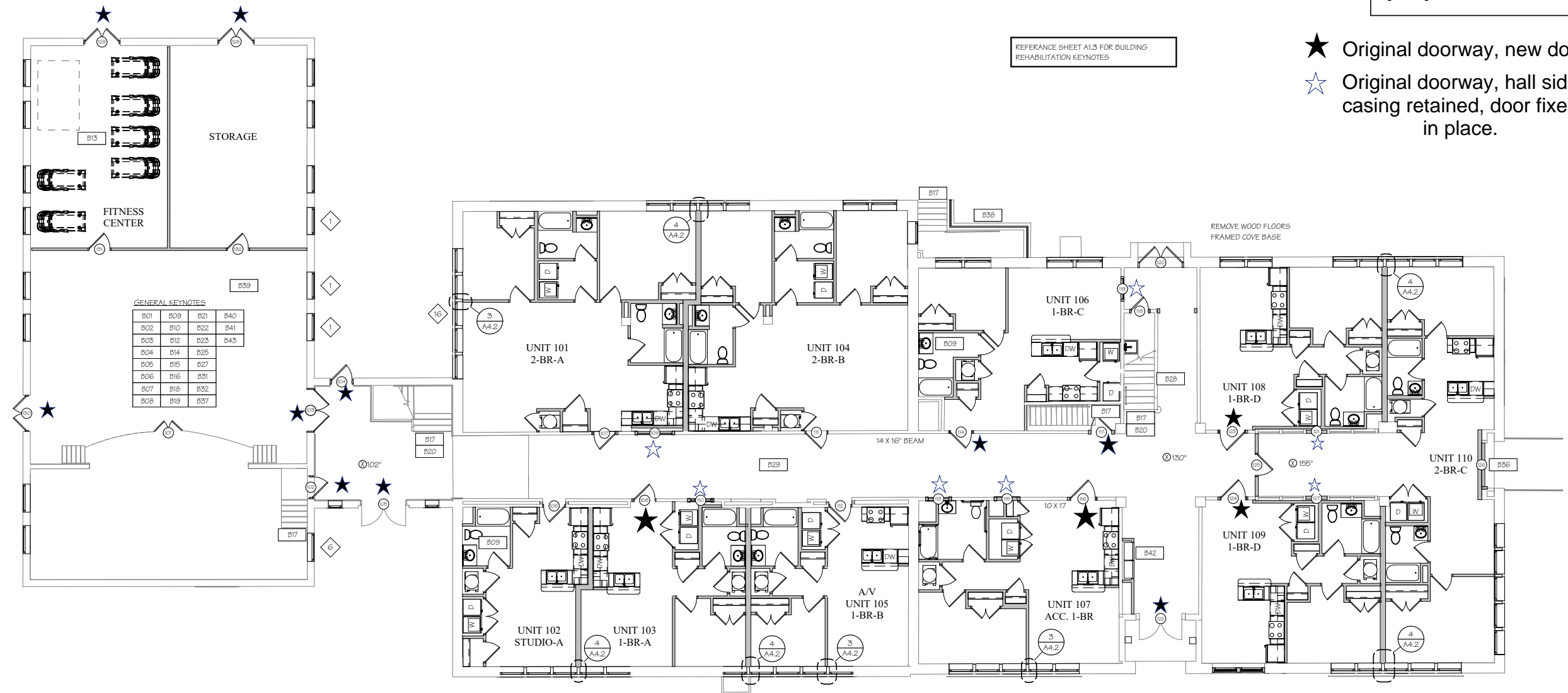


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A1.2
SCALE: 1/8" = 1'-0"
BASEMENT RENOVATED BUILDING PLAN



REFERENCE SHEET A1.3 FOR BUILDING REHABILITATION KEYNOTES

- ★ Original doorway, new door
- ☆ Original doorway, hall side casing retained, door fixed in place.



2
A1.2
SCALE: 1/8" = 1'-0"
FIRST FLOOR RENOVATED BUILDING PLAN

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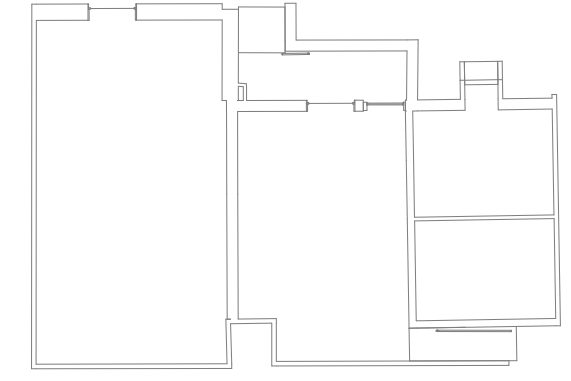
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BASEMENT RENOVATED REFLECTED CEILING PLAN

1
 A8.0 SCALE: 1/8" = 1'-0"



FIRST FLOOR RENOVATED REFLECTED CEILING PLAN

2
 A8.0 SCALE: 1/8" = 1'-0"

**BUILDING DEMOLITION/
MODIFICATIONS KEYNOTES**

- BD01 REMOVE BASEMENT DOOR AND FRAMES AND PREPARE FOR NEW HM FRAME AND INSULATED HM DOOR AND HARDWARE.
- BD02 REMOVE FRAMED WALLS INCLUDING FINISHES (FOR EXAMPLE: FRAMING STUDS, NONLOADBEARING MASONRY WALLS, METAL LATH AND PLASTER), AND SELECTIVE TRIM DEMOLITION.
- BD03 SAW CUT OR CORE, AND REMOVE PORTIONS OF CONCRETE SLAB AS REQUIRED FOR MECHANICAL, ELECTRICAL AND PLUMBING ROUGH-INS. COORDINATE ROUTING WITH MEP AND STRUCTURE. NOTIFY ARCHITECT OF DISCREPANCIES IF PROPOSED PENETRATIONS OR MEP ROUGH-INS CONFLICT WITH EXISTING STRUCTURE.
- BD04 AT AREAS WHERE EXISTING WALLS ARE SHOW TO REMAIN, RETAIN AND PROTECT EXISTING WOOD TRIM AND MILLWORK THAT IS TO BE REFINISHED.
- BD05 AT EXISTING COORIDOR WALLS TO REMIAN, RETAIN AND PROTECT IN PLACE EXISTING DISPLAY CASES AND TRIM TO BE REFINISHED.
- BD06 REMOVE ALL EXISTING WINDOWS AND EXTERIOR PANNING AND PREPARE FOR NEW REPLACEMENT WINDOWS AND PANNING AS APPROVED BY ARCHITECT AND HISTORIC PRESERVATION CONSULTANT. (PROTECT IN PLACE EXISTING CASINGS, TRIM, STROOLS, ETC. TO BE REFINISHED. SEE HISTORIC BREIF9 FOR REQUIREMENTS).
- BD07 REMOVE ALL UNIT INTERIOR EXISTING DISPLAY CASES AND ASSOCIATED FRAMING. VOIDS AND OPENINGS FROM DEMOLITION SHALL BE PATCHED AND/OR INFILL FRAMED TO MATCH ADJACENT FINISH SURFACE AND TEXTURE.
- BD08 REMOVE ALL EXISTING DOORS, HARWARE AND JAMBS. DOOR CASING, TRIM, AND TRANSOMS ARE TO REMAIN AND PROTECTED IN PLACE TO BE REFINISHED. SEE HISTORIC BRIEFS FOR ADDITIONAL REQUIREMENTS.
- BD09 REMOVE EXISTING EQUIPMENT IN BASEMENT AREA. COORDINATE WITH GENERAL CONTRACTOR AND MEP FOR ITEMS TO BE ABANDONED IN PLACE.
- BD10 REMOVE EXISTING SUMP PUMP AND ASSOCIATED EQUIPMENT AND PREPARE FOR INSTALLATION OF NEW SUMP PUMP SYSTEM. (COORDINATE WITH PLUMBING AND ELECTRICAL)
- BD11 REMOVE EXISTING METAL HANDRAILS AT COORIDOR STAIR AND PREPARE FOR INSTALLATION OF NEW METAL HANDRAILS.
- BD12 REMOVE ALL ABANDOND MEP LINES. CAP ALL PLUMBING, ELECTRICAL LINES AND CONDUITS AT ALL SLAB, WALL AND CEILING PENETRATIONS TO BE DEMOLISHED OR ABANDONED. COORDINATE WITH MEP DRAWINGS FOR ALL EXISTING MECHANICAL, PLUMBING AND ELECTRICAL RUNS TO BE REMOVED.
- BD13 REMOVE ALL PLUMBING FIXTURES AND ASSOCIATED DWV, WATER SUPPLY LINES AT EXISTING RESTROOMS. CAP ABONDONED LINES AND SEAL IN WALL AND FLOOR SLAB CONDITIONS. COORDINATE WITH PLUMBING DRAWINGS.
- BD14 REMOVE RAISED FLOOR DOWN TO ADJACENT FINISH FLOOR LEVEL. CAP ABANDONED PIPES AND PENETRATIONS. NOTIFY ARCHITECT OF ANY DISCREPANCIES PRIOR TO COMMENCING WORK.
- BD15 REMOVE EXISTING AUDITORIUM STAGE EQUIPMENT AND LIGHTING. REPAIR WALL, CEILING AND FLOOR DAMAGE CAUSED FROM REMOVAL OF EQUIPMENT AND MATCH ADJACENT FINISH AND TEXTURE.
- BD16 REMOVE AREAS OF DAMAGED WOOD AUDITORIUM STAGE FLOORING AND REPAIR. PREPARE WOOD FLOORING SYSTEM TO BE REFINISHED. SEE HISTORIC PRESERVATION BRIEFS FOR ADDITIONAL INFORMATION.
- BD17 CUT OPENING IN EXISTING ROOF FOR MECHANICAL PENETRATIONS. VERIFY FINAL LOCATION AND SIZE WITH MECHANICAL DRAWINGS/ENGINEER. PROPERLY FLASH AND SEAL AROUND ROOF PENETRATION AND/OR EQUIPMENT CURBS.
- BD18 SAW CUT AND REMOVE PORTIONS OF EXTERIOR MASONRY WALL TO ACCOMODATE NEW MEP PENETRATIONS. COORDINATE LOCATION IN FIELD WITH MEP ROUTING.
- BD19 REMOVE EXISTING RTU AND MECHANICAL EQUIPMENT FROM EXISTING ROOF AREAS. REMOVE EXISTING EQUIPMENT CURBS TO BE FLUSH ADJACENT ROOF SURFACE AND INFILL FRAME MECHANICAL OPENING WITH 2X10 PERIMETER BOX FRAME EPOXY ANHORED TO EXISTING STRUCTURE, WITH 2X10'S PLACED 16"O.C. WITH SIMPSON HANGERS. (COORDINATE WITH MECHANICAL)



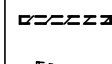

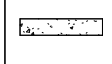
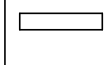


**BUILDING DEMOLITION/
MODIFICATIONS KEYNOTES**

- BD20 PROVIDE ASBESTOS ABATEMENT/REMEDATION PER PHASE 1 ENVIRONMENTAL SITE ASSESSMENT REPORT BY A LICENSED CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITY.
- BD21 PROVIDE LEAD-PAINT ABATEMENT/REMEDATION PER PHASE 1 ENVIRONMENTAL SITE ASSESSMENT REPORT BY A LICENSED CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITY
- BD22 REMOVE AND DISCARD ALL LAYERS OF EXISTING APPLIED FLOOR FINISHES AND ADHESIVES DOWN TO HARD SURFACES SUCH AS CONCRETE AND TERRAZZO.
- BD23 REMOVE ABANDONED MECHANICAL AND ELECTRICAL EQUIPMENT BELOW AUDITORIUM STAGE IN MECHANICAL CRAWL SPACE.
- BD24 REMOVE EXISTING ROOF HATCH AND PREPARE FOR INSTALLATION OF NEW ROOF HATCH SYSTEM.
- BD25 REMOVE ALL EXISTING SUSPENDED CEILING AND PREP FOR NEW CEILING FINISHES; SEE FINISH SCHEDULE AND REFLECTED CEILING PLANS.
- BD26 FIELD INSPECT AND REMOVE ANY DAMAGED PLASTER AT WALLS TO REMAIN AND PREPARE FOR NEW FINISHES OF MATCHING FINISH TEXTURE.
- BD27 AT EXISTING EXTERIOR WALL LOUVERS,PREPARE OPENING TO BE INFILLED. MATCH ADJACENT MATERIALS, FINISHES, AND TEXTURE.
- BD28 REMOVE EXISTING TONGUE AND GROOVE WOOD FLOORING WHERE OCCURS AND PREPARE SUBFLOOR OR CONCRETE SLAB AS REQUIRED FOR NEW FLOOR FINISHES (AUDITORIUM WOOD FLOORING TO BE REPAIRED AND REFINISHED).
- BD29 REMOVE EXISTING AUDITORIUM VINYL FLOOR TILE AS PART OF HAZARDOUS MATERIAL ABATEMENT AND PREPARE SURFACES FOR NEW FLOOR FINISHES PER FINISH SCHEDULE

NOTES:
CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND MEASUREMENTS.

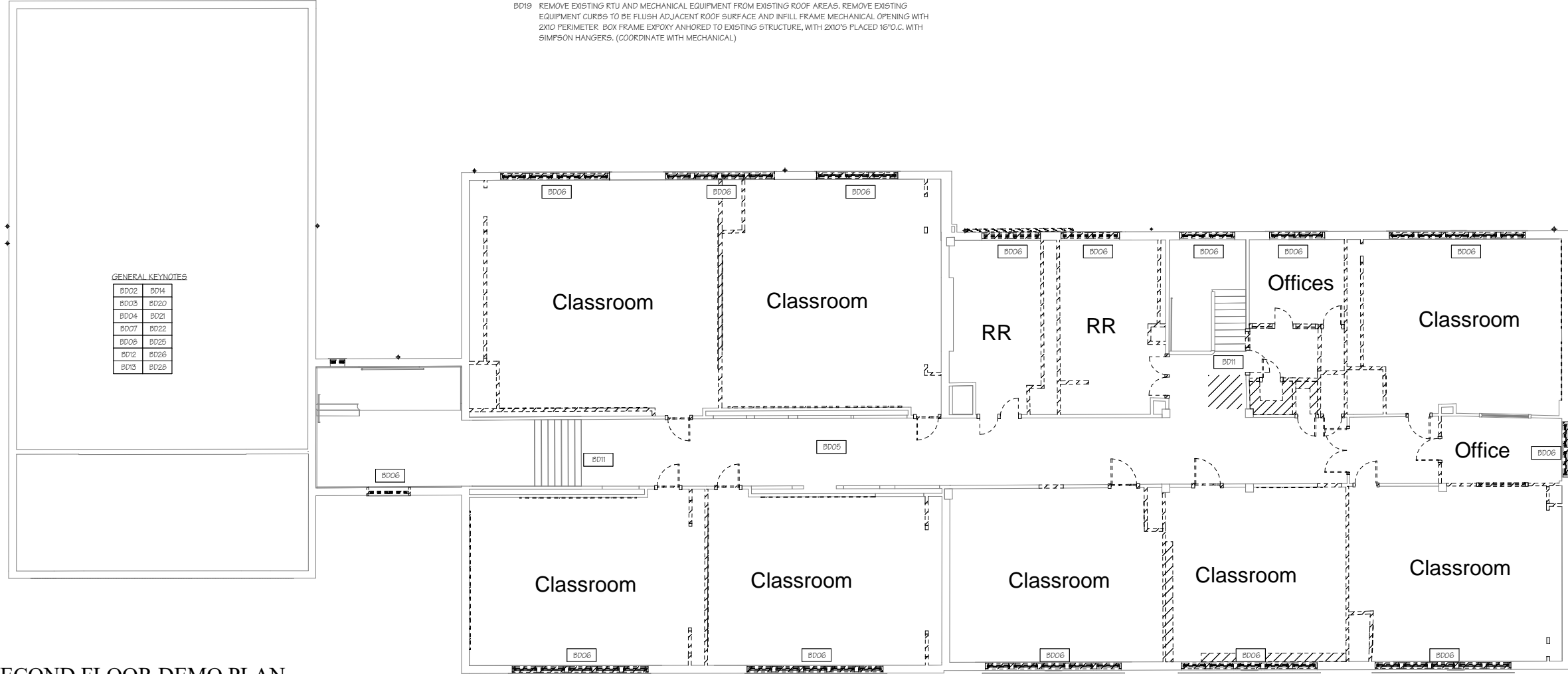
MITIGATE ANY HAZARDOUS MATERIALS (ASBESTOS, LEAD-BASED PAINT, ETC.) THAT IS IDENTIFIED IN THE OWNER PROVIDED ENVIRONMENTAL REPORT.

LEGEND

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-  = EXISTING DOORS
-  = WINDOWS, WALLS, PLUMBING FIXTURES, KITCHEN MILLWORK ETC. TO BE REMOVED. SEE WINDOW SCHEDULE FOR EXTENT OF WINDOW DEMOLITION REQUIRED.
-  = DOORS TO BE REMOVED
-  = NEW CONCRETE
-  = NEW WINDOWS, PLUMBING FIXTURES, KITCHEN MILLWORK ETC.
-  = NEW WALLS
-  = NEW DOORS

GENERAL KEYNOTES

BD02	BD14
BD03	BD20
BD04	BD21
BD07	BD22
BD08	BD25
BD12	BD26
BD13	BD28



1 SECOND FLOOR DEMO PLAN
SCALE: 1/8" = 1'-0"

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BUILDING REHABILITATION KEYNOTES

- B01 AT AREAS WHERE EXISTING CORRIDOR WALLS ARE SHOWN TO REMAIN REFINISH EXISTING TRIM, CASINGS, SIDE LITE WINDOW FRAMES, AND MILLWORK. REPLICATE EXISTING COMPONENTS AND TRIM TO FILL IN WITH NEW COMPONENTS AND TRIM WHERE THEY ARE MISSING OR DAMAGED BEYOND REPAIR. NEW COMPONENTS OR TRIM SHALL MATCH EXISTING IN MATERIAL, SIZE, DIMENSIONS, SHAPE, DETAIL AND FORM. CLEAN AND SAND OR STRIP FINISHES FROM EXISTING WOOD COMPONENTS AND TRIM. PREPARE WOOD SURFACES FOR NEW FINISH. STAIN NEW AND OLD PARTS TO MATCH HISTORIC, PRIME AND PAINT. (COLOR/FINISHES TO BE APPROVED BY OWNER AND HISTORIC PRESERVATION CONSULTANT.) APPLY PROTECTIVE MATTE POLYURETHANE COATING(S).
- B02 INSTALL NEW DOORS AND HARDWARE PER DOOR SCHEDULE, & SPECIFICATIONS.
- B03 PROVIDE AND INSTALL NEW WALL OR BASE DOORSTOPS AT ALL OPERABLE DOORS
- B04 INSTALL WOOD BASEBOARD TRIM THROUGHOUT. REUSE SALVAGED WOOD BASEBOARD MATERIAL RECOVERED DURING DEMOLITION. PROVIDE AND INSTALL NEW WOOD BASEBOARD AS NEEDED TO SUPPLEMENT SALVAGED MATERIAL FOR A COMPLETE INSTALLATION. CONCENTRATE BEST SALVAGED MATERIALS IN THE MOST PUBLIC SPACES. USE ONLY ONE KIND OF BASEBOARD IN EACH SPACE. SALVAGED OR NEW, AS MUCH AS POSSIBLE. CLEAN AND SAND OR STRIP FINISHES FROM EXISTING WOOD COMPONENTS AND TRIM. PREPARE WOOD SURFACES FOR NEW FINISH. STAIN NEW AND OLD PARTS TO MATCH HISTORIC STAIN COLOR. APPLY PROTECTIVE MATTE POLYURETHANE COATING(S).
- B05 APPLY LIGHT TEXTURE FINISH AT ALL NEW WALLS AND GYP. BD. CEILINGS.
- B06 PREPARE INTERIOR SURFACES FOR PAINTED FINISH. PRIME AND PAINT INTERIOR WALLS AND CEILINGS WITH LOW VOC PAINT. COLORS SHALL BE AS SELECTED BY OWNER AND REVIEWED/APPROVED BY HISTORIC PRESERVATION CONSULTANT.
- B07 PROVIDE AND INSTALL NEW FLOOR FINISHES PER FINISH SCHEDULE. (WOOD GRAIN PATTERNS ARE NOT ACCEPTABLE PER HISTORIC BRIEFS)
- B08 PROVIDE AND INSTALL NEW STUD-CAVITY WOOD BLOCKING WHERE REQUIRED TO FIRMLY SECURE WALL MOUNTED ACCESSORIES.
- B09 PROVIDE AND INSTALL NEW TOILET ACCESSORIES AT ALL RESTROOMS AND BATHROOMS. SEE PLANS AND SPECS.
- B10 INSTALL NEW BUILDING COMMON AREA AND TENANT SIGNAGE, EMERGENCY EGRESS PATH SIGNAGE AND NEW FEMA TORNADO SAFE ROOM MAXIMUM OCCUPANT LOAD SIGN (MAX OCCUPANCY SIGNAGE PER EACH FEMA SHELTER, FIVE TOTAL), TORNADO SHELTER ENTRANCE AND PATHWAY SIGNAGE (PER 2015 IBC, ICC500/NSA, 2015 FEMA P-361 AND OUBCC STORM SHELTER REQUIREMENTS.)
- B11 FIX NEW DOOR IN PLACE AND REMOVE DOOR HARDWARE. DOOR TRIM TO REMAIN AND TO RECEIVE NEW FINISHES. SEE DOOR DETAILS.
- B12 SEE MECHANICAL, ELECTRICAL, AND PLUMBING SHEETS FOR TRADE REQUIREMENTS.
- B13 COORDINATE FINAL LOCATION OF FITNESS EQUIPMENT WITH OWNER AND ARCHITECT. COORDINATE ELECTRICAL REQUIREMENTS AND INSTALLATION OF FITNESS EQUIPMENT.
- B14 AT AREAS WHERE EXISTING WALLS ARE SHOWN TO REMAIN, RETAIN AND PROTECT EXISTING INTERIOR BASE, TRIM, CASING, MILLWORK, ETC.
- B15 INFILL FRAME AT ALL DISPLAY CASES, FEATURES AND RECESSED ELEMENTS AT INTERIOR SIDE OF RESIDENTIAL UNITS. INSTALL NEW PARTITION WALLS AND FINISHES AS INDICATED.
- B16 PATCH AND REPAIR ALL FLOOR OPENINGS PER THE BUILDING CONCRETE REPAIR SPECIFICATION. #4 BAR AT 1'-0" O.C. MAX. SHALL BE EPOXY INTO THE EXISTING CONCRETE AT MID-DEPTH OF SLAB THICKNESS WITH 4" HILTI HY 200 EPOXY EMBEDMENT.
- B17 REPAIR AND MAINTAIN EXISTING WOOD HISTORIC GUARDRAILS/HANDRAILS, PREP AND FINISH (FINISH SHALL BE AS SELECTED BY OWNER AND REVIEWED/APPROVED BY HISTORIC PRESERVATION CONSULTANT). WHERE A HANDRAIL IS EXISTING ON ONLY ONE SIDE OF A STAIRWAY, INSTALL A NEW HANDRAIL ON THE OTHER SIDE, FABRICATED AND FINISHED TO MATCH THE EXISTING HISTORIC HANDRAIL. FINISHES AND PROFILES TO BE APPROVED BY THE OWNER AND HISTORIC PRESERVATION CONSULTANT.
- B18 EXISTING TERRAZZO FLOOR FINISHES SHALL REMAIN, PROTECT TERRAZZO FLOOR FROM DAMAGE DURING CONSTRUCTION OPERATIONS. REPAIR, CLEAN AND POLISH.

BUILDING REHABILITATION KEYNOTES

- B19 REPAIR PLASTER CEILING IN KIND AS REQUIRED. FINISH TO MATCH ADJACENT CONSTRUCTION.
- B20 CONSTRUCT 18" VERTICAL DRAFT CURTAINS ACROSS OPEN STAIRS PER NFPA 13 WITH SPRINKLER HEADS SPACED AT 8'-0" O.C. MAX (VERIFY LOCATIONS WITH ARCHITECT, G.C. AND FIRE SUPPRESSION CONTRACTOR).
- B21 INSTALL NEW CEILING PER FINISH SCHEDULE AND REFLECTED CEILING PLANS.
- B22 COORDINATE WITH MEP DRAWINGS FOR EXISTING MECHANICAL CHASE LOCATIONS TO BE REUSED FOR NEW CONSTRUCTION.
- B23 FIX ALL EXISTING CORRIDOR TRANSOM WINDOWS IN PLACE BEFORE NEW CEILING INSTALLATION. INSTALL FRP LAMINATED GYPSUM BOARD PANEL INFILLS TO THE UNIT SIDE GLAZING. SEE THE DOOR AND WINDOW DETAILS.
- B24 CLEAN AND SEAL BASEMENT STAIRS AND FLOORING PER SPECS.
- B25 EXISTING LOUVER, FRAME, SILLS, TO REMAIN IN PLACE AND TO BE REFINISHED. PREPARE OPENING FROM UNIT INTERIORS SIDE TO BE INFILL FRAMED W/ INSULATED METAL 6" STUDS (R-19 INSULATION), 7/16" EXTERIOR TREATED SHEATHING, BUILDING WRAP AT INTERIOR SIDE OF LOUVER TO SEAL OFF EXISTING OPENING AND CREATE A WEATHER TIGHT ENCLOSURE.
- B26 SEAL EXTERIOR MASONRY CONDITIONS WITH A TRANSPARENT SEALER AS APPROVED BY HISTORIC PRESERVATION CONSULTANT AND AS INDICATED BY HISTORIC BRIEFS.
- B27 MECHANICAL LOUVERS TO BE PAINTED TO MATCH ADJACENT WALLFINISH MATERIAL COLOR.
- B28 ALL FIRE SUPPRESSION SPRINKLER HEADS SHALL BE PAINTED TO MATCH ADJACENT FINISH COLOR FOR ALL LOCATIONS. TYPICAL.
- B29 EXISTING CORE WALLS TO REMAIN AS INDICATED. PREPARE AND APPLY NEW FINISH (COLOR AND FINISHES TO BE APPROVED BY OWNER AND HISTORIC PRESERVATION CONSULTANT)
- B30 DEMO BASEMENT SLAB AS NEEDED TO REPAIR DAMAGED SUMP PIT AND AS REQUIRED FOR INSTALLATION OF NEW SUMP PUMP SYSTEM.
- B31 AT THE EXISTING WINDOWS SILLS AND APRONS, RESTORE TO MATCH ORIGINAL WHERE NEW OR REPLACEMENT SILL AND APRONS ARE REQUIRED. TRIM PROFILES SHALL MATCH ORIGINAL PROFILES. (OBTAIN APPROVAL FROM HISTORIC PRESERVATION CONSULTATION ON RESTORED AND NEW TRIM.)
- B32 AT ALL BUILDING WINDOWS THAT EXCEED 9 SQ. FT. IN AN INDIVIDUAL PANE, AND WHERE THE BOTTOM EDGE OF THE GLAZING IS LESS THAN 18" A.F.F. AND THE TOP EDGE OF THE GLAZING IS MORE THAN 36" A.F.F. AND ONE OF MORE WALKING SURFACES ARE WITHIN 36" MEASURED HORIZONTALLY AND IN A STRAIGHT LINE OF THE PLANE OF THE GLAZING, INSTALL A HORIZONTAL RAIL 34-38" A.F.F. THE RAIL SHALL BE CAPABLE OF SUPPORTING SOLBS PER IBC 1607.1. HORIZONTAL LOAD, WITHOUT CONTACTING THE GLASS AND BE 1" X 15" IN CROSS SECTIONAL HEIGHT. SUBMIT MOCK UP OF RAIL AND ATTACHMENT TO ARCHITECT AND HISTORIC PRESERVATION CONSULTANT.
- B33 REPAIR AND/OR REPLACE DAMAGED STONE COPING AND REPLACE THRU WALL FLASHINGS, RAKE AND RESEAL ALL COPING JOINTS.
- B34 ROOFING CONTRACTOR SHALL COORDINATE WITH MEP TRADE WORK. ROOF PENETRATIONS TO PROPERLY PROVIDE AND INSTALL ALL TPO FLASHINGS/ACCESSORIES TO COMPLETE ALL REQUIRED TPO ROOFING MODIFICATIONS. ROOFING CONTRACTOR TO COORDINATE WITH TPO ROOFING MANUFACTURER
- B35 PROVIDE NEW 60 MIL TPO ROOFING MEMBRANE AND ALL ASSOCIATED FLASHINGS, PITCH PANS, TERMINATIONS, ETC.
- B36 AT EAST BUILDING ENTRANCE FIX PAIR OF ALUMINUM FULL GLASS DOORS IN PLACE, MOUNTED WITHOUT OPERABLE HARDWARE WITH FULL PERIMETER SEALANTS FOR A COMPLETE AND WEATHER TIGHT ASSEMBLY. DOORS TO BE ENCLOSED WITH NEW INTERIOR WALL FRAMING AND FINISHES AT INTERIOR SIDE OF RESIDENTIAL UNIT.
- B37 COORDINATE FINAL LOCATIONS FOR SECURITY SYSTEMS AND SURVEILLANCE CAMERAS WITH OWNER, ARCHITECT AND HISTORIC CONSULTANT PRIOR TO COMMENCING WORK
- B38 PROVIDE NEW 42" METAL GUARDRAIL AT EXTERIOR STAIRS TO BASEMENT MOUNTED TO TOP OF RETAINING WALL WITH EPOXY ANCHORS. PROVIDE NEW WALL MOUNTED HANDRAIL AT EXTERIOR STAIR INSTALLED AT 34"-36" AFF WITH 12" EXTENSIONS AT EACH END.
- B39 REPAIR WATER DAMAGE AT AUDITORIUM WALL TILE WAINSCOT. REMOVE/RAKE DAMAGED MORTAR/GROUT AND REPLACE WITH NEW COLOR MATCHED GROUT.
- B40 SEAL ALL EXPOSED CONCRETE FLOORS AT CORRIDORS AND BASEMENT.
- B41 PRESERVE IN PLACE EXISTING POURED WALL BASE COVES AT EXTERIOR WALLS AND CORRIDOR WALL LOCATIONS. COORDINATE NEW FLOORING TRANSITIONS WITH FLOORING CONTRACTOR.
- B42 PROVIDE NEW MAIL BOXES RECESS MOUNTED IN NEW FRAMED ENCLOSURE WITH PAINTED GYPSUM AND LIGHT TEXTURE FINISH
- B43 PROVIDE NEW AUDITORIUM COMMON AREA FLOORING, 12" X 24" VCT AS APPROVED

NOTES:
CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND MEASUREMENTS.

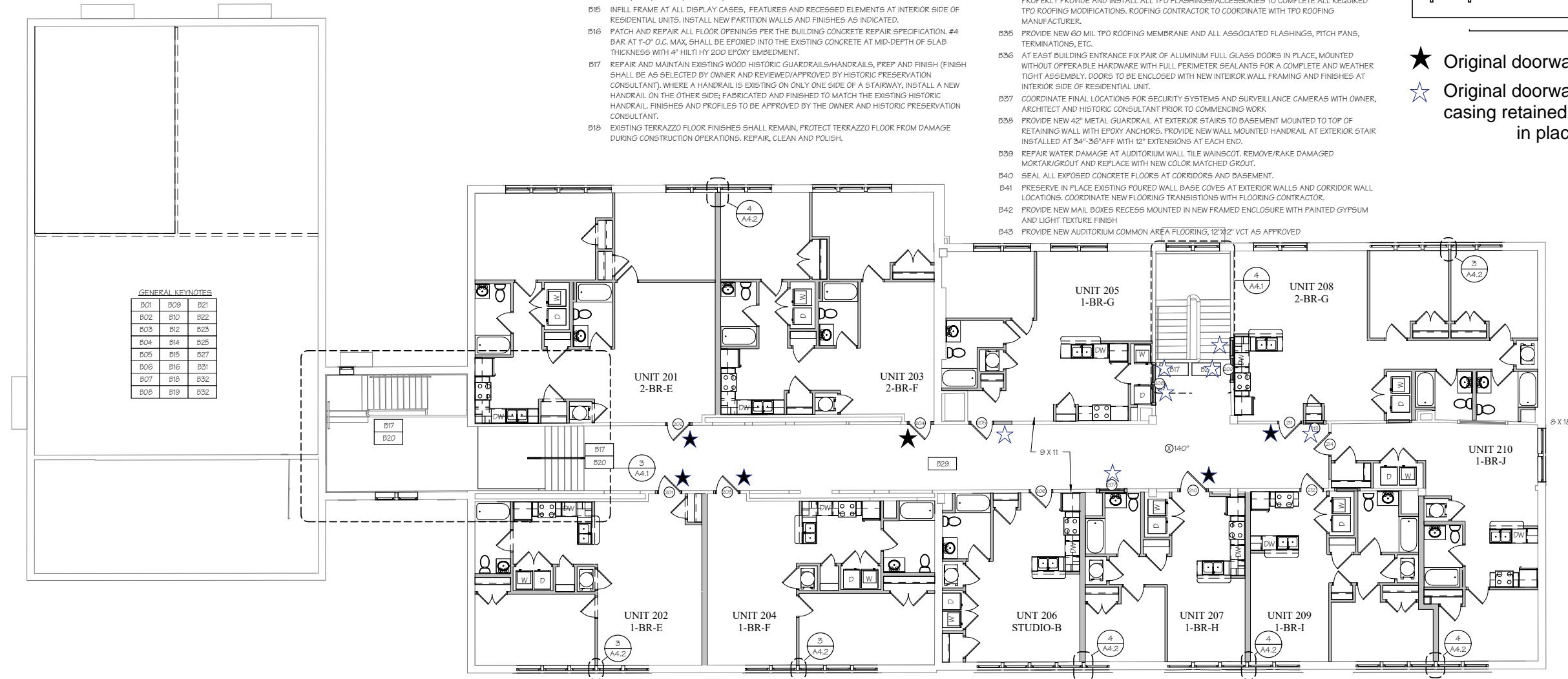
MITIGATE ANY HAZARDOUS MATERIALS (ASBESTOS, LEAD-BASED PAINT, ETC.) THAT IS IDENTIFIED IN THE OWNER PROVIDED ENVIRONMENTAL REPORT.

LEGEND

- = EXISTING WINDOWS, WALLS, PLUMBING FIXTURES, KITCHEN MILLWORK, ETC.
- = EXISTING DOORS
- = WINDOWS, WALLS, PLUMBING FIXTURES, KITCHEN MILLWORK, ETC. TO BE REMOVED. SEE WINDOW SCHEDULE FOR EXTENT OF WINDOW DEMOLITION REQUIRED.
- = DOORS TO BE REMOVED
- = NEW CONCRETE
- = NEW WINDOWS, PLUMBING FIXTURES, KITCHEN MILLWORK, ETC.
- = NEW WALLS
- = NEW DOORS

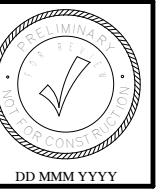
- ★ Original doorway, new door
- ☆ Original doorway, hall side casing retained, door fixed in place.

GENERAL KEYNOTES		
B01	B09	B21
B02	B10	B22
B03	B12	B23
B04	B14	B25
B05	B15	B27
B06	B16	B31
B07	B18	B32
B08	B19	B32



SECOND FLOOR RENOVATED BUILDING PLAN

1 A1.3 SCALE: 1/8" = 1'-0"



MARCUS GARVEY HARMONY APARTMENTS
OKLAHOMA CITY, OKLAHOMA COUNTY, OKLAHOMA

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NOTES:
 CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND MEASUREMENTS.
 MITIGATE ANY HAZARDOUS MATERIALS (ASBESTOS, LEAD-BASED PAINT, ETC.) THAT IS IDENTIFIED IN THE OWNER PROVIDED ENVIRONMENTAL REPORT.

Unless otherwise noted, ceilings will be lowered no more than 4" and covered with painted gypboard.



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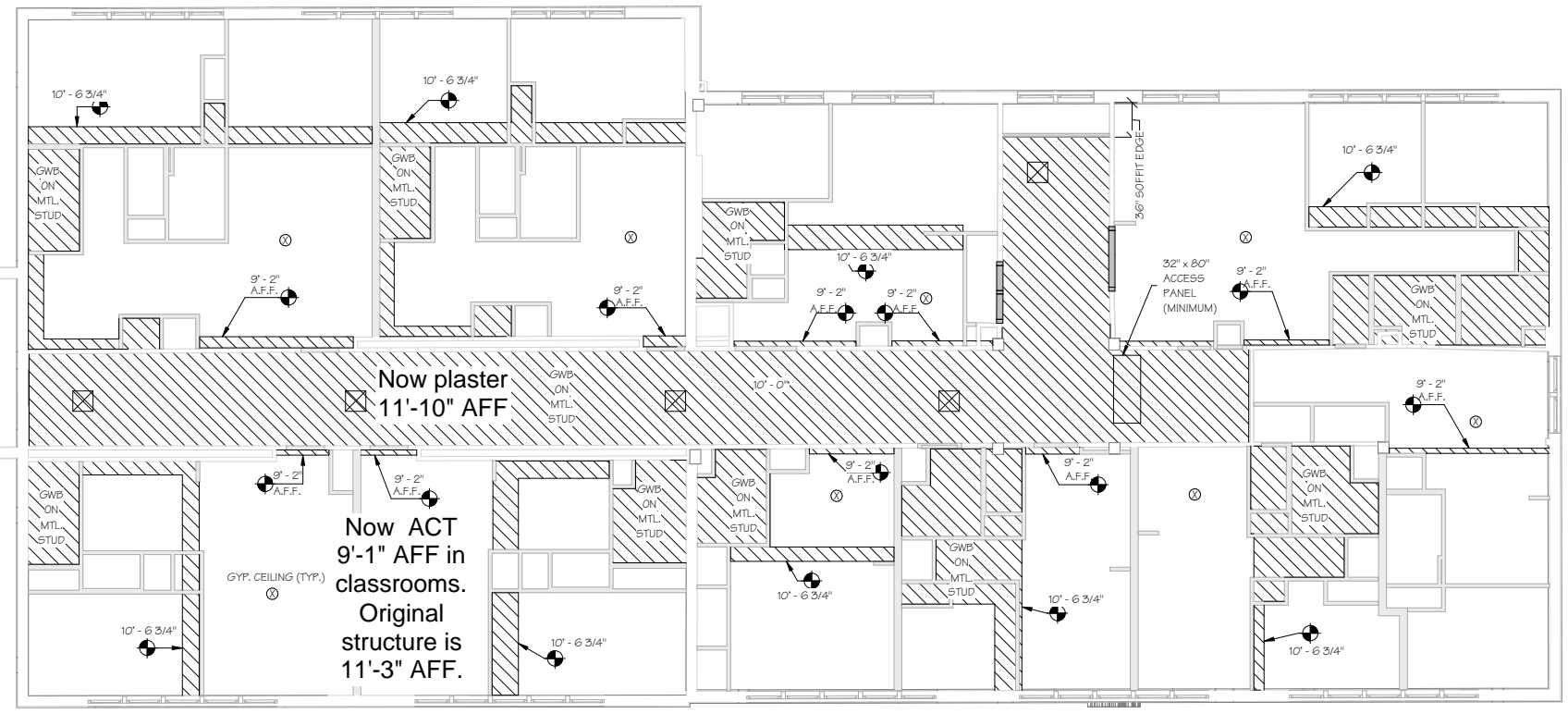
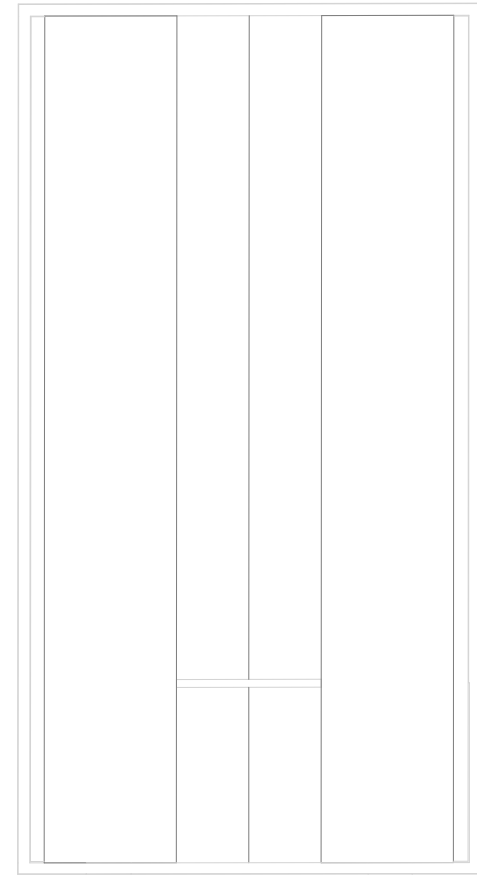
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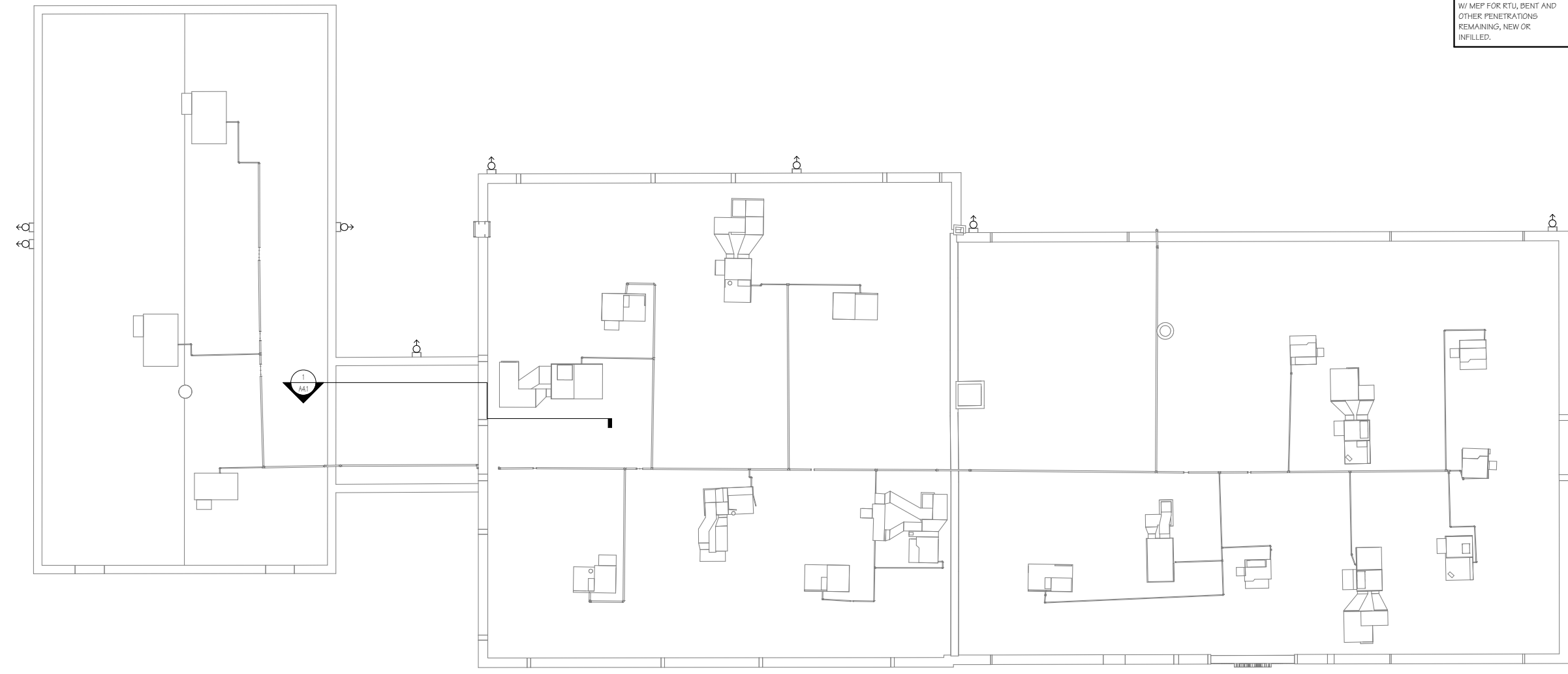
SECOND FLOOR RENOVATED REFLECTED CEILING PLAN
 SCALE: 1/8" = 1'-0"

NOTES:
 CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND MEASUREMENTS.

MITIGATE ANY HAZARDOUS MATERIALS (ASBESTOS, LEAD-BASED PAINT, ETC.) THAT IS IDENTIFIED IN THE OWNER PROVIDED ENVIRONMENTAL REPORT.



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GENERAL NOTES:
 COORDINATE ROOFING REMOVAL AND REPLACEMENT W/ MEP FOR RTU, DUCT AND OTHER PENETRATIONS REMAINING, NEW OR INFILLED.

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2 ROOF PLAN Existing
 A2.0 SCALE: 1/8" = 1'-0"

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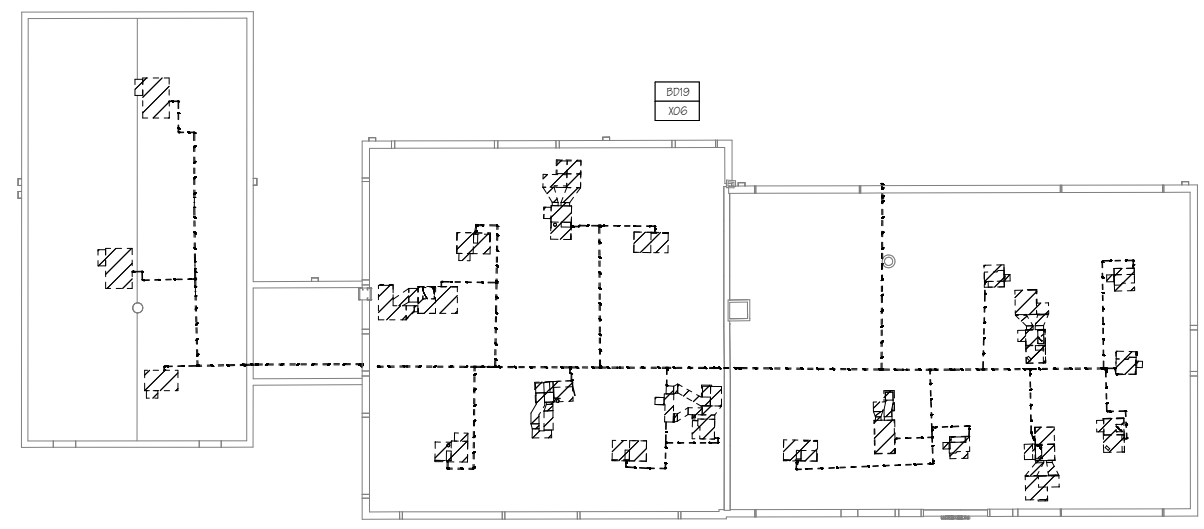
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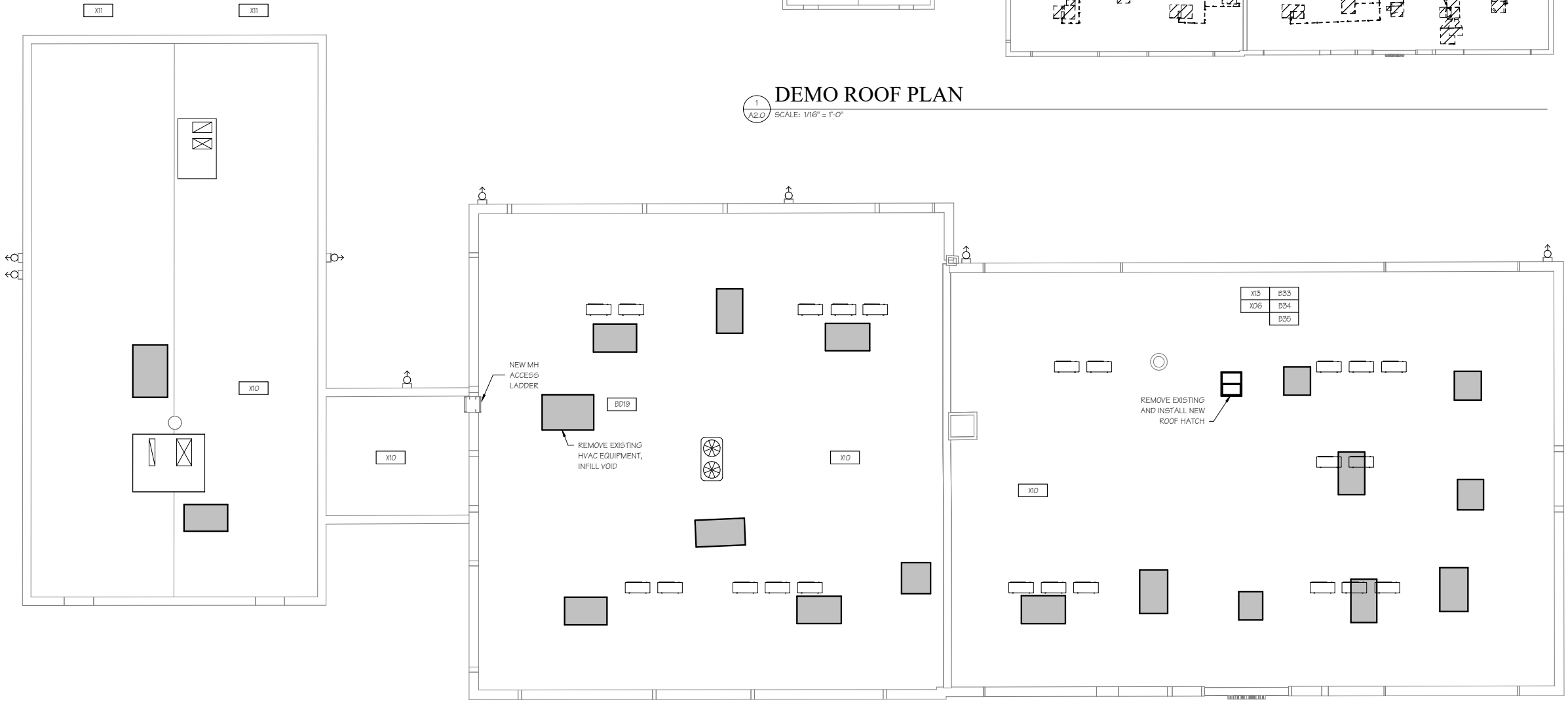
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GENERAL NOTES:
 COORDINATE ROOFING REMOVAL AND REPLACEMENT W/ MEP FOR RTU, BENT AND OTHER PENETRATIONS REMAINING, NEW OR INFILLED.



1
 A2.0 SCALE: 1/16" = 1'-0"

DEMO ROOF PLAN



2
 A2.0 SCALE: 1/8" = 1'-0"

ROOF PLAN Proposed

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EXTERIOR BUILDING REHABILITATION KEYNOTES

- X01 CLEAN EXISTING EXTERIOR MASONRY AT ALL ELEVATIONS, INCLUDING BUT NOT LIMITED TO VISIBLE EXTERIOR BRICKWORK AND STONEMWORK, IN A MANNER CONSISTENT WITH NATIONAL PARK SERVICE PUBLISHED PRESERVATION BRIEFS. DO NOT DAMAGE OR ALTER THE PHYSICAL CHARACTERISTICS OF THE MASONRY SURFACES. WATER PRESSURE SHALL BE AS LOW AS POSSIBLE AND SHALL NOT EXCEED 350 PSI. PROVIDE MINIMUM 9 SF MOCK-UP PANEL OF CLEANED AREA FOR INSPECTION AND APPROVAL BY HISTORIC PRESERVATION SPECIALIST. PROVIDE AS MANY MOCK-UP PANELS AS NEEDED TO DEMONSTRATE VARIOUS CLEANING MATERIALS AND PRESSURES CONSIDERED AND TO GAIN APPROVAL BEFORE PROCEEDING WITH OVERALL CLEANING OPERATIONS. SUBMIT PROPOSED CLEANING MATERIALS AND DESCRIPTION OF PROCEDURE FOR REVIEW AND APPROVAL. (SHALL BE PERFORMED AFTER TUCKPOINTING IS COMPLETED.)
- X02 REMOVE EXISTING ABANDONED FASTENERS AND PENETRATIONS, SUCH AS METAL WALL ANCHORS AND SIMILAR FASTENERS, PATCH HOLES WITH TYPE N MORTAR TO MATCH EXISTING.
- X03 CLEAN, REPAIR/REPLACE DAMAGED MASONRY UNITS, AND RE-POINT EXISTING BRICK AND STONE WORK (ESTIMATED AT 100 BRICK AND MORTAR REPLACEMENTS AND 30 SEPERATE FULL LENGTH HORIZONTAL MORTAR JOINT RE-POINTING AVERAGE PER ELEVATION FOR BASE BID UNLESS NOTED OTHERWISE). RE-POINTING MORTAR SHALL BE TYPE "N" AND MATCH THE COLOR, TEXTURE, JOINT WIDTH, AND JOINT PROFILE OF THE EXISTING HISTORIC MASONRY. WORK SHALL BE PERFORMED IN A MANNER CONSISTENT WITH PRESERVATION BRIEFS (AS PUBLISHED BY THE NATIONAL PARK SERVICE) FOR MASONRY CLEANING, REPAIR/REPLACEMENT AND RE-POINTING. PROVIDE SEPARATE SAMPLE PANELS DEMONSTRATING MASONRY CLEANING, BRICK AND STONE REPAIR/REPLACEMENT, AND RE-POINTING FOR INSPECTION AND APPROVAL BY HISTORIC PRESERVATION CONSULTANT. ADDITIONAL SAMPLE PANELS SHALL BE PREPARED AS NEEDED TO ACHIEVE APPROVAL. MASONRY CONTRACTOR TO VERIFY QUANTITIES PRIOR TO SUBMITTING BID.
- X04 PREPARE ABANDOND WALL PENETRATIONS TO BE FILLED WITH COLOR MATCHING MORTAR AND/OR REPLACE MASONRY UNITS AS REQUIRED FOR A FLUSH AND WEATHER TIGHT BUILDING ENVELOPE. BRICK AND MORTAR MOCK-UPS SHALL BE PROVIDED AND AS APPROVED BY THE ARCHITECT AND HISTORIC PRESERVATION CONSULTANT.
- X05 EXISTING LOUVER, FRAME, SILLS, TO REMAIN IN PLACE AND TO BE REFINISHED. PREPARE OPENING FROM INTERIOR SIDE TO BE INFILL FRAMED W/ INSULATED METAL 6" STUDS (R-19 INSULATION), 7/16" EXTERIOR TREATED SHEATHING, BUILDING WRAP AT INTERIOR SIDE OF LOUVER TO SEAL OFF EXISTING OPENING AND CREATE A WEATHER TIGHT ENCLOSURE.
- X07 REMOVE EXISTING CAULK AND PROVIDE AND INSTALL NEW CAULK AROUND NEW AND EXISTING EXTERIOR WALL PENETRATIONS THAT ARE TO REMAIN. INFILL ABANDONED VOIDS W/ MATERIALS THAT MATCH ADJACENT FINISHES AT PENETRATIONS TO BE REMOVED; COORDINATE WITH MEP.
- X08 RESTORE AND MAINTAIN EXISTING BUILDING IDENTIFICATION SIGNAGE ABOVE ENTRANCE. (PER NATIONAL PARKS BRIEFS)
- X09 PROVIDE SEPERATE UNIT COST FOR BRICK REPLACEMENT, TUCK POINTING AND CAST STONE RESTORATION/REPLACEMENT. UNIT COST SHALL INCLUDE NEW MORTAR ON ALL FOUR SIDES OF THE BRICK OR STONE UNIT. UNIT COST WILL BE USED TO ADD AND DEDUCT BRICK AND STONE REPLACEMENT WORK ABOVE OR BELOW THE BASE BID SCOPE OF WORK.
- X10 ROOFING CONTRACTOR SHALL COORDINATE WITH MEP TRADE WORK ROOF PENETRATIONS TO PROPERLY PROVIDE AND INSTALL ALL TPO FLASHINGS/ACCESSORIES TO COMPLETE ALL REQUIRED TPO ROOFING MODIFICATIONS. ROOFING CONTRACTOR TO COORDINATE WITH TPO ROOFING MANUFACTURE AS NEEDED TO MAINTAIN CURRENT ROOFING WARRANTY
- X11
- X12 REMOVE AND REPLACE ENTRY DOORS PER DOOR SCHEDULE (INCLUDE PANIC HARDWARE WHERE INDICATED, CLOSER AND ELECTRONIC ACCESS CONTROL(S)). SUBMIT SHOP DRAWINGS TO ARCHITECT FOR APPROVAL.
- X13 MASONRY RESTORATION CONTRACTOR TO INSPECT, RESTORE AND CLEAN ALL PARAPET WALLS AND ARCHITECTURAL STONE COPINGS.
- X14 PROVIDE NEW WALL MOUNTED EXTERIOR LIGHTING AT ENTRY LOCATIONS. SEE ELECTRICAL PLANS FOR ADDITIONAL INFORMAITON.

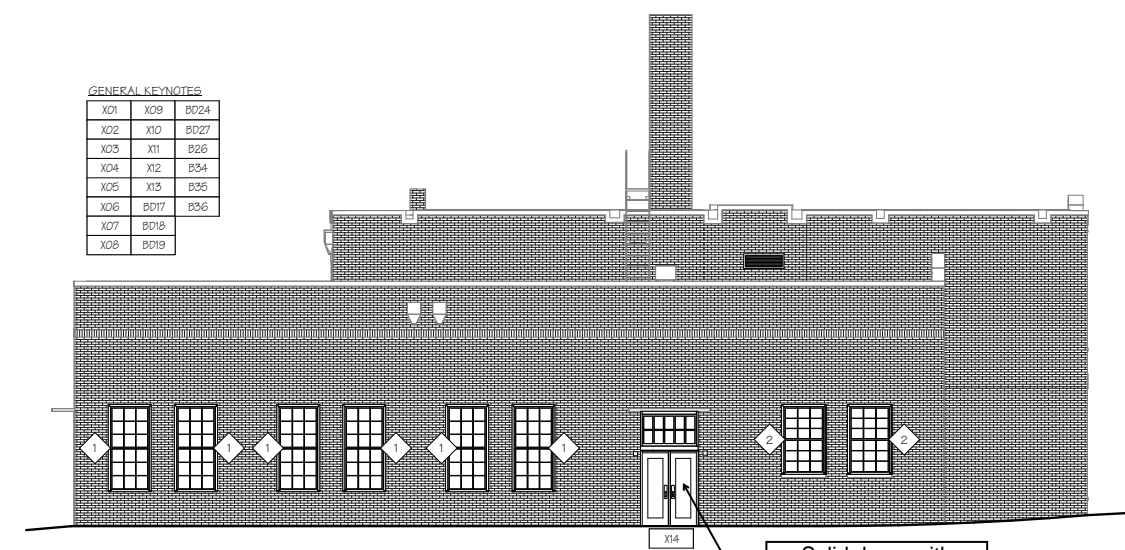
NOTES:
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 MITIGATE ANY HAZARDOUS MATERIALS (ASBESTOS, LEAD-BASED PAINT, ETC.) THAT IS IDENTIFIED IN THE OWNER PROVIDED ENVIRONMENTAL REPORT.



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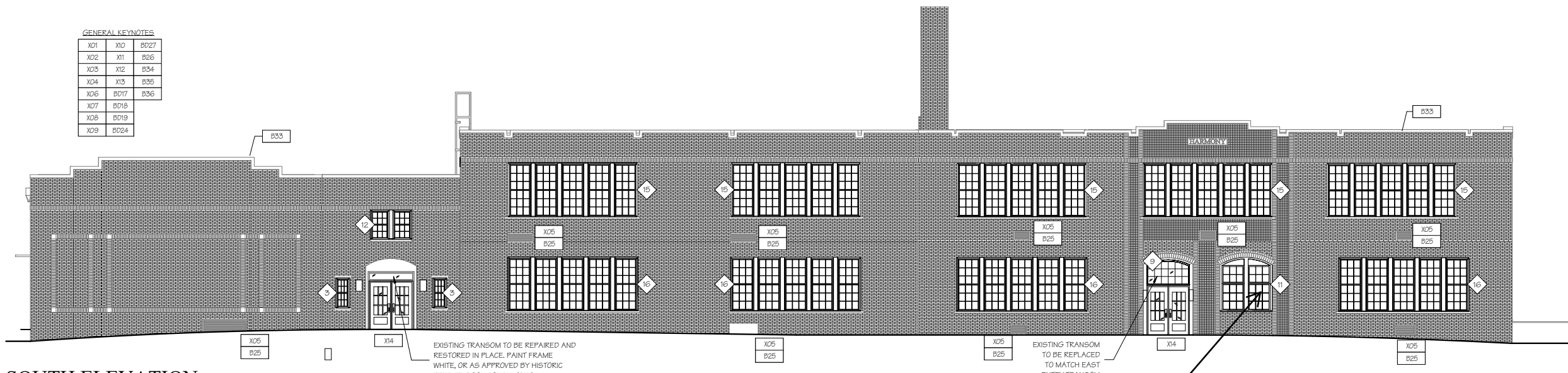
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GENERAL KEYNOTES		
X01	X09	B024
X02	X10	B027
X03	X11	B26
X04	X12	B34
X05	X13	B35
X06	B017	B36
X07	B018	
X08	B019	



WEST SIDE ELEVATION
 SCALE: 1/8" = 1'-0"

GENERAL KEYNOTES		
X01	X10	B027
X02	X11	B26
X03	X12	B34
X04	X13	B35
X06	B017	B36
X07	B018	
X08	B019	
X09	B024	



SOUTH ELEVATION
 SCALE: 1/8" = 1'-0"

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EXTERIOR BUILDING REHABILITATION KEYNOTES

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- X02 REMOVE EXISTING ABANDONED FASTENERS AND PENETRATIONS, SUCH AS METAL WALL ANCHORS AND SIMILAR FASTENERS, PATCH HOLES WITH TYPE N MORTAR TO MATCH EXISTING.
- X03 CLEAN, REPAIR/REPLACE DAMAGED MASONRY UNITS, AND RE-POINT EXISTING BRICK AND STONE WORK (ESTIMATED AT 100 BRICK AND MORTAR REPLACEMENTS AND 30 SEPERATE FULL LENGTH HORIZONTAL MORTAR JOINT RE-POINTING AVERAGE PER ELEVATION FOR BASE BID UNLESS NOTED OTHERWISE). RE-POINTING MORTAR SHALL BE TYPE "N" AND MATCH THE COLOR, TEXTURE, JOINT WIDTH, AND JOINT PROFILE OF THE EXISTING HISTORIC MASONRY. WORK SHALL BE PERFORMED IN A MANNER CONSISTENT WITH PRESERVATION BRIEFS (AS PUBLISHED BY THE NATIONAL PARK SERVICE) FOR MASONRY CLEANING, REPAIR/REPLACEMENT AND RE-POINTING. PROVIDE SEPERATE SAMPLE PANELS DEMONSTRATING MASONRY CLEANING, BRICK AND STONE REPAIR/REPLACEMENT, AND RE-POINTING FOR INSPECTION AND APPROVAL BY HISTORIC PRESERVATION CONSULTANT. ADDITIONAL SAMPLE PANELS SHALL BE PREPARED AS NEEDED TO ACHIEVE APPROVAL. MASONRY CONTRACTOR TO VERIFY QUANTITIES PRIOR TO SUBMITTING BID.
- X04 PREPARE ABANDONED WALL PENETRATIONS TO BE FILLED WITH COLOR MATCHING MORTAR AND/OR REPLACE MASONRY UNITS AS REQUIRED FOR A FLUSH AND WEATHER TIGHT BUILDING ENVELOPE. BRICK AND MORTAR MOCK-UPS SHALL BE PROVIDED AND AS APPROVED BY THE ARCHITECT AND HISTORIC PRESERVATION CONSULTANT.
- X05 EXISTING LOUVER, FRAME, SILLS, TO REMAIN IN PLACE AND TO BE REFINISHED. PREPARE OPENING FROM INTERIOR SIDE TO BE INFILL FRAMED W/ INSULATED METAL 6" STUDS (R-19 INSULATION), 7/16" EXTERIOR TREATED SHEATHING, BUILDING WRAP AT INTERIOR SIDE OF LOUVER TO SEAL OFF EXISTING OPENING AND CREATE A WEATHER TIGHT ENCLOSURE.
- X07 REMOVE EXISTING CAULK AND PROVIDE AND INSTALL NEW CAULK AROUND NEW AND EXISTING EXTERIOR WALL PENETRATIONS THAT ARE TO REMAIN. INFILL ABANDONED VOIDS W/ MATERIALS THAT MATCH ADJACENT FINISHES AT PENETRATIONS TO BE REMOVED; COORDINATE WITH MEP.
- X08 RESTORE AND MAINTAIN EXISTING BUILDING IDENTIFICATION SIGNAGE
- X09 PROVIDE SEPERATE UNIT COST FOR BRICK REPLACEMENT, TUCK POINTING AND CAST STONE RESTORATION/REPLACEMENT. UNIT COST SHALL INCLUDE NEW MORTAR ON ALL FOUR SIDES OF THE BRICK OR STONE UNIT. UNIT COST WILL BE USED TO ADD AND DEDUCT BRICK AND STONE REPLACEMENT WORK ABOVE OR BELOW THE BASE BID SCOPE OF WORK.
- X10 ROOFING CONTRACTOR SHALL COORDINATE WITH MEP TRADE WORK ROOF PENETRATIONS TO PROPERLY PROVIDE AND INSTALL ALL TPO FLASHINGS/ACCESSORIES TO COMPLETE ALL REQUIRED TPO ROOFING MODIFICATIONS. ROOFING CONTRACTOR TO COORDINATE WITH TPO ROOFING MANUFACTURE AS NEEDED TO MAINTAIN CURRENT ROOFING WARRANTY
- X12 REMOVE AND REPLACE ENTRY DOORS PER DOOR SCHEDULE (INCLUDE PANIC HARDWARE WHERE INDICATED, CLOSER AND ELECTRONIC ACCESS CONTROL(S)). SUBMIT SHOP DRAWINGS TO ARCHITECT FOR APPROVAL.
- X13 MASONRY RESTORATION CONTRACTOR TO INSPECT, RESTORE AND CLEAN ALL PARAPET WALLS AND ARCHITECTURAL STONE COPINGS.
- X14 PROVIDE NEW WALL MOUNTED EXTERIOR LIGHTING AT ENTRY LOCATIONS. SEE ELECTRICAL PLANS FOR ADDITIONAL INFORMATION.

NOTES:
 CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND MEASUREMENTS.
 MITIGATE ANY HAZARDOUS MATERIALS (ASBESTOS, LEAD-BASED PAINT, ETC.) THAT IS IDENTIFIED IN THE OWNER PROVIDED ENVIRONMENTAL REPORT.

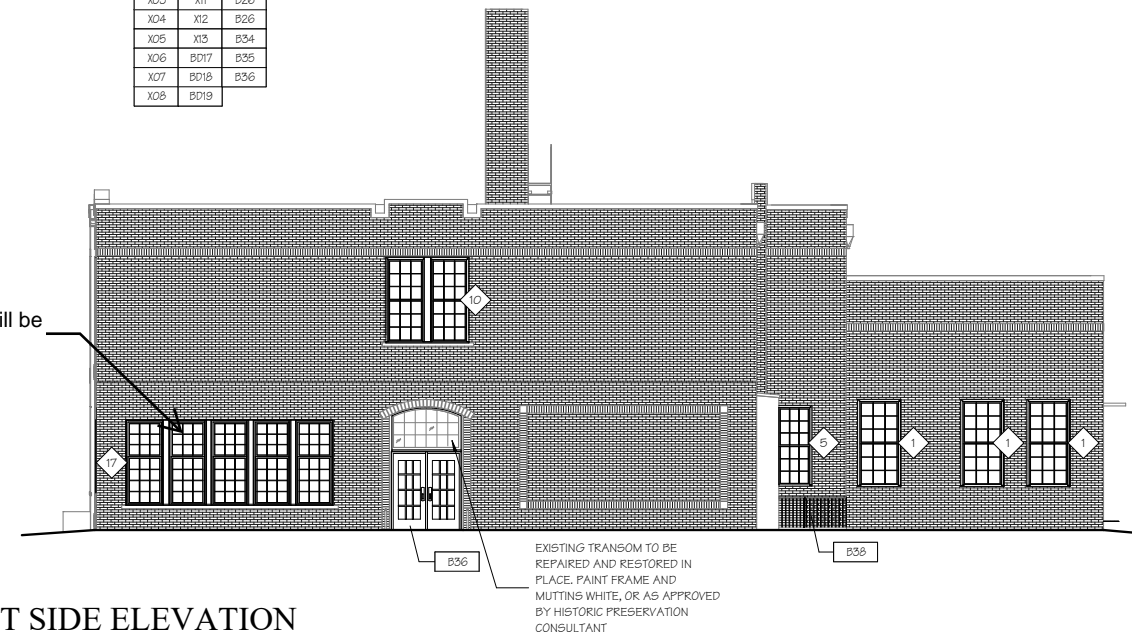


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 OKLAHOMA CITY, OKLAHOMA COUNTY, OKLAHOMA

GENERAL KEYNOTES

X01	X09	B024
X02	X10	B027
X03	X11	B26
X04	X12	B26
X05	X13	B34
X06	B017	B35
X07	B018	B36
X08	B019	

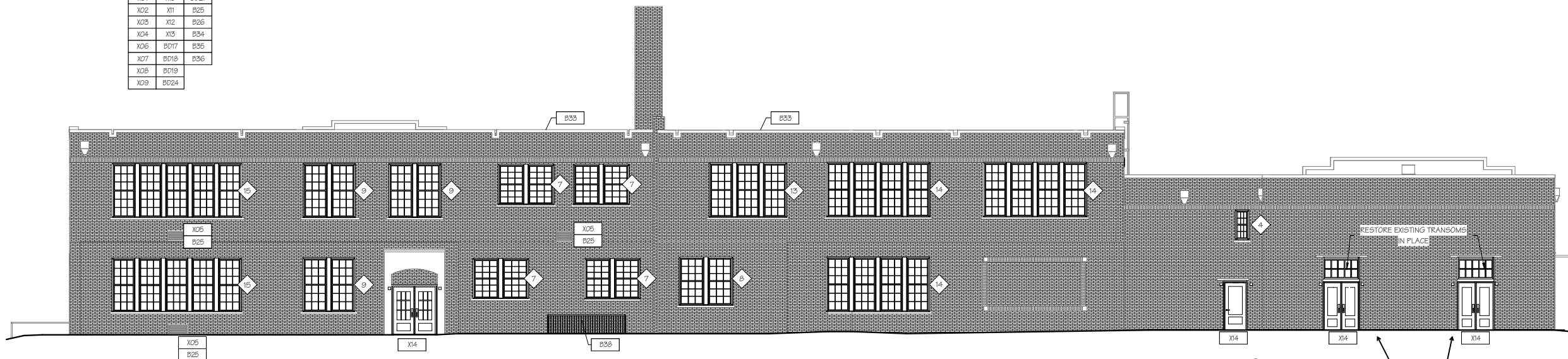
Drawing error--these will be hung windows.



EAST SIDE ELEVATION
 SCALE: 1/8" = 1'-0"

GENERAL KEYNOTES

X01	X10	B027
X02	X11	B25
X03	X12	B26
X04	X13	B34
X06	B017	B35
X07	B018	B36
X08	B019	
X09	B024	



NORTH ELEVATION
 SCALE: 1/8" = 1'-0"

Solid doors with applied panel molding.

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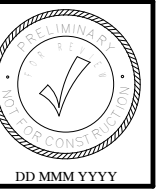
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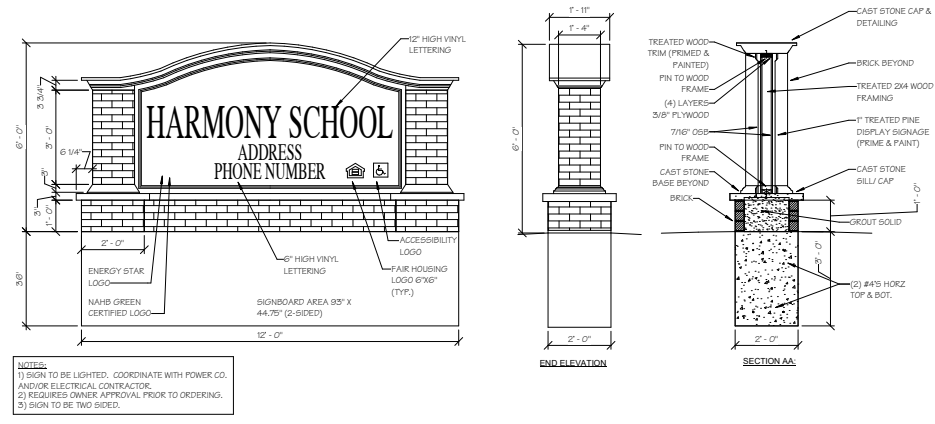
NOTES:
CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND MEASUREMENTS.

MITIGATE ANY HAZARDOUS MATERIALS (ASBESTOS, LEAD-BASED PAINT, ETC.) THAT IS IDENTIFIED IN THE OWNER PROVIDED ENVIRONMENTAL REPORT.

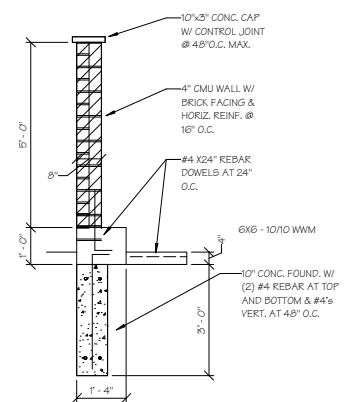


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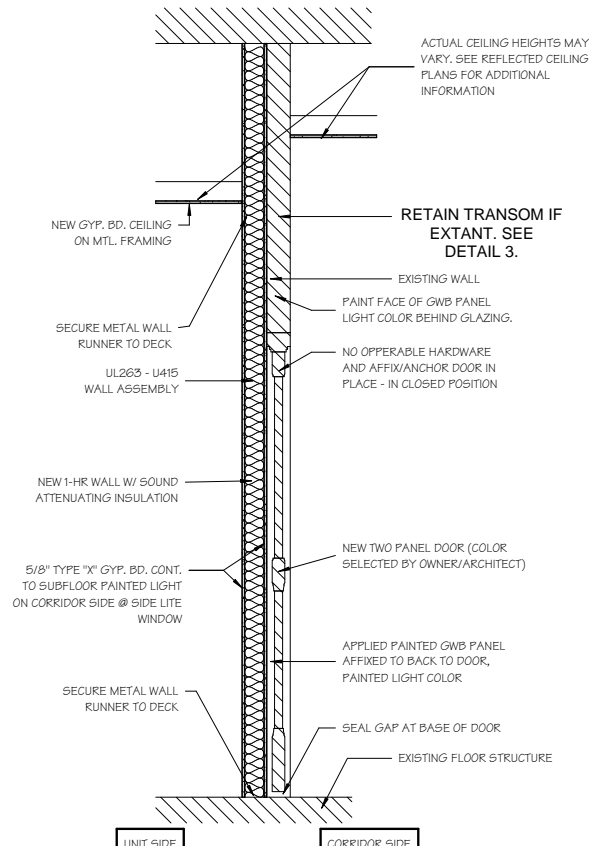
PRELIMINARY NOT FOR CONSTRUCTION, RECORDING PURPOSES OR IMPLEMENTATION



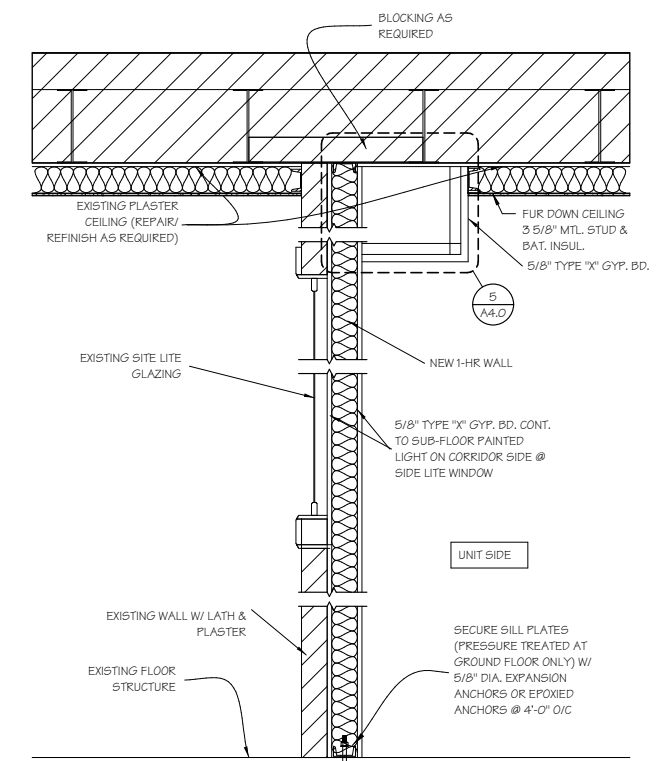
PROJECT MONUMENT SIGN



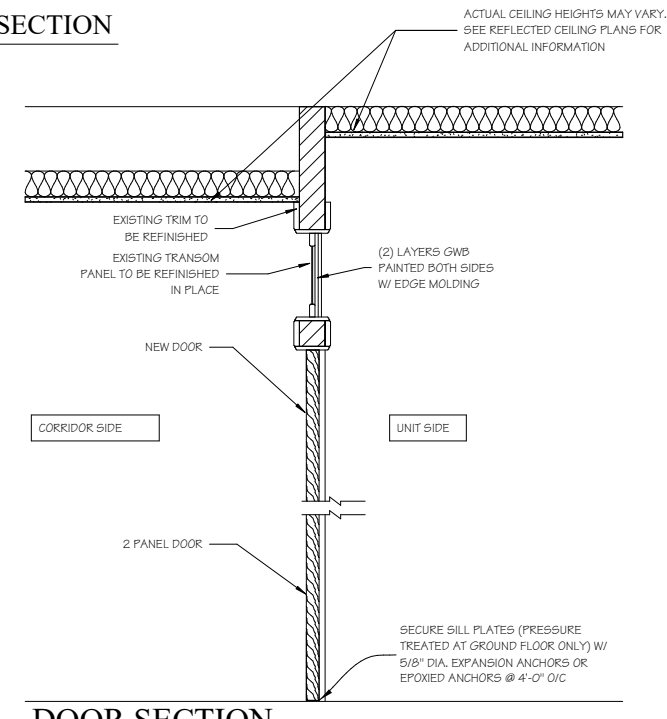
DUMPSTER ENCLOSURE SECTION



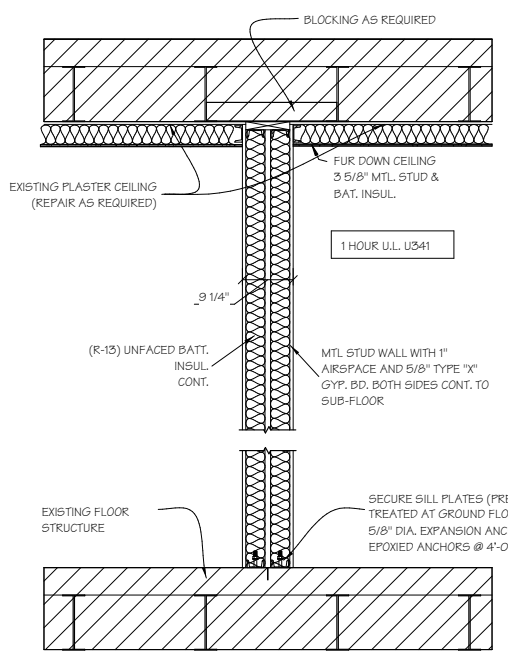
CORRIDOR WALL SECTION



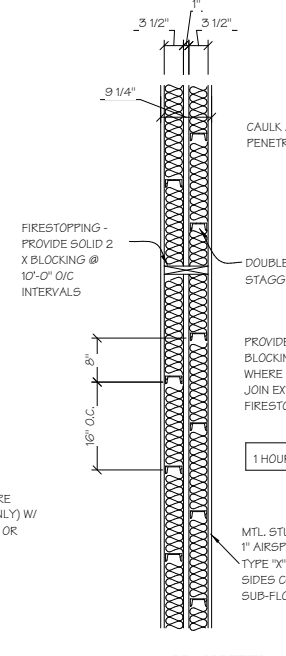
SIDELITE WINDOW SECTION



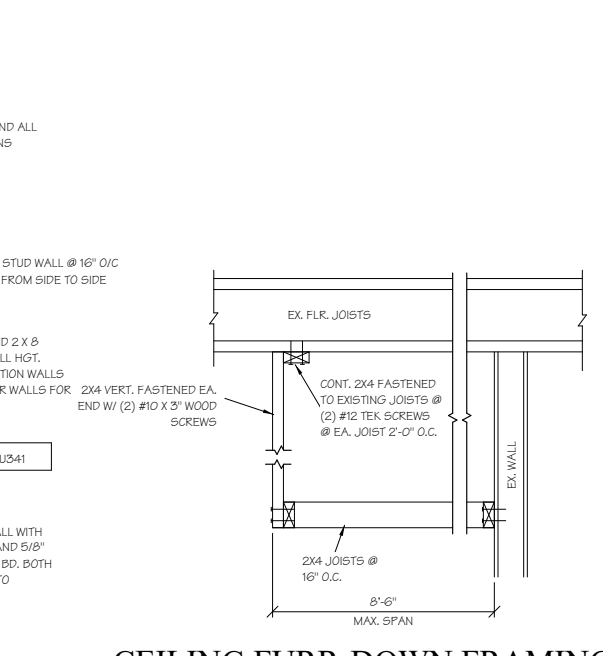
DOOR SECTION



1-HOUR DWFT TIGHT UNIT SEPARATION WALL



PLAN VIEW



CEILING FURR-DOWN FRAMING (SUPPORTED BY (1) WALL)

MARCUS GARVEY HARMONY APARTMENTS
OKLAHOMA CITY, OKLAHOMA COUNTY, OKLAHOMA

Wallace ARCHITECTS, L.L.C.
Columbia, MO
P 573-256-7200

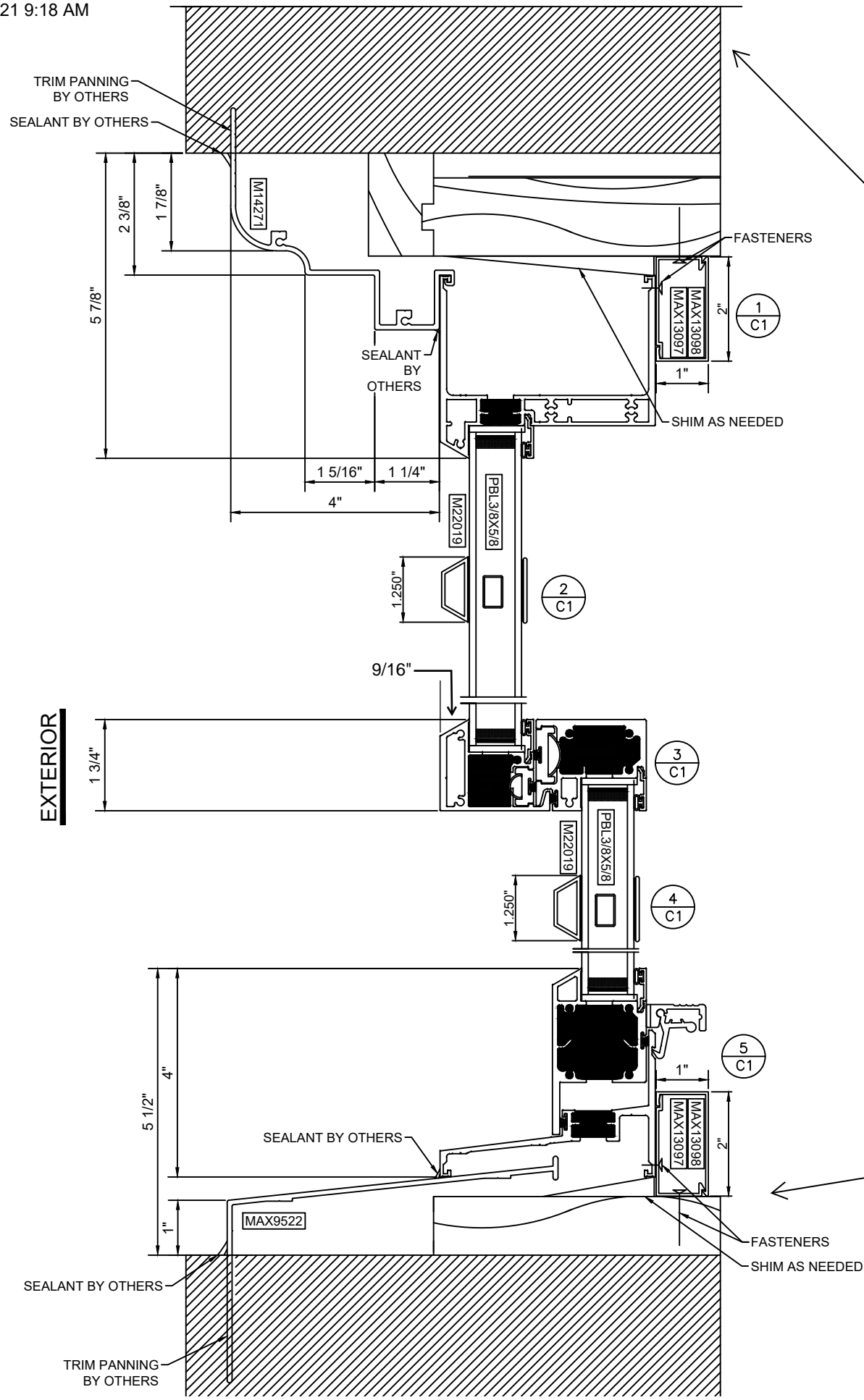
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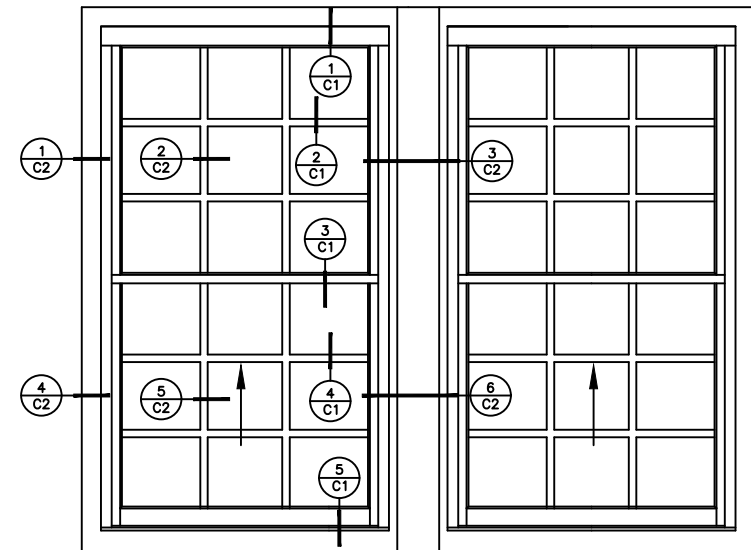
NAILING FLANGES AND DRIP CAPS (INTEGRAL OR APPLIED) DO NOT TAKE THE PLACE OF WINDOW FLASHING. ALL WINDOWS AND DOORS MUST BE PROPERLY FLASHED AND SEALED WITH MATERIAL COMPATIBLE SEALANT FOR PROTECTION AGAINST WATER AND INFILTRATION AROUND THE ENTIRE PERIMETER. FAILURE TO DO SO COULD RESULT IN PRODUCT OR PROPERTY DAMAGE.

SEALANT MUST MEET OR EXCEED ASTM C920-11 SPECIFICATION
PROVIDE ADEQUATE BLOCKING TO SUPPORT THE SILL OF THE WINDOW

VERIFY INSTALLATION
VERIFY WALL DETAILS

NOTICE:
QUAKER DOES NOT SUPPLY ANY FASTENERS, SHIMS, BACKER ROD, OR SEALANTS. UNLESS OTHERWISE NOTED.

Existing interior casing to remain in place.



Existing interior stool and apron to remain in place.

Notes and changes to Quaker Window drawings by Deb Sheals

PROPOSED

**Quaker H650 Series
Single Hung**

Project Name: **HARMONY SCHOOL**

Description: **TYPICAL CUT DETAILS**

PHONE (573)-744-5211
FAX (573)-744-5586
COMMERCIAL

QUAKER
COMMERCIAL
WINDOWS AND DOORS

504 Highway 63 South
Freeburg, MO 65035

Drawing Created 8/12/21

QUAKER WINDOW PRODUCTS WILL NOT BE RESPONSIBLE FOR FIELD MEASUREMENT QUANTITIES & INSTALLATION DESIGN. CONTRACTOR MUST VERIFY ALL DIMENSIONS.

Scale: 3/8"=1"
Sheet #: C1

Drawn By: J S
Checked By: ---

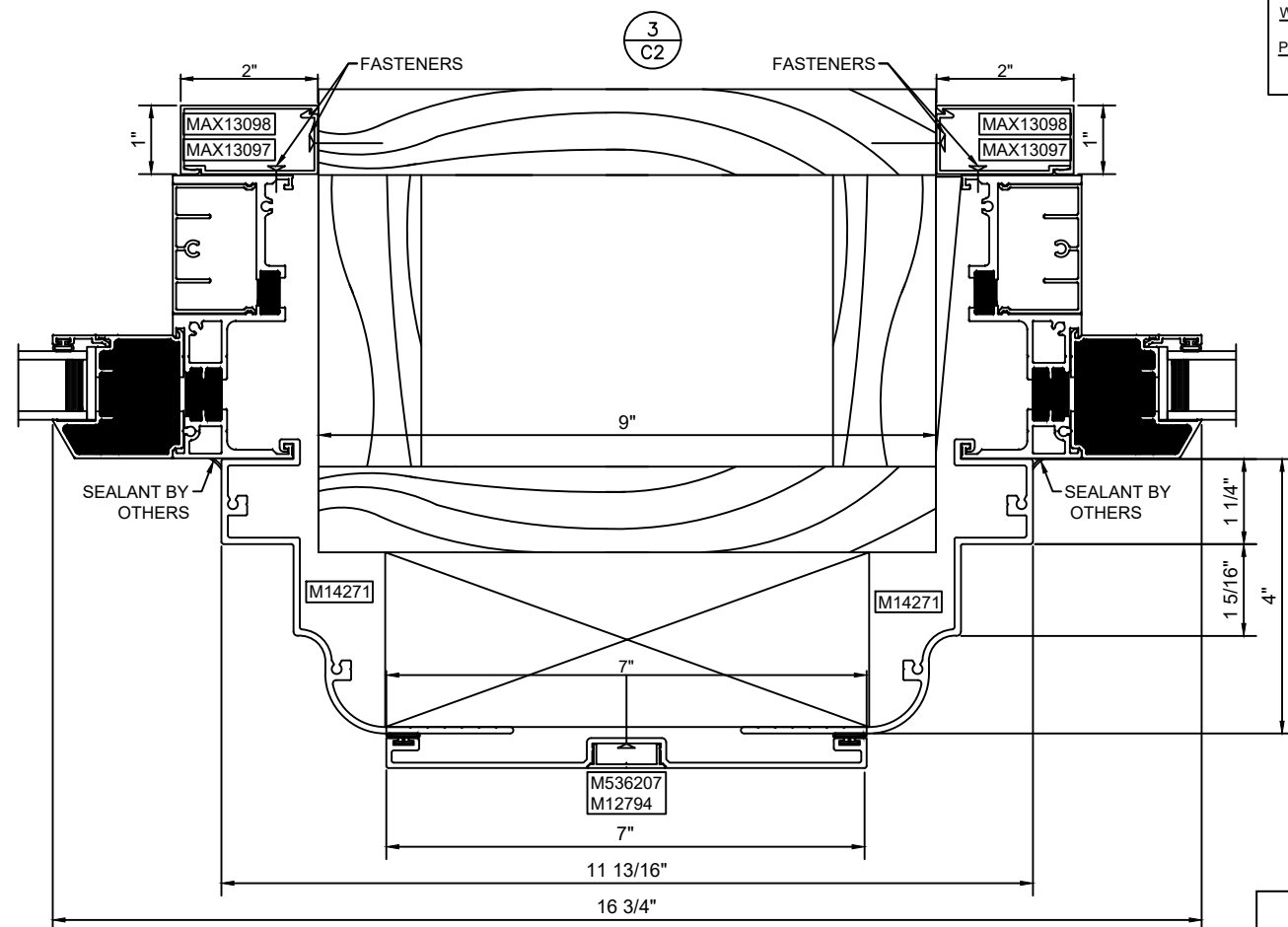
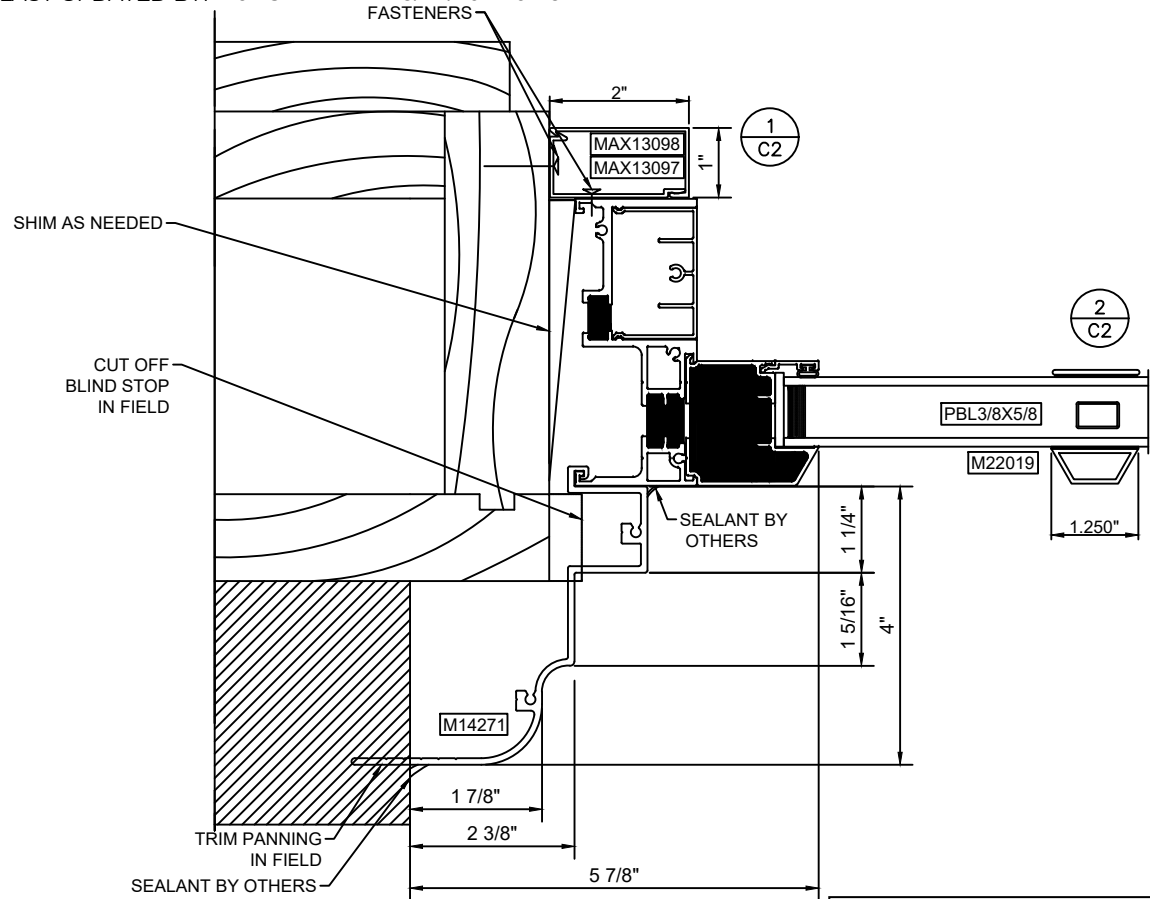
NAILING FLANGES AND DRIP CAPS (INTEGRAL OR APPLIED) DO NOT TAKE THE PLACE OF WINDOW FLASHING. ALL WINDOWS AND DOORS MUST BE PROPERLY FLASHED AND SEALED WITH MATERIAL COMPATIBLE SEALANT FOR PROTECTION AGAINST WATER AND INFILTRATION AROUND THE ENTIRE PERIMETER. FAILURE TO DO SO COULD RESULT IN PRODUCT OR PROPERTY DAMAGE.

NOTICE:
QUAKER DOES NOT SUPPLY ANY FASTENERS, SHIMS, BACKER ROD, OR SEALANTS. UNLESS OTHERWISE NOTED.

VERIFY INSTALLATION
VERIFY WALL DETAILS

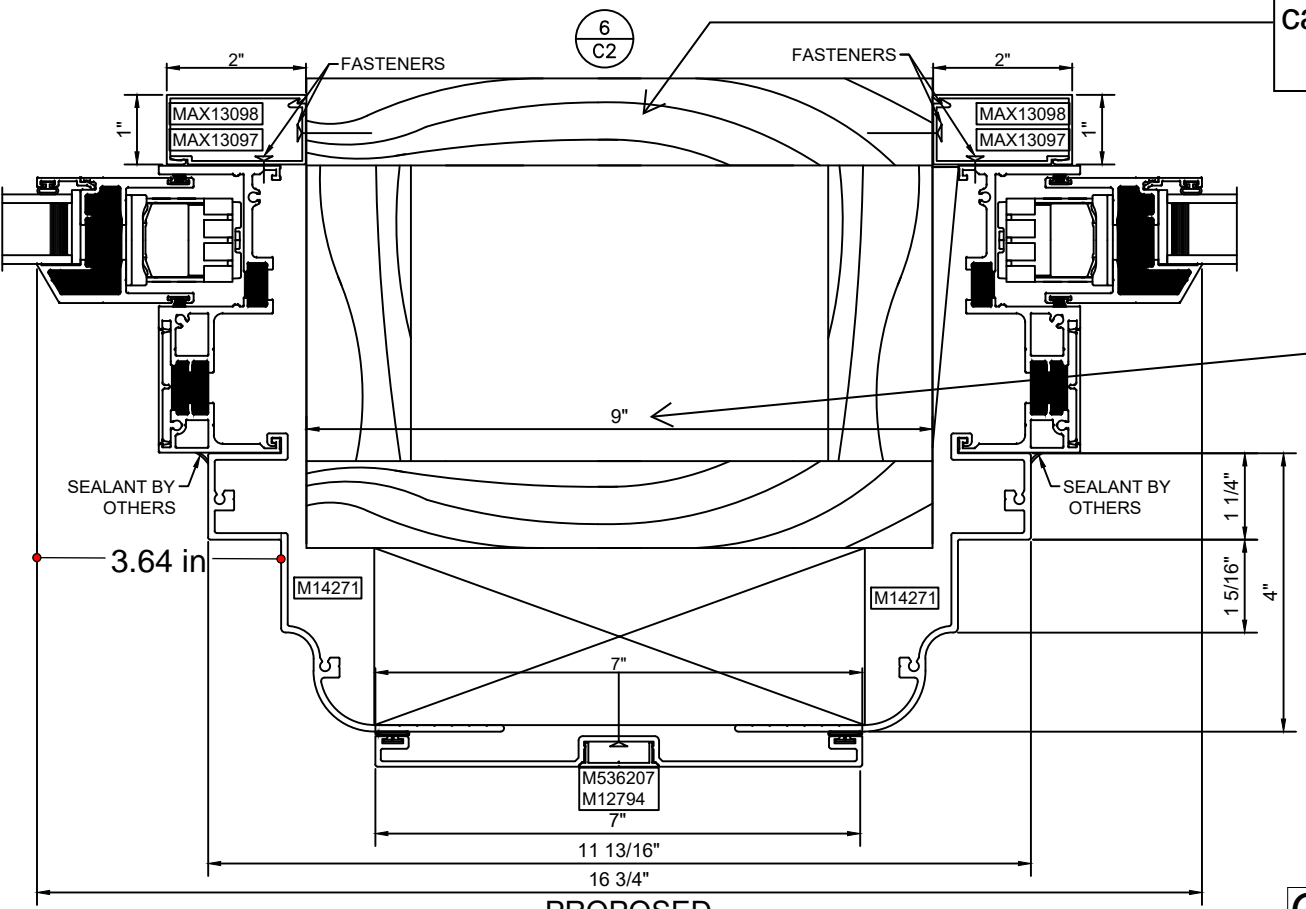
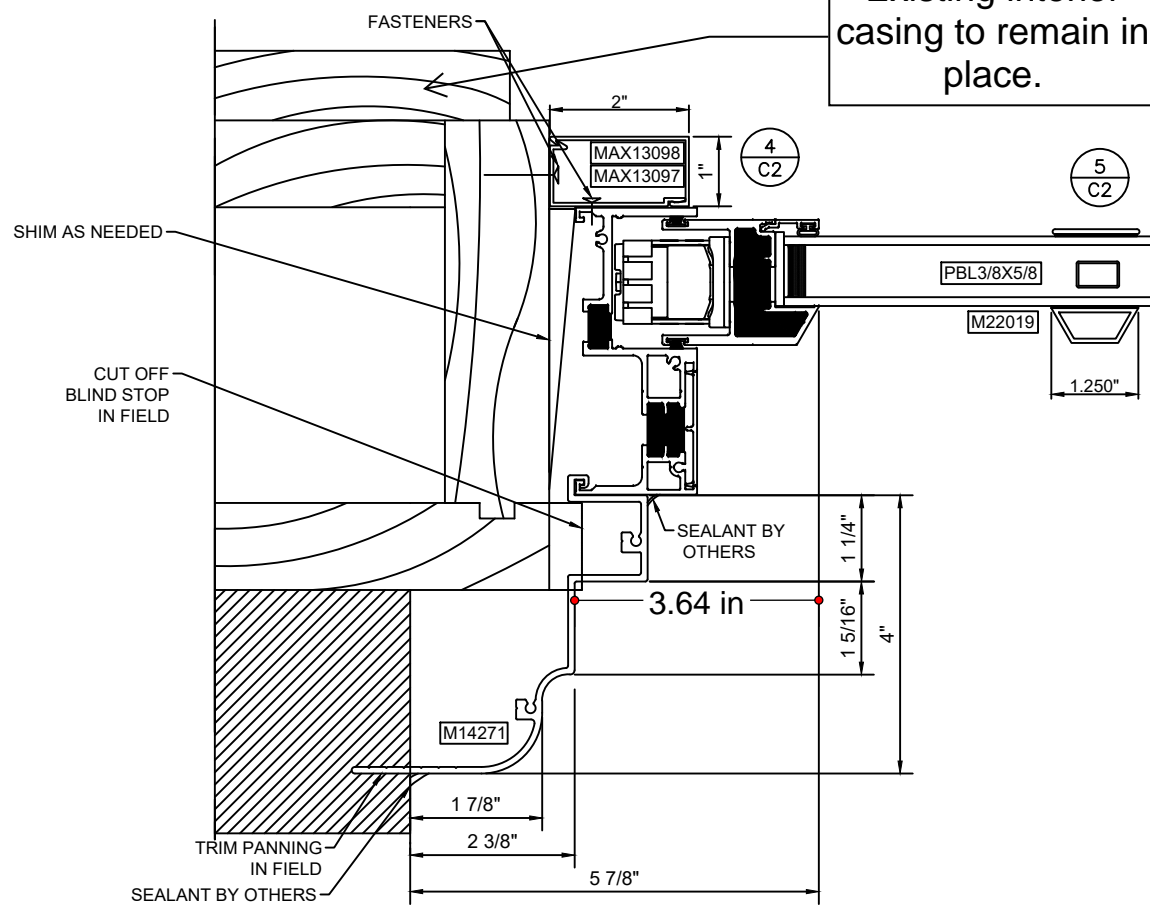
SEALANT MUST MEET OR EXCEED
ASTM C920-11 SPECIFICATION

PROVIDE ADEQUATE BLOCKING TO
SUPPORT THE SILL OF THE WINDOW



Existing interior casing to remain in place.

Existing interior casing to remain in place.



NOTE: Mullion widths vary, but most interior mullions are 7-1/4" instead of 9". See details on the following page for a detail of the smaller mullion. All existing mullions and interior face plates will be retained.

PROPOSED
EXTERIOR

Quaker H650 Series
Single Hung

Project Name: HARMONY SCHOOL

Description: TYPICAL CUT DETAILS

QUAKER WINDOW PRODUCTS WILL NOT BE RESPONSIBLE FOR FIELD MEASUREMENT, QUANTITIES, & INSTALLATION DESIGN. CONTRACTOR MUST VERIFY ALL DIMENSIONS.

PHONE (573)-744-5211
FAX (573)-744-5586

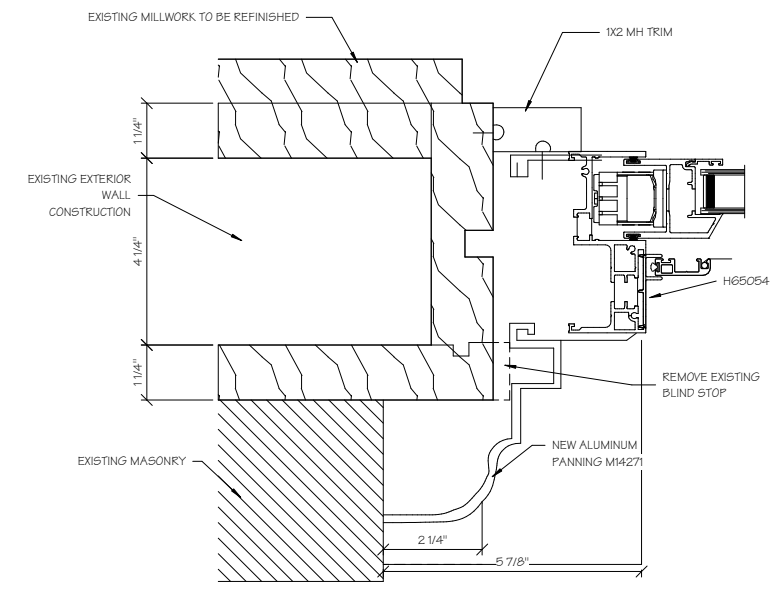
COMMERCIAL
504 Highway 63 South
Freeburg, MO 65035

Scale: 3/8"=1"
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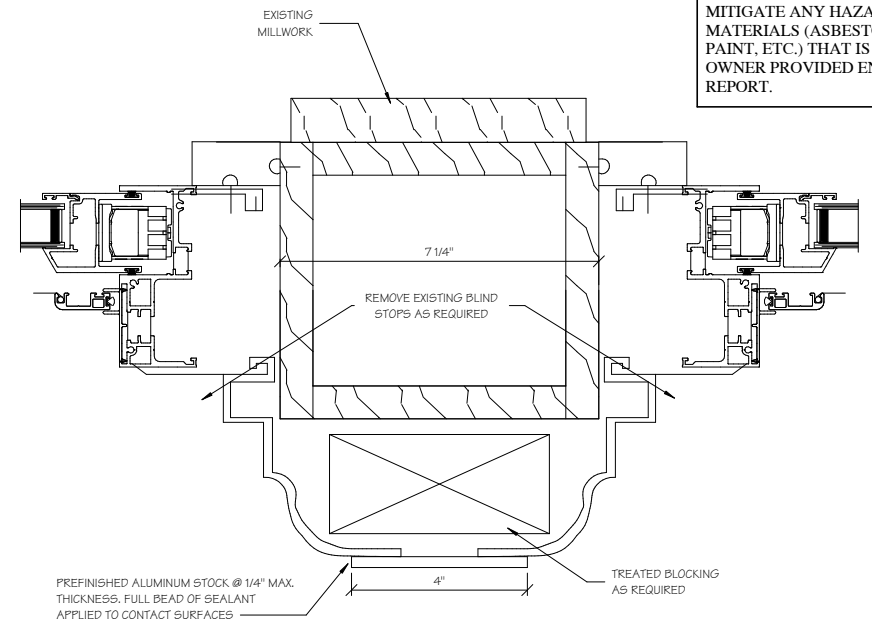
Drawing Created 8/12/21

Drawn By: J S
Checked By: ---

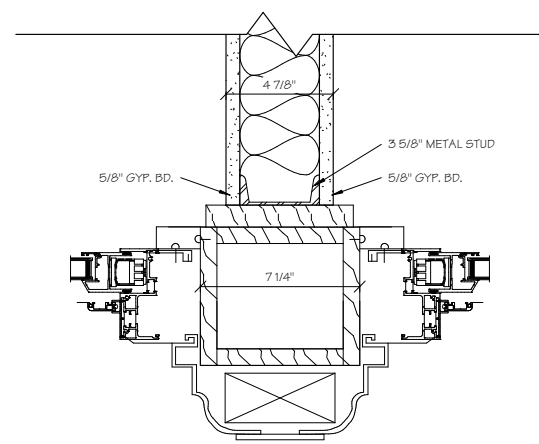
NOTES:
 CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND MEASUREMENTS.
 MITIGATE ANY HAZARDOUS MATERIALS (ASBESTOS, LEAD-BASED PAINT, ETC.) THAT IS IDENTIFIED IN THE OWNER PROVIDED ENVIRONMENTAL REPORT.



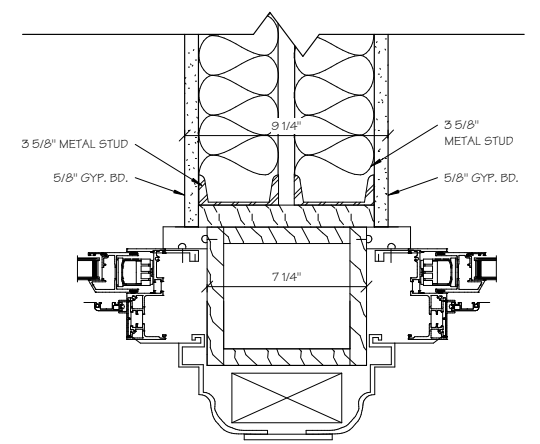
1
TYPICAL JAMB DETAIL
 SCALE: 6" = 1'-0"



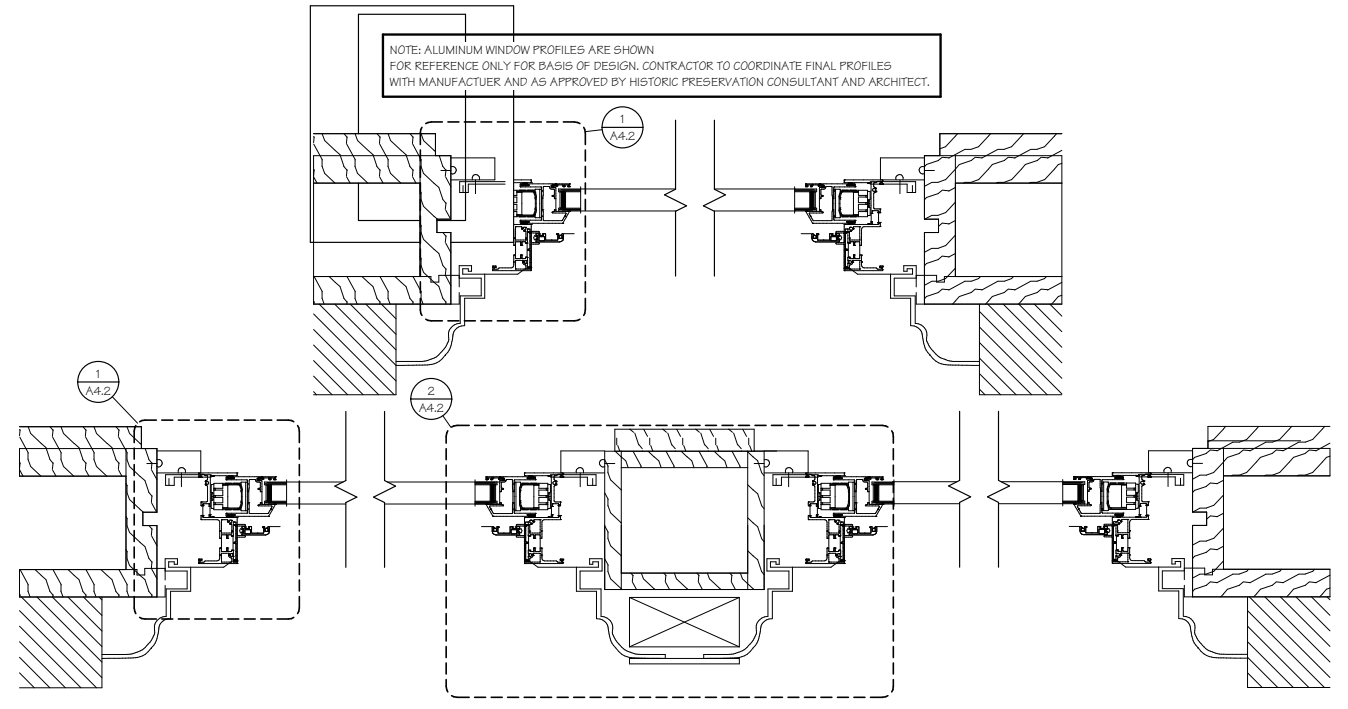
2
TYPICAL MULLION DETAIL
 SCALE: 6" = 1'-0"



3
TYP. WALL TERMINATION @ WINDOW
 SCALE: 3" = 1'-0"



4
UNIT SEPARATION WALL TERMINATION @ WINDOW
 SCALE: 3" = 1'-0"



5
TYPICAL WINDOW JAMB DETAILS
 SCALE: 3" = 1'-0"

PRELIMINARY NOT FOR CONSTRUCTION, RECORDING PURPOSES OR IMPLEMENTATION

PRELIMINARY NOT FOR CONSTRUCTION, RECORDING PURPOSES OR IMPLEMENTATION

MARCUS GARVEY HARMONY APARTMENTS
 OKLAHOMA CITY, OKLAHOMA COUNTY, OKLAHOMA



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Historic Photo

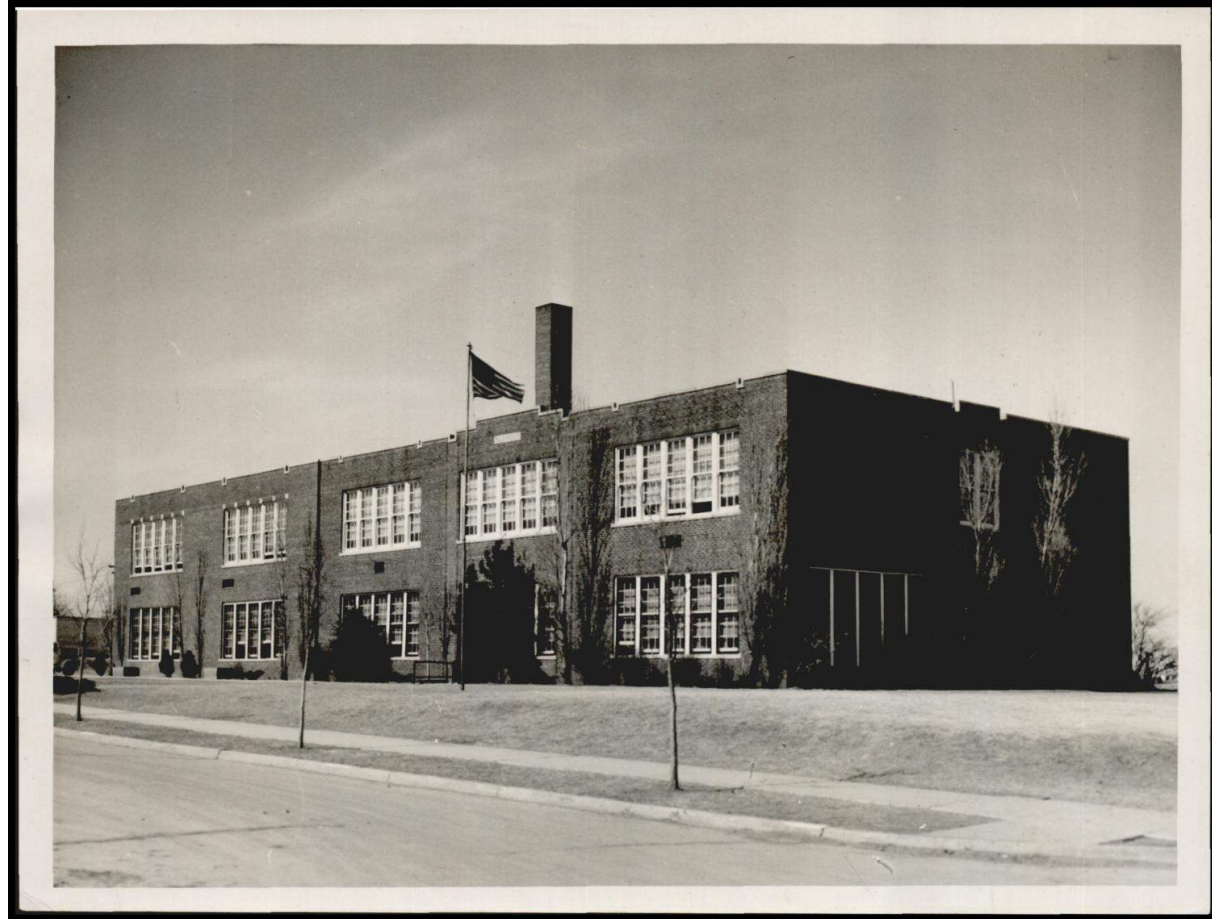
Showing Muntin Patterns

Original School, ca. 1932



Photo from the Oklahoma
Historical Society

Historic Photos

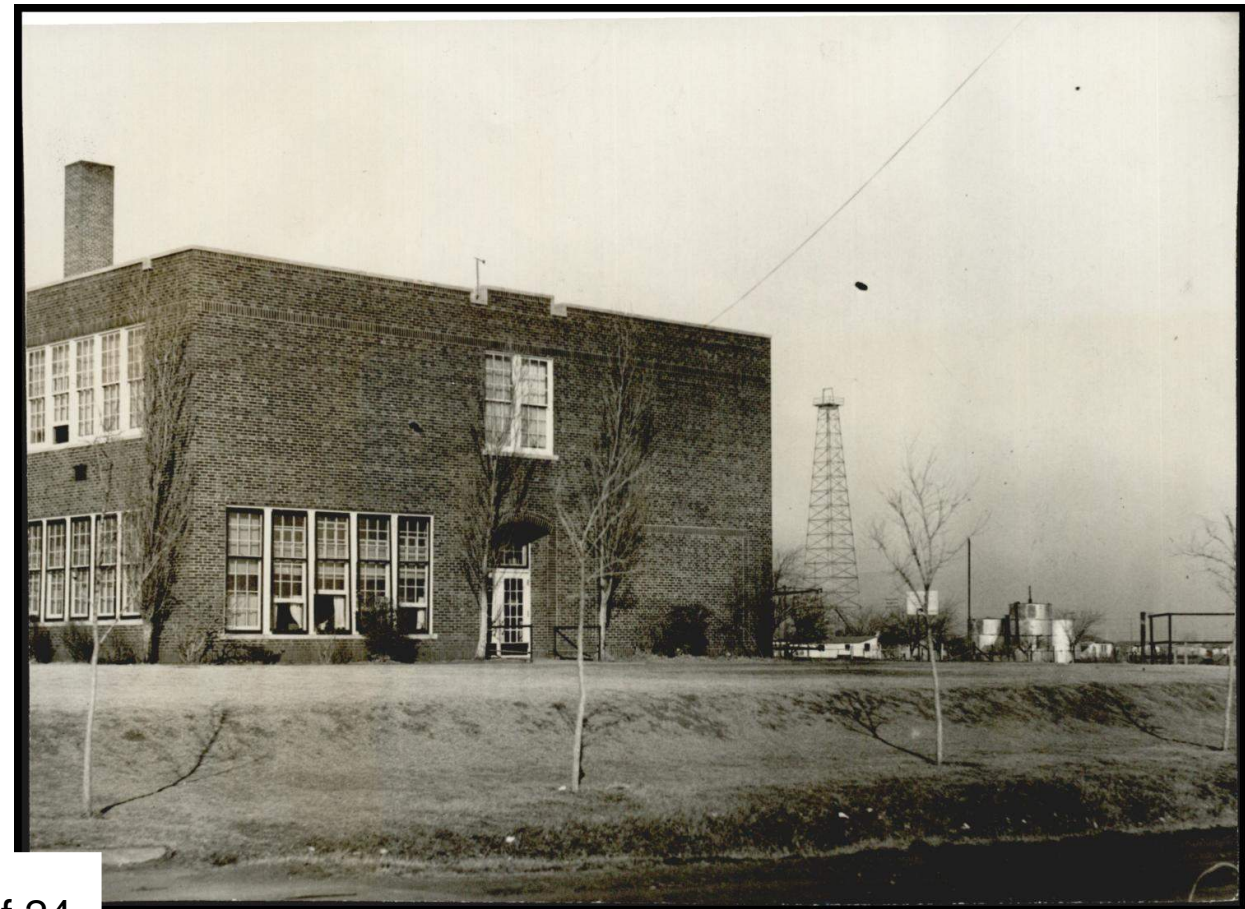


ca. 1936

Top:
1936
Bottom:
1943



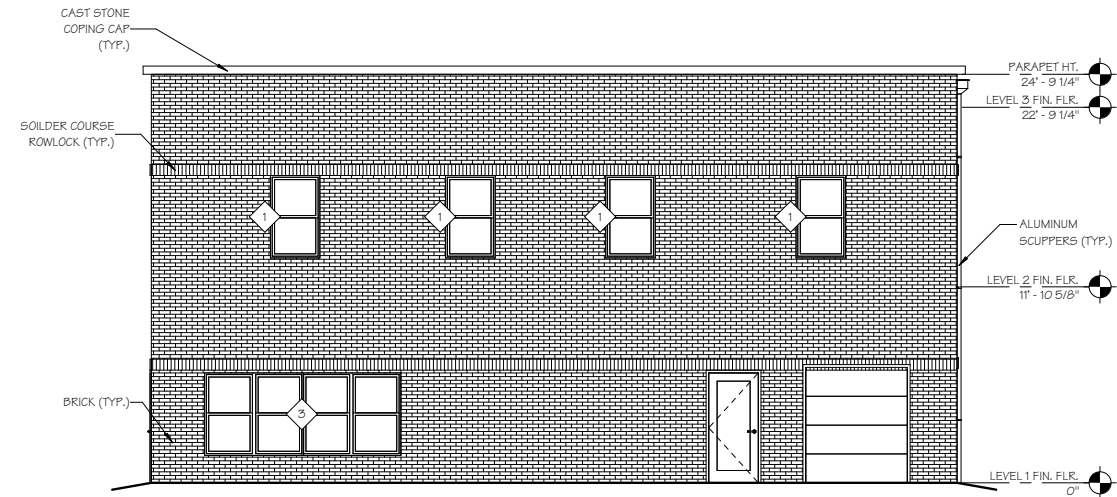
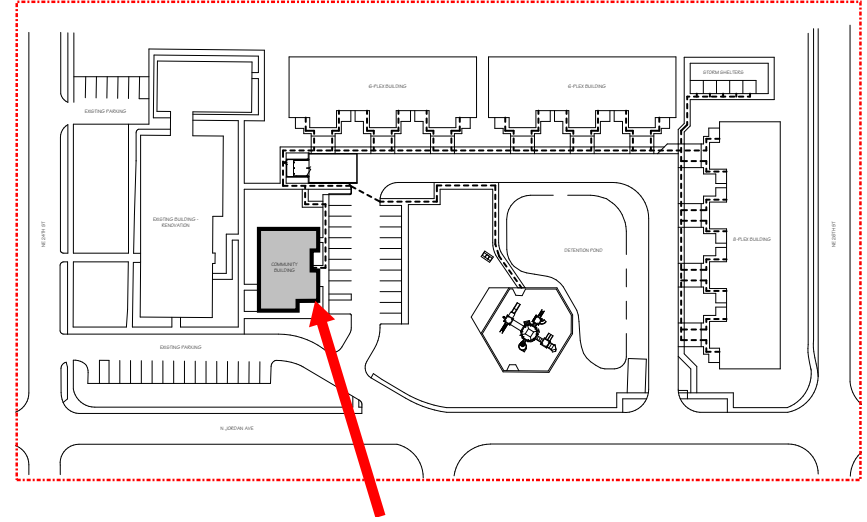
1935 East Wall



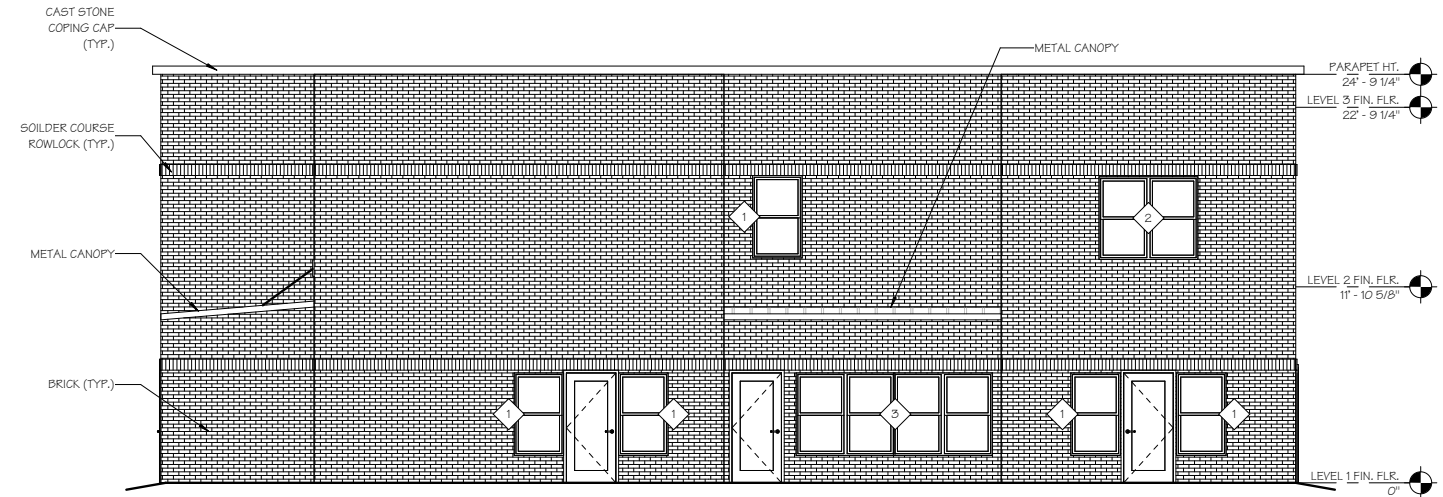


WINDOW SCHEDULE TYPE MARK					
NOTE: CONTRACTOR SHALL CERTIFY THAT BEDROOM WINDOWS INSTALLED PROVIDE EGRESS OPENING OF 5.7 SQ. FT. (MIN.) WITH MIN. CLEAR HEIGHT OF 24" AND A CLEAR WIDTH OF 20"					
NOTE: MIN. ONE OPERABLE WINDOW IN EACH BEDROOM AND LIVING ROOM WITH 36" MAX. SILL HEIGHTS, 44" IN. GARDEN LEVEL. (PARTIAL BELOW GRADE) IS ACCEPTABLE.					
TYPE MARK	WIDTH X HEIGHT	GLAZING	HARDWARE	COMMENTS	
1	3' - 0" X 5' - 0"	INSUL LOW "E"	STANDARD	MUNTINS W SCREEN	
2	6' - 0" X 5' - 0"	INSUL LOW "E"	STANDARD	MUNTINS W SCREEN	
3	6' - 0" X 5' - 0"	LOW "E"	STANDARD	MUNTINS W SCREEN	

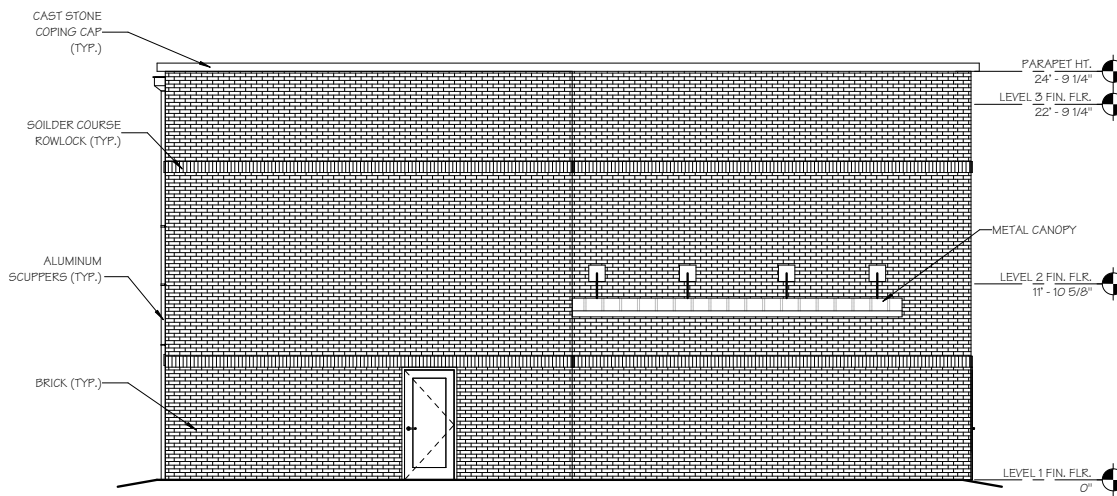
WINDOW ELEVATIONS



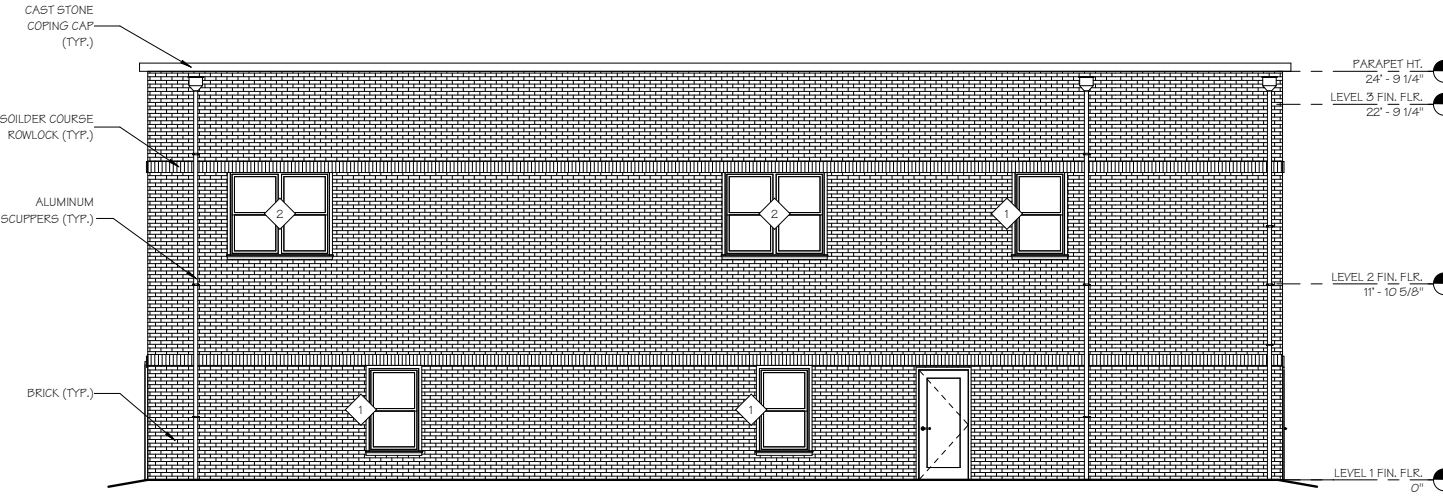
1 LEFT SIDE ELEVATION
SCALE: 3/16" = 1'-0"



2 FRONT ELEVATION
SCALE: 3/16" = 1'-0"



3 RIGHT SIDE ELEVATION
SCALE: 3/16" = 1'-0"



4 REAR ELEVATION
SCALE: 3/16" = 1'-0"

HARMONY CENTER
OKLAHOMA CITY, OKLAHOMA COUNTY,
OKLAHOMA



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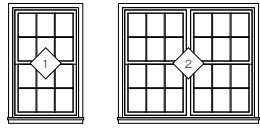
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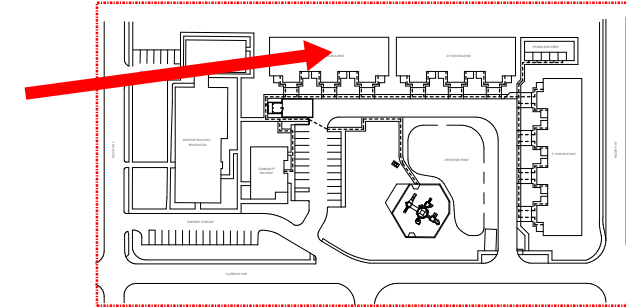
WINDOW SCHEDULE TYPE MARK					
TYPE MARK	SIZE	HARDWARE	GLAZING	COMMENTS	
1	3'-0" x 5'-0"	STANDARD	LOW 'E' ENERGY STAR	MUNTINS W SCREEN	
2	6'-0" x 5'-0"	STANDARD	LOW 'E' ENERGY STAR	MUNTINS W SCREEN	

WINDOW ELEVATIONS



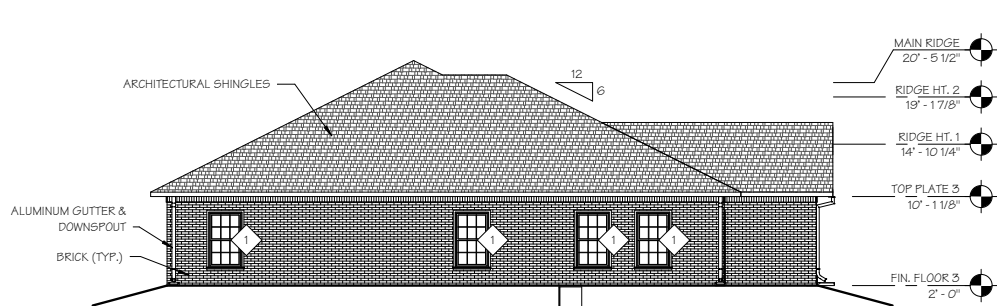
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2



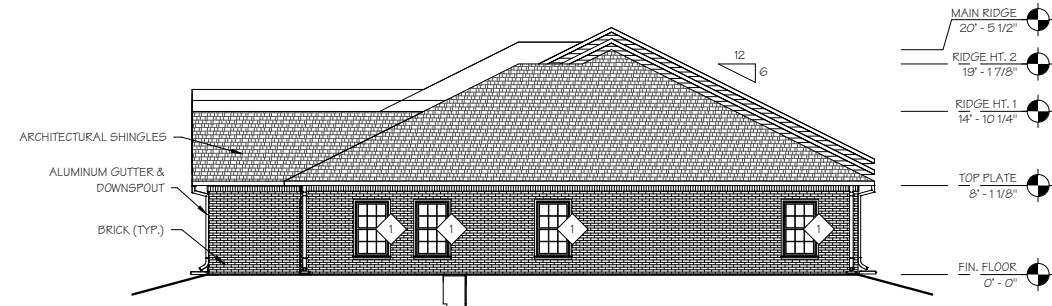
6-PLEX FRONT ELEVATION

SCALE: 1/8" = 1'-0"



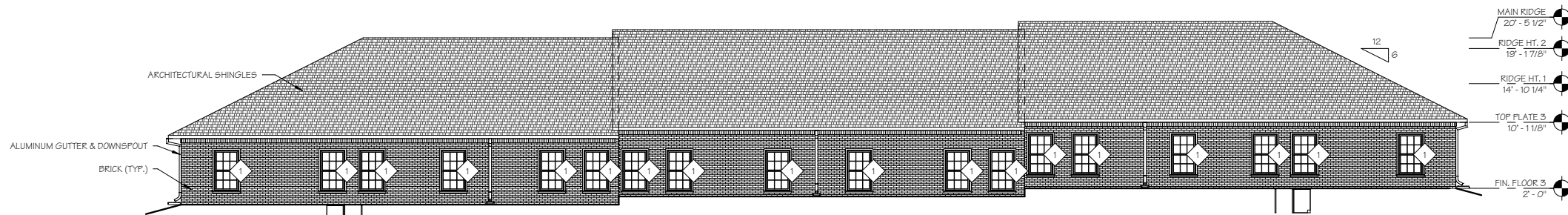
6-PLEX LEFT SIDE ELEVATION

SCALE: 1/8" = 1'-0"



6-PLEX RIGHT SIDE ELEVATION

SCALE: 1/8" = 1'-0"



6-PLEX REAR ELEVATION

SCALE: 1/8" = 1'-0"

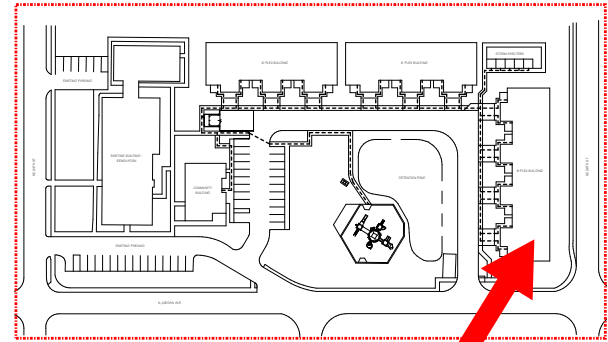
HARMONY APARTMENTS
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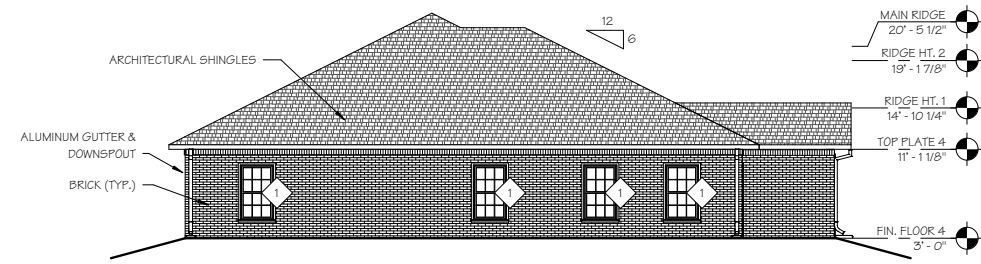
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A PRELIMINARY NOT FOR CONSTRUCTION, RECORDING PURPOSES OR IMPLEMENTATION D

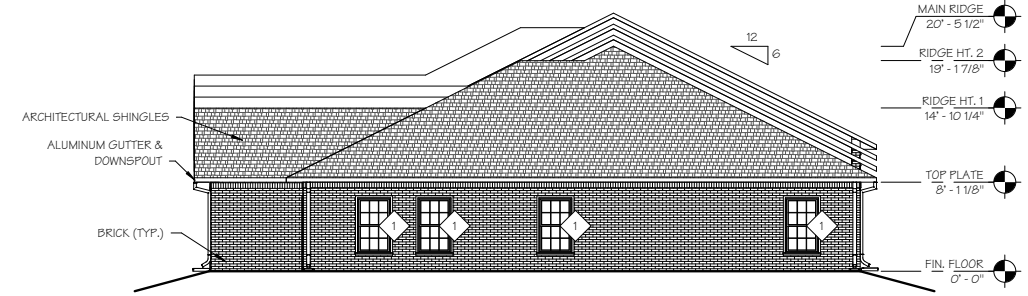
A PRELIMINARY NOT FOR CONSTRUCTION, RECORDING PURPOSES OR IMPLEMENTATION D



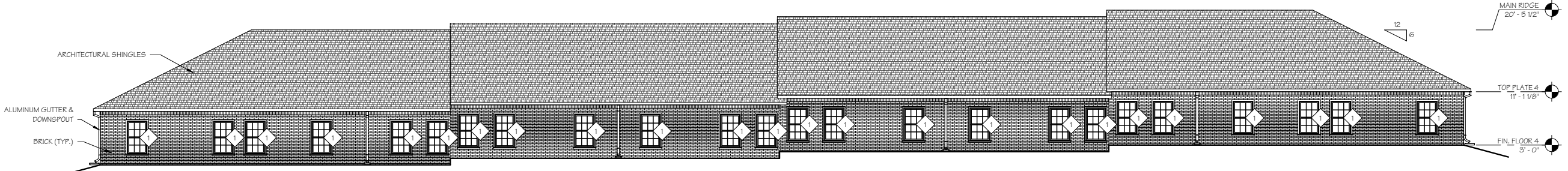
1 8-PLEX FRONT ELEVATION
SCALE: 1/8" = 1'-0"



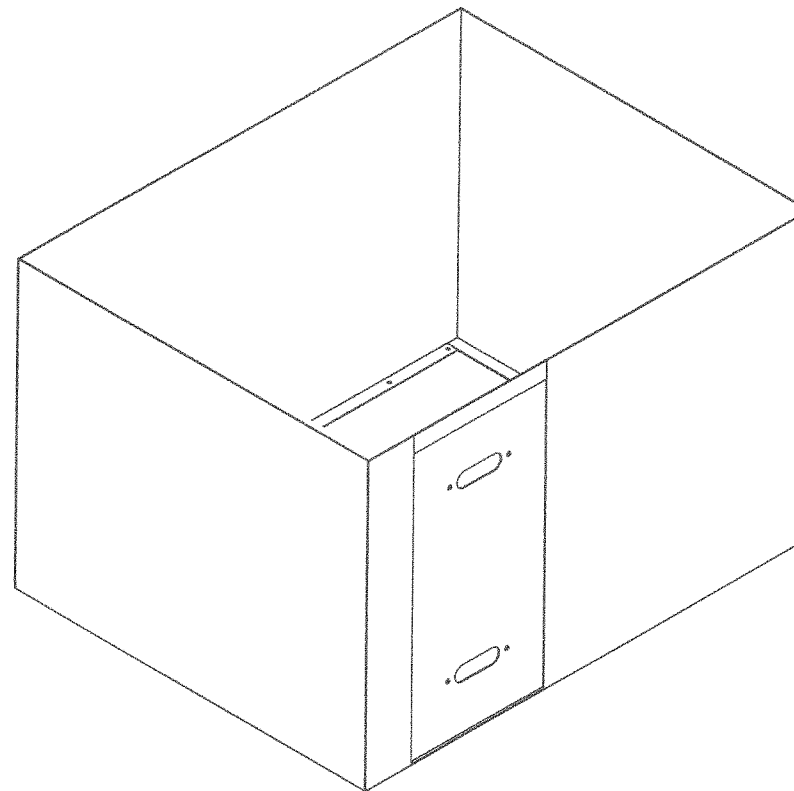
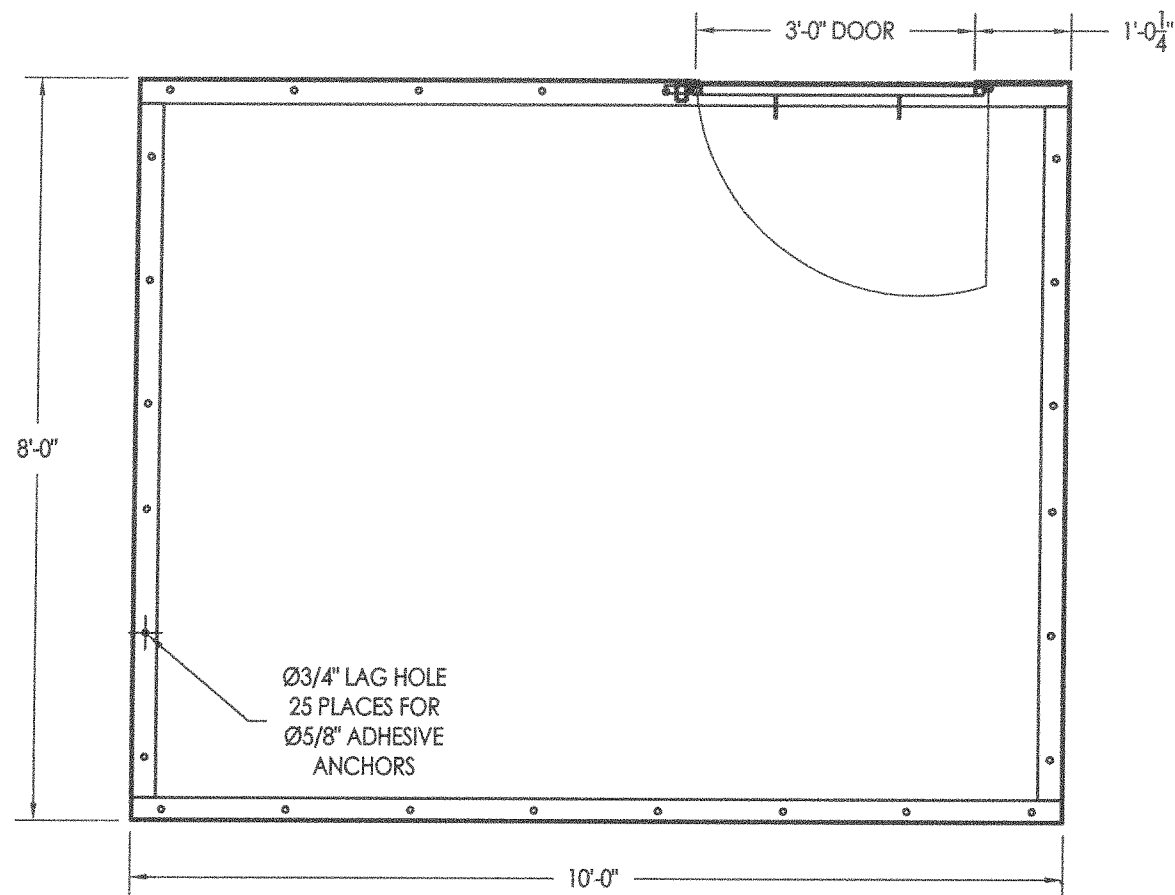
2 8-PLEX LEFT SIDE ELEVATION
SCALE: 1/8" = 1'-0"



3 8-PLEX RIGHT SIDE ELEVATION
SCALE: 1/8" = 1'-0"



4 8-PLEX REAR ELEVATION
SCALE: 1/8" = 1'-0"



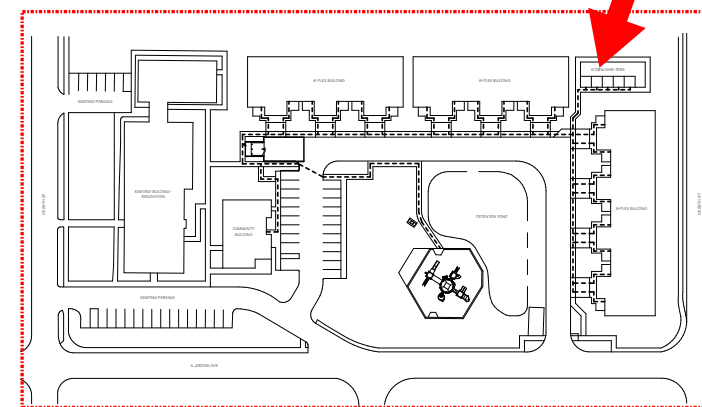
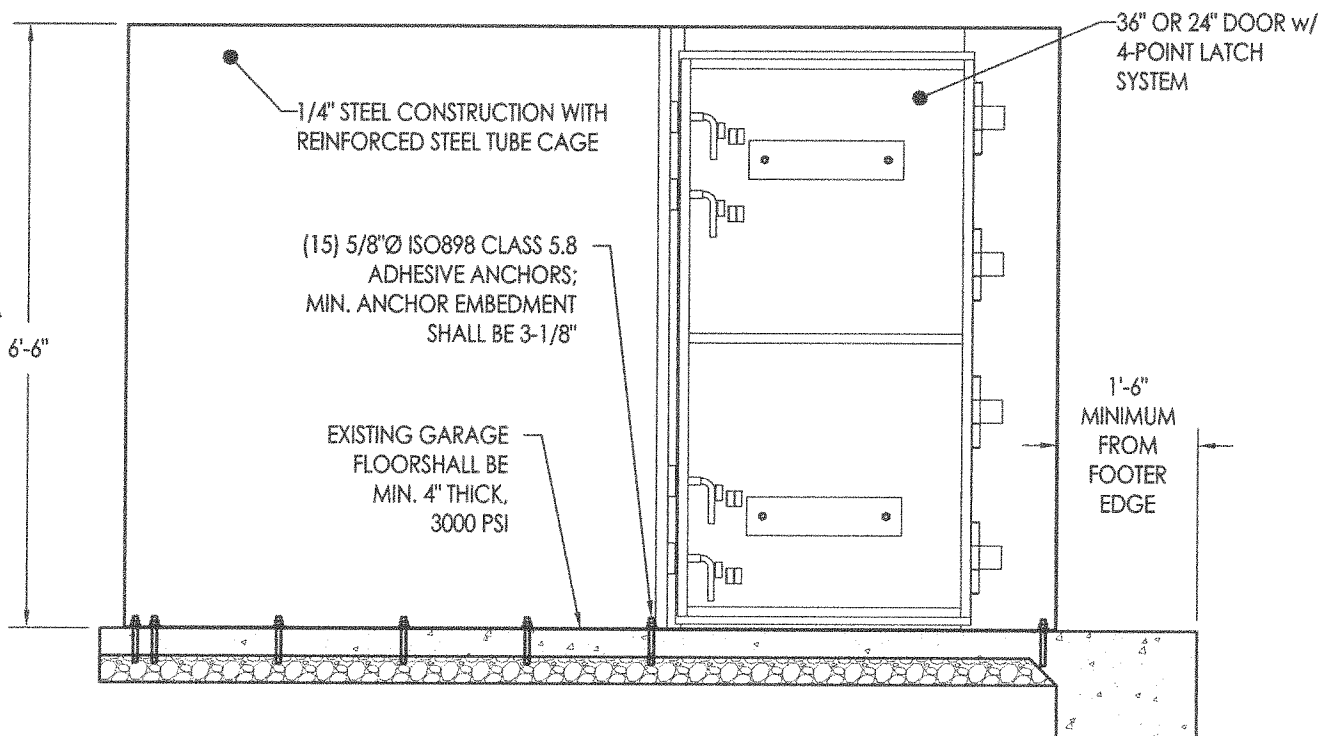
ROOF NOT SHOWN FOR CLARITY

REINFORCED CONCRETE NOTES:

- DESIGN, FABRICATION, MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE LATEST ACI SPECIFICATIONS, LOCAL BUILDING CODES, THE DESIGN DRAWINGS, AND THESE NOTES.
- MINIMUM COVERINGS FOR REINFORCEMENT STEEL PER THE ACI CODE IS IN EFFECT.
- CONCRETE SPECIFICATIONS:
 - MINIMUM CONCRETE REQUIRED PER SHELTER: 1 CY
 - MINIMUM CEMENT CONTENT OF 5.8 SACKS PER CUBIC YARD
 - MINIMUM CONCRETE STRENGTH: 3000 PSI
 - MAXIMUM SLUMP OF 3 INCHES
 - MINIMUM MODULUS OF RUPTURE OF 575 PSI AT 28 DAYS
 - WELDED STEEL WIRE FABRIC REINFORCEMENT SHALL COMPLY WITH REQUIREMENTS OF ASTM A185 FURNISH IN FLAT SHEETS
 - STEEL REINFORCEMENT ON CHAIR, TIE BARS, AND DOWEL BARS COMPLY WITH APPLICABLE REQUIREMENTS OF STANDARD SPECIFICATIONS, SECTION 905, STEEL REINFORCEMENT.
- MINIMUM CURE TIMES FOR LOADING OF THE STRUCTURE PER ACI REQUIREMENTS ARE IN EFFECT (MINIMUM OF 28 DAYS FOR NORMAL AND HEAVY TRAFFIC).

GENERAL NOTES:

- THIS STRUCTURE IS DESIGNED IN ACCORDANCE WITH ICC 500, FEMA 320, AND FEMA 361 STANDARDS.
- THE CONSTRUCTION SEQUENCE MUST FOLLOW GENERALLY MAINTAINED PRACTICES AND PROCEDURES IN ORDER TO MAINTAIN STRUCTURAL INTEGRITY.
- CONSTRUCTION PRACTICES WILL FOLLOW THOSE PRACTICES DESCRIBED IN THE LATEST EDITION OF THE INTERNATIONAL BUILDING CODE, LOCAL BUILDING CODES, AND LOCAL ORDINANCES.



FABRICATION NOTES:

- DESIGN, FABRICATION, MATERIAL, AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE LATEST ASTM SPECIFICATIONS, THE DESIGN DRAWINGS AND THESE NOTES.
- ALL STRUCTURAL AND SHEET STEEL UNLESS OTHERWISE NOTED, WILL CONFORM TO ASTM SPECIFICATION A36, A500, OR A513.
- INSTALLATION AND WORKMANSHIP WILL COMPLY WITH LOCAL BUILDING CODES, AND THESE NOTES.
- THIS STRUCTURE IS DESIGNED AS A STABLE UNIT AFTER ALL COMPONENT PARTS ARE IN PLACE. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY SHORING AND BRACING TO INSURE STABILITY DURING CONSTRUCTION.
- FIELD CONNECTIONS SHALL BE BOLTED AS SPECIFIED ON THE DRAWINGS.
- HOLES REQUIRED FOR FIELD ERECTION SHALL BE DRILLED AND REAMED.



	DRAWING DESCRIPTION:					
	ABOVE GRADE SAFEROOM 8' X 10' X 6'-6" H					
PROPRIETARY NOTE: THIS DRAWING IS THE PROPERTY OF GROUND ZERO SHELTERS AND IS NOT TO BE USED IN WHOLE OR IN PART WITHOUT THE PERMISSION OF GROUND ZERO SHELTERS	DRAWN: ADN 5/9/12	CHECKED: RSM 5/9/12	APPROVED: RSM 5/9/12	DWG SIZE: B	DRAWING NO: 1030-0070	REVISION
	PURPOSE OF ISSUE INSTALLATION	ISSUE DATE 5/9/12	SCALE: NTS	SHEET NO: 1 OF 1		



McGraw-Edison

GLEON Galleon

Area / Site Luminaire

Typical Applications
Outdoor • Parking Lots • Walkways • Roadways • Building Areas

Product Certifications


Product Features


Connected Systems

- WaveLinx
- Enlighted

Interactive Menu

- Ordering Information page 2
- Mounting Details page 3
- Optical Distributions page 4
- Product Specifications page 4
- Energy and Performance Data page 4
- Control Options page 9

Quick Facts

- Lumen packages range from 4,200 - 80,800 (34W - 640W)
- Efficacy up to 156 lumens per watt

Dimensional Details



Number of Light Squares	"A" Width	"B" Standard Arm Length	"B" Extended Arm Length ¹	"B" Quick Mount Arm Length	"B" Quick Mount Extended Arm Length
1-4	15-1/2"	7"	10"	10-5/8"	16-9/16"
5-6	21-5/8"	7"	10"	10-5/8"	16-9/16"
7-8	27-5/8"	7"	13"	10-5/8"	-
9-10	33-3/4"	7"	16"	-	-

NOTES:
For arm selection requirements and additional line art, see Mounting Details section.

Exterior Light Fixtures



Southwest Doors to Auditorium Link

VEX WALL SCONCE
TECH LIGHTING


The Vex Outdoor LED Wall Sconce is a minimalist profile featuring up and down lighting and delivers a wide range of optical control and illumination options. Independently controlled beam angles range from 10° - 120° achieved with a simple tool-free adjustment. Beams are lockable and can be set symmetric or asymmetric in both directions. Angle markers ensure consistency and precision from fixture to fixture. Vex is ideal for indoor or outdoor accent lighting, ambient lighting and wayfinding where beam angle is critical.

Key features


- Tool-free, independent, up/down beam angle adjustment 10° - 120°
- Asymmetric or Symmetric Beam Shaping
- Lockable
- Angle markers for consistent and precise aiming

SPECIFICATIONS


DELIVERED LUMENS	554.3
WATTS	18.7
VOLTAGE	Universal 120V - 277V
DIMMING	0-10V, ELV, TRAC, CL
LIGHT DISTRIBUTION	Symmetric or Asymmetric depending on barn doors position
MOUNTING OPTIONS	Wall
OPTICS	Adjustable beam spread
CCT	2700K, 3000K or 4000K
CRI	90+
COLOR BINNING	3-Step
BUG RATING	B0-U3-G0
DARK SKY	Non-Compliant
WET LISTED	IP65
GENERAL LISTING	ETL, ADA
CALIFORNIA TITLE 24	Can be used to comply with CEC 2019 Title 24 Part 6 for outdoor use. Registration with




VEX
shown in black



VEX
shown in bronze



VEX
shown in charcoal



VEX
shown in white

Next to Exterior Doors

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 - General Conditions of the Contract: Dates for applications for payment.
- B. Section 01 00 00 - General Requirements: IECC Energy Efficiency test reports.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with the requirements of this Section 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 Oklahoma Housing Finance Agency (OHFA) shall schedule a meeting prior to start of construction.
- B. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect.
 - 4. OHFA Representative.
 - 5. Historic Preservation consultant.
 - 6. Contractor's superintendent.
 - 7. 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. OHFA Representative.
 - 5. Historic Preservation consultant.

6. Contractor's superintendent.
 7. 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 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 compliance with information given and the design concept expressed in 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 design 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 Energy Audit Report when required.
- B. Submit Correction Punch List for Substantial Completion.
- C. Submit Final Correction Punch List for Substantial Completion.
- D. 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.
- E. 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 Contract Documents and coordinating related work.
 2. Do not reproduce 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 40 06
NATIONAL PARK SERVICE PRESERVATION BRIEFS**

DOCUMENTS

1.01 APPLICABLE TO THIS CONTRACT, AND ATTACHED FOLLOWING THIS PAGE ARE:

**NATIONAL PARK SERVICE
U.S. DEPARTMENT OF THE INTERIOR
PRESERVATION BRIEFS**

1.02 PRESERVATION BRIEFS INCLUDED:

- A. PB-1 Cleaning and Water-Repellent Treatments for Historic Masonry Buildings
- B. PB-2 Repointing Mortar Joints in Historic Masonry Buildings

END OF SECTION

1 PRESERVATION BRIEFS

Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings

Robert C. Mack, AIA
Anne Grimmer



U.S. Department of the Interior
National Park Service
Cultural Resources
Heritage Preservation Services

Inappropriate cleaning and coating treatments are a major cause of damage to historic masonry buildings. While either or both treatments may be appropriate in some cases, they can be very destructive to historic masonry if they are not selected carefully. Historic masonry, as considered here, includes stone, brick, architectural terra cotta, cast stone, concrete and concrete block. It is frequently cleaned because cleaning is equated with improvement. Cleaning may sometimes be followed by the application of a water-repellent coating. However, unless these procedures are carried out under the guidance and supervision of an architectural conservator, they may result in irrevocable damage to the historic resource.

The purpose of this Brief is to provide information on the variety of cleaning methods and materials that are available for use on the *exterior* of historic masonry buildings, and to provide guidance in selecting the most appropriate method or combination of methods. The difference between

water-repellent coatings and waterproof coatings is explained, and the purpose of each, the suitability of their application to historic masonry buildings, and the possible consequences of their inappropriate use are discussed.

The Brief is intended to help develop sensitivity to the qualities of historic masonry that makes it so special, and to assist historic building owners and property managers in working cooperatively with architects, architectural conservators and contractors (Fig. 1). Although specifically intended for historic buildings, the information is applicable to all masonry buildings. This publication updates and expands *Preservation Brief 1: The Cleaning and Waterproof Coating of Masonry Buildings*. The Brief is not meant to be a cleaning manual or a guide for preparing specifications. Rather, it provides general information to raise awareness of the many factors involved in selecting cleaning and water-repellent treatments for historic masonry buildings.



Figure 1. Low-to medium-pressure steam (hot-pressurized water washing), is being used to clean the exterior of the U.S. Tariff Commission Building, the first marble building constructed in Washington, D.C., in 1839. This method was selected by an architectural conservator as the "gentlest means possible" to clean the marble. Steam can soften heavy soiling deposits such as those on the cornice and column capitals, and facilitate easy removal. Note how these deposits have been removed from the right side of the cornice which has already been cleaned.

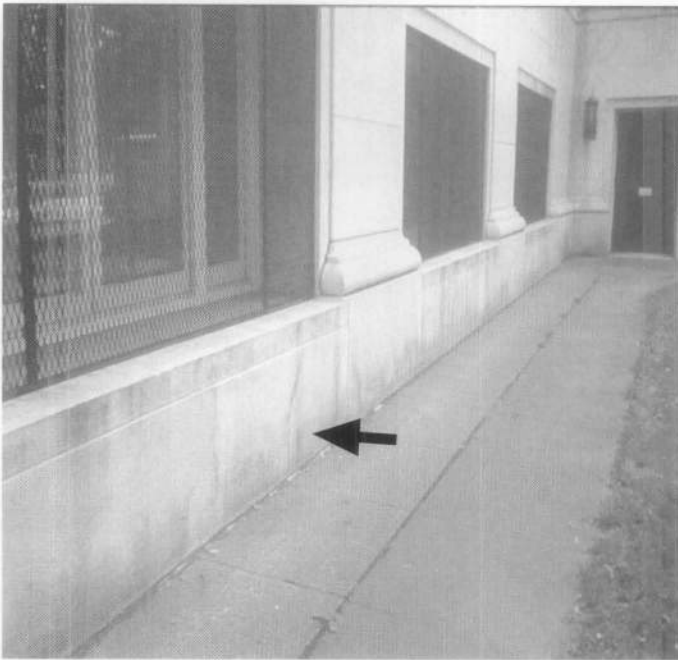


Figure 2. Biological growth as shown on this marble foundation can usually be removed using a low-pressure water wash, possibly with a non-ionic detergent added to it, and scrubbing with a natural or synthetic bristle brush.



Figure 3. This small test area has revealed a red brick patch that does not match the original beige brick. This may explain why the building was painted, and may suggest to the owner that it may be preferable to keep it painted.

Preparing for a Cleaning Project

Reasons for cleaning. First, it is important to determine whether it is appropriate to clean the masonry. The objective of cleaning a historic masonry building must be considered carefully before arriving at a decision to clean. There are several major reasons for cleaning a historic masonry building: **improve the appearance of the building** by removing unattractive dirt or soiling materials, or non-historic paint from the masonry; **retard deterioration** by removing soiling materials that may be damaging the masonry; or **provide a clean surface** to accurately match repointing mortars or patching compounds, or to conduct a condition survey of the masonry.

Identify what is to be removed. The general nature and source of dirt or soiling material on a building must be identified to remove it in the *gentlest means possible* — that is, in the most effective, yet least harmful, manner. Soot and smoke, for example, require a different cleaning agent to remove than oil stains or metallic stains. Other common cleaning problems include biological growth such as mold or mildew, and organic matter such as the tendrils left on masonry after removal of ivy (Fig. 2).

Consider the historic appearance of the building. If the proposed cleaning is to remove paint, it is important in each case to learn whether or not unpainted masonry is historically appropriate. And, it is necessary to consider why the building was painted (Fig. 3). Was it to cover bad repointing or unmatched repairs? Was the building painted to protect soft brick or to conceal deteriorating stone? Or, was painted masonry simply a fashionable

treatment in a particular historic period? Many buildings were painted at the time of construction or shortly thereafter; retention of the paint, therefore, may be more appropriate historically than removing it. And, if the building appears to have been painted for a long time, it is also important to think about whether the paint is part of the character of the historic building and if it has acquired significance over time.

Consider the practicalities of cleaning or paint removal. Some gypsum or sulfate crusts may have become integral with the stone and, if cleaning could result in removing some of the stone surface, it may be preferable not to clean. Even where unpainted masonry is appropriate, the retention of the paint may be more practical than removal in terms of long range preservation of the masonry. In some cases, however, removal of the paint may be desirable. For example, the old paint layers may have built up to such an extent that removal is necessary to ensure a sound surface to which the new paint will adhere.

Study the masonry. Although not always necessary, in some instances it can be beneficial to have the coating or paint type, color, and layering on the masonry researched before attempting its removal. Analysis of the nature of the soiling or of the paint to be removed from the masonry, as well as guidance on the appropriate cleaning method, may be provided by professional consultants, including architectural conservators, conservation scientists and preservation architects. The State Historic Preservation Office (SHPO), local historic district commissions, architectural review boards and preservation-oriented websites may also be able to supply useful information on masonry cleaning techniques.

Understanding the Building Materials

The construction of the building must be considered when developing a cleaning program because inappropriate cleaning can have a deleterious effect on the masonry as well as on other building materials. The masonry material or materials must be correctly identified. It is sometimes difficult to distinguish one type of stone from another; for example, certain sandstones can be easily confused with limestones. Or, what appears to be natural stone may not be stone at all, but cast stone or concrete. Historically, cast stone and architectural terra cotta were frequently used in combination with natural stone, especially for trim elements or on upper stories of a building where, from a distance, these substitute materials looked like real stone (Fig. 4). Other features on historic buildings that appear to be stone, such as decorative cornices, entablatures and window hoods, may not even be masonry, but metal.

Identify prior treatments. Previous treatments of the building and its surroundings should be researched and building maintenance records should be obtained, if available. Sometimes if streaked or spotty areas do not seem to get cleaner following an initial cleaning, closer inspection and analysis may be warranted. The discoloration may turn out not to be dirt but the remnant of a water-repellent coating applied long ago which has darkened the surface of the masonry over time (Fig. 5). Successful removal may require testing several cleaning agents to find something that will dissolve and remove the coating. Complete removal may not always be possible. Repairs may have been stained to match a dirty building, and cleaning may make these differences apparent. De-icing salts used near the building that have dissolved can



Figure 4. The foundation of this brick building is limestone, but the decorative trim above is architectural terra cotta intended to simulate stone.



Figure 5. Repeated water washing did not remove the staining inside this limestone porte cochere. Upon closer examination, it was determined to be a water-repellent coating that had been applied many years earlier. An alkaline cleaner may be effective in removing it.

migrate into the masonry. Cleaning may draw the salts to the surface, where they will appear as efflorescence (a powdery, white substance), which may require a second treatment to be removed. Allowances for dealing with such unknown factors, any of which can be a potential problem, should be included when investigating cleaning methods and materials. Just as more than one kind of masonry on a historic building may necessitate multiple cleaning approaches, unknown conditions that are encountered may also require additional cleaning treatments.

Choose the appropriate cleaner. The importance of testing cleaning methods and materials cannot be over emphasized. Applying the wrong cleaning agents to historic masonry can have disastrous results. Acidic cleaners can be extremely damaging to acid-sensitive stones, such as marble and limestone, resulting in etching and dissolution of these stones. Other kinds of masonry can also be damaged by incompatible cleaning agents, or even by cleaning agents that are usually compatible. There are also numerous kinds of sandstone, each with a considerably different geological composition. While an acid-based cleaner may be safely used on some sandstones, others are acid-sensitive and can be severely etched or dissolved by an acid cleaner. Some sandstones contain water-soluble minerals and can be eroded by water cleaning. And, even if the stone type is correctly identified, stones, as well as some bricks, may contain unexpected impurities, such as iron particles, that may react negatively with a particular cleaning agent and result in staining. Thorough understanding of the physical and chemical properties of the masonry will help avoid the inadvertent selection of damaging cleaning agents.

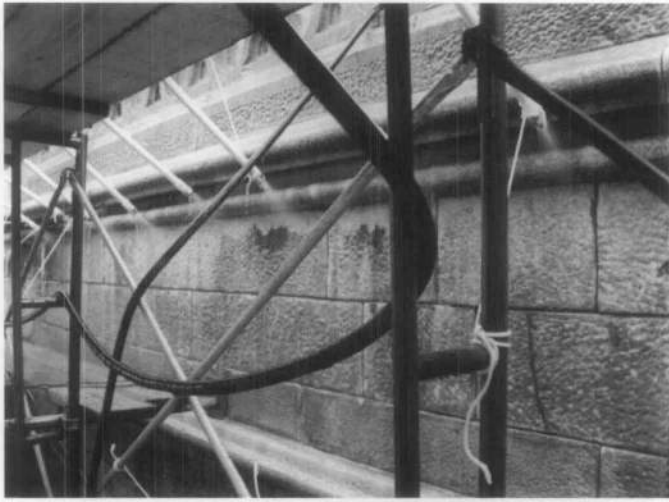


Figure 6. Timed water soaking can be very effective for cleaning limestone and marble as shown here at the Marble Collegiate Church in New York City. In this case, a twelve-hour water soak using a multi-nozzle manifold was followed by a final water rinse. Photo: Diane S. Kaese, Wiss, Janney, Elstner Associates, Inc., N.Y., N.Y.

Other building materials also may be affected by the cleaning process. Some chemicals, for example, may have a corrosive effect on paint or glass. The portions of building elements most vulnerable to deterioration may not be visible, such as embedded ends of iron window bars. Other totally unseen items, such as iron cramps or ties which hold the masonry to the structural frame, also may be subject to corrosion from the use of chemicals or even from plain water. The only way to prevent problems in these cases is to study the building construction in detail and evaluate proposed cleaning methods with this information in mind. However, due to the very likely possibility of encountering unknown factors, any cleaning project involving historic masonry should be viewed as unique to that particular building.

Cleaning Methods and Materials

Masonry cleaning methods generally are divided into three major groups: water, chemical, and abrasive. *Water methods* soften the dirt or soiling material and rinse the deposits from the masonry surface. *Chemical cleaners* react with dirt, soiling material or paint to effect their removal, after which the cleaning effluent is rinsed off the masonry surface with water. *Abrasive methods* include blasting with grit, and the use of grinders and sanding discs, all of which mechanically remove the dirt, soiling material or paint (and, usually, some of the masonry surface). Abrasive cleaning is also often followed with a water rinse. *Laser cleaning*, although not discussed here in detail, is another technique that is used sometimes by conservators to clean small areas of historic masonry. It can be quite effective for cleaning limited areas, but it is expensive and generally not practical for most historic masonry cleaning projects.

Although it may seem contrary to common sense, masonry cleaning projects should be carried out starting at the

bottom and proceeding to the top of the building always keeping all surfaces wet below the area being cleaned. The rationale for this approach is based on the principle that dirty water or cleaning effluent dripping from cleaning in progress above will leave streaks on a dirty surface but will not streak a clean surface as long as it is kept wet and rinsed frequently.

Water Cleaning

Water cleaning methods are generally the *gentlest means possible*, and they can be used safely to remove dirt from all types of historic masonry.* There are essentially four kinds of water-based methods: soaking; pressure water washing; water washing supplemented with non-ionic detergent; and steam, or hot-pressurized water cleaning. Once water cleaning has been completed, it is often necessary to follow up with a water rinse to wash off the loosened soiling material from the masonry.

Soaking. Prolonged spraying or misting with water is particularly effective for cleaning limestone and marble. It is also a good method for removing heavy accumulations of soot, sulfate crusts or gypsum crusts that tend to form in protected areas of a building not regularly washed by rain. Water is distributed to lengths of punctured hose or pipe with non-ferrous fittings hung from moveable scaffolding or a swing stage that continuously mists the surface of the masonry with a very fine spray (Fig. 6). A timed on-off spray is another approach to using this cleaning technique. After one area has been cleaned, the apparatus is moved on to another. Soaking is often used in combination with water washing and is also followed by a final water rinse. Soaking is a very slow method — it may take several days or a week—but it is a very gentle method to use on historic masonry.

Water Washing. Washing with low-pressure or medium-pressure water is probably one of the most commonly used methods for removing dirt or other pollutant soiling from historic masonry buildings (Fig. 7). Starting with a very low pressure (100 psi or below), even using a garden hose, and progressing as needed to slightly higher pressure —generally no higher than 300-400 psi—is always the recommended way to begin. Scrubbing with natural bristle or synthetic bristle brushes—never metal which can abrade the surface and leave metal particles that can stain the masonry—can help in cleaning areas of the masonry that are especially dirty.

Water Washing with Detergents. Non-ionic detergents—which are not the same as soaps—are synthetic organic compounds that are especially effective in removing oily soil. (Examples of some of the numerous proprietary non-ionic detergents include Igepal by GAF, Tergitol by Union Carbide and Triton by Rohm & Haas.) Thus, the addition of a non-ionic detergent, or surfactant, to a low- or medium-pressure water wash can be a useful aid in the cleaning

*Water cleaning methods may not be appropriate to use on some badly deteriorated masonry because water may exacerbate the deterioration, or on gypsum or alabaster which are very soluble in water.

process. (A non-ionic detergent, unlike most household detergents, does not leave a solid, visible residue on the masonry.) Adding a non-ionic detergent and scrubbing with a natural bristle or synthetic bristle brush can facilitate cleaning textured or intricately carved masonry. This should be followed with a final water rinse.

Steam/Hot-Pressurized Water Cleaning. Steam cleaning is actually low-pressure hot water washing because the steam condenses almost immediately upon leaving the hose. This is a gentle and effective method for cleaning stone and particularly for acid-sensitive stones. Steam can be especially useful in removing built-up soiling deposits and dried-up plant materials, such as ivy disks and tendrils. It can also be an efficient means of cleaning carved stone details and, because it does not generate a lot of liquid water, it can sometimes be appropriate to use for cleaning interior masonry (Figs. 8-9).

Potential hazards of water cleaning. Despite the fact that water-based methods are generally the most gentle, even they can be damaging to historic masonry. Before beginning a water cleaning project, it is important to make sure that all mortar joints are sound and that the building is watertight. Otherwise water can seep through the walls to the interior, resulting in rusting metal anchors and stained and ruined plaster.

Some water supplies may contain traces of iron and copper which may cause masonry to discolor. Adding a chelating or complexing agent to the water, such as EDTA (ethylene diamine tetra-acetic acid), which inactivates other metallic ions, as well as softens minerals and water hardness, will help prevent staining on light-colored masonry.

Any cleaning method involving water should never be done in cold weather or if there is any likelihood of frost or freezing because water within the masonry can freeze, causing spalling and cracking. Since a masonry wall may take over a week to dry after cleaning, no water cleaning should be permitted for several days prior to the first average frost date, or even earlier if local forecasts predict cold weather.

Most essential of all, it is important to be aware that using water at too high a pressure, a practice common to "power washing" and "water blasting", is very abrasive and can easily etch marble and other soft stones, as well as some types of brick (Figs. 10-11). In addition, the distance of the nozzle from the masonry surface and the type of nozzle, as well as gallons per minute (gpm), are also important variables in a water cleaning process that can have a significant impact on the outcome of the project. This is why it is imperative that the cleaning be closely monitored to ensure that the cleaning operators do not raise the pressure or bring the nozzle too close to the masonry in an effort to "speed up" the process. The appearance of grains of stone or sand in the cleaning effluent on the ground is an indication that the water pressure may be too high.



Figure 7. Glazed architectural terra cotta often may be cleaned successfully with a low-pressure water wash and hand scrubbing supplemented, if necessary, with a non-ionic detergent. Photo: National Park Service Files.

Chemical Cleaning

Chemical cleaners, generally in the form of proprietary products, are another material frequently used to clean historic masonry. They can remove dirt, as well as paint and other coatings, metallic and plant stains, and graffiti. Chemical cleaners used to remove dirt and soiling include **acids, alkalis** and **organic compounds**. Acidic cleaners, of course, should not be used on masonry that is acid sensitive. Paint removers are **alkaline**, based on **organic solvents** or other chemicals.

Chemical Cleaners to Remove Dirt

Both alkaline and acidic cleaning treatments include the use of water. Both cleaners are also likely to contain surfactants (wetting agents), that facilitate the chemical reaction that removes the dirt. Generally, the masonry is wet first for both types of cleaners, then the chemical cleaner is sprayed on at very low pressure or brushed onto the surface. The cleaner is left to dwell on the masonry for an amount of time recommended by the product manufacturer or, preferably, determined by testing, and rinsed off with a low- or moderate-pressure cold, or sometimes hot, water wash. More than one application of the cleaner may be necessary, and it is always a good practice to test the product manufacturer's recommendations concerning dilution rates and dwell times. Because each cleaning situation is unique, dilution rates and dwell times can vary considerably. The masonry surface may be scrubbed lightly with natural or synthetic bristle brushes prior to rinsing. After rinsing, pH strips should be applied to the surface to ensure that the masonry has been neutralized completely.

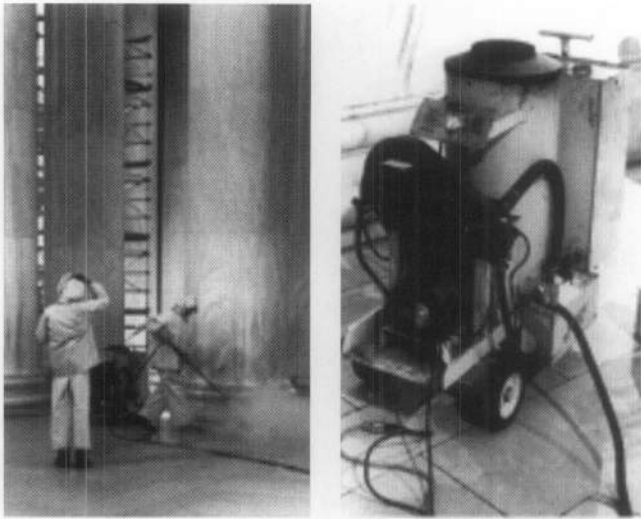


Figure 8. (Left) Low-pressure (under 100 psi) steam cleaning (hot-pressurized water washing), is part of the regular maintenance program at the Jefferson Memorial, Washington, D.C. The white marble interior of this open structure is subject to constant soiling by birds, insects and visitors. (Right) This portable steam cleaner enables prompt cleanup when necessary. Photos: National Park Service Files.

Acidic Cleaners. Acid-based cleaning products may be used on **non-acid sensitive** masonry, which generally includes: granite, most sandstones, slate, unglazed brick and unglazed architectural terra cotta, cast stone and concrete (Fig. 12). Most commercial acidic cleaners are composed primarily of hydrofluoric acid, and often include some phosphoric acid to prevent rust-like stains from developing on the masonry after the cleaning. Acid cleaners are applied to the pre-wet masonry which should be kept wet while the acid is allowed to "work", and then removed with a water wash.

Alkaline Cleaners. Alkaline cleaners should be used on **acid-sensitive** masonry, including: limestone, polished and unpolished marble, calcareous sandstone, glazed brick and glazed architectural terra cotta, and polished granite. (Alkaline cleaners may also be used sometimes on masonry materials that are not acid sensitive—after testing, of course

—but they may not be as effective as they are on acid-sensitive masonry.) Alkaline cleaning products consist primarily of two ingredients: a non-ionic detergent or surfactant; and an alkali, such as potassium hydroxide or ammonium hydroxide. Like acidic cleaners, alkaline products are usually applied to pre-wet masonry, allowed to dwell, and then rinsed off with water. (Longer dwell times may be necessary with alkaline cleaners than with acidic cleaners.) Two additional steps are required to remove alkaline cleaners after the initial rinse. First the masonry is given a slightly acidic wash—often with acetic acid—to neutralize it, and then it is rinsed again with water.

Chemical Cleaners to Remove Paint and Other Coatings, Stains and Graffiti

Removing paint and some other coatings, stains and graffiti can best be accomplished with alkaline paint removers, organic solvent paint removers, or other cleaning compounds. The removal of layers of paint from a masonry surface usually involves applying the remover either by brush, roller or spraying, followed by a thorough water wash. As with any chemical cleaning, the manufacturer's recommendations regarding application procedures should always be tested before beginning work.

Alkaline Paint Removers. These are usually of much the same composition as other alkaline cleaners, containing potassium or ammonium hydroxide, or trisodium phosphate. They are used to remove oil, latex and acrylic paints, and are effective for removing multiple layers of paint. Alkaline cleaners may also remove some acrylic, water-repellent coatings. As with other alkaline cleaners, both an acidic neutralizing wash and a final water rinse are generally required following the use of alkaline paint removers.

Organic Solvent Paint Removers. The formulation of organic solvent paint removers varies and may include a combination of solvents, including methylene chloride, methanol, acetone, xylene and toluene.

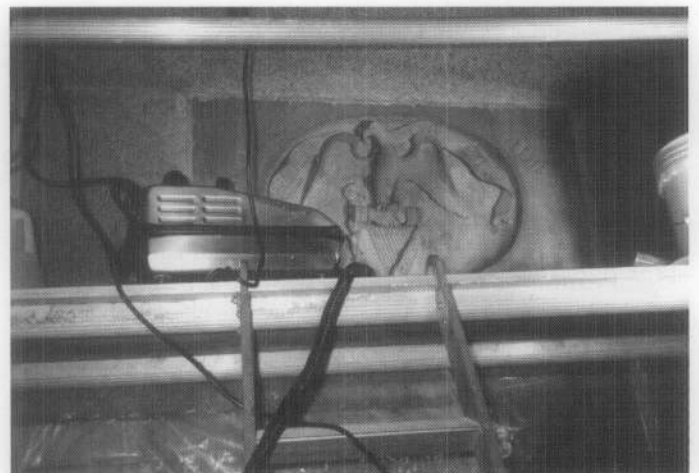


Figure 9. (Left) This small steam cleaner—the size of a vacuum cleaner—offers a very controlled and gentle means of cleaning limited, or hard-to-reach areas or carved stone details. (Right) It is particularly useful for interiors where it is important to keep moisture to a minimum, such as inside the Washington Monument, Washington, D.C., where it was used to clean the commemorative stones. Photos: Audrey T. Tepper.



Figure 10. High-pressure water washing too close to the surface has abraded and, consequently, marred the limestone on this early-20th century building.

Other Paint Removers and Cleaners. Other cleaning compounds that can be used to remove paint and some painted graffiti from historic masonry include paint removers based on N-methyl-2-pyrrolidone (NMP), or on petroleum-based compounds. Removing stains, whether they are industrial (smoke, soot, grease or tar), metallic (iron or copper), or biological (plant and fungal) in origin, depends on carefully matching the type of remover to the type of stain (Fig. 13). Successful removal of stains from historic masonry often requires the application of a number of different removers before the right one is found. The removal of layers of paint from a masonry surface is usually accomplished by applying the remover either by brush, roller or spraying, followed by a thorough water wash (Fig. 14).

Potential hazards of chemical cleaning. Since most chemical cleaning methods involve water, they have many of the potential problems of plain water cleaning. Like water methods, they should not be used in cold weather because of the possibility of freezing. Chemical cleaning should never be undertaken in temperatures below 40 degrees F (4 degrees C), and generally not below 50 degrees F. In addition, many chemical cleaners simply do not work in cold temperatures. Both acidic and alkaline cleaners can be dangerous to cleaning operators and, clearly, there are environmental concerns associated with the use of chemical cleaners.



Figure 11. Rinsing with high-pressure water following chemical cleaning has left a horizontal line of abrasion across the bricks on this late-19th century row house.

If not carefully chosen, chemical cleaners can react adversely with many types of masonry. Obviously, acidic cleaners should not be used on acid-sensitive materials; however, it is not always clear exactly what the composition is of any stone or other masonry material. For this reason, testing the cleaner on an inconspicuous spot on the building is always necessary. While certain acid-based cleaners may be appropriate if used as directed on a particular type of masonry, if left too long or if not adequately rinsed from the masonry they can have a negative effect. For example, hydrofluoric acid can etch masonry leaving a hazy residue (whitish deposits of silica or calcium fluoride salts) on the surface. While this efflorescence may usually be removed by a second cleaning—although it is likely to be expensive and time-consuming—hydrofluoric acid can also leave calcium fluoride salts or a colloidal silica deposit on masonry which may be impossible to remove (Fig. 15). Other acids, particularly hydrochloric (muriatic) acid, which is very powerful, should not be used on historic masonry, because it can dissolve lime-based mortar, damage brick and some stones, and leave chloride deposits on the masonry.



Figure 12. A mild acidic cleaning agent is being used to clean this heavily soiled brick and granite building. Additional applications of the cleaner and hand-scrubbing, and even poulticing, may be necessary to remove the dark stains on the granite arches below. Photo: Sharon C. Park, FAIA.

Alkaline cleaners can stain sandstones that contain a ferrous compound. Before using an alkaline cleaner on sandstone it is always important to test it, since it may be difficult to know whether a particular sandstone may contain a ferrous compound. Some alkaline cleaners, such as **sodium hydroxide (caustic soda or lye)** and **ammonium bifluoride**, can also damage or leave disfiguring brownish-yellow stains and, in most cases, should not be used on historic masonry. Although alkaline cleaners will not etch a masonry surface as acids can, they are caustic and can burn the surface. In addition, alkaline cleaners can deposit potentially damaging salts in the masonry which can be difficult to rinse thoroughly.

Abrasive and Mechanical Cleaning

Generally, abrasive cleaning methods are not appropriate for use on historic masonry buildings. Abrasive cleaning methods are just that—abrasive. Grit blasters, grinders, and sanding discs all operate by *abrading* the dirt or paint off the surface of the masonry, rather than *reacting* with the dirt and the masonry which is how water and chemical methods work. Since the abrasives do not differentiate between the dirt and the masonry, they can also remove the outer surface of the masonry at the same time, and result in permanently damaging the masonry. Brick, architectural terra cotta, soft stone, detailed carvings, and polished surfaces are especially susceptible to physical and aesthetic damage by abrasive methods. Brick and architectural terra cotta are fired products which have a smooth, glazed surface which can be removed by abrasive blasting or grinding (Figs. 18-19). Abrasively-cleaned masonry is damaged aesthetically as well as physically, and it has a rough surface which tends to hold dirt and the roughness will make future cleaning more difficult. Abrasive cleaning processes can also increase the likelihood of subsurface cracking of the masonry. Abrasion of carved details causes a rounding of sharp corners and other loss of delicate features, while abrasion of polished surfaces removes the polished finish of stone.

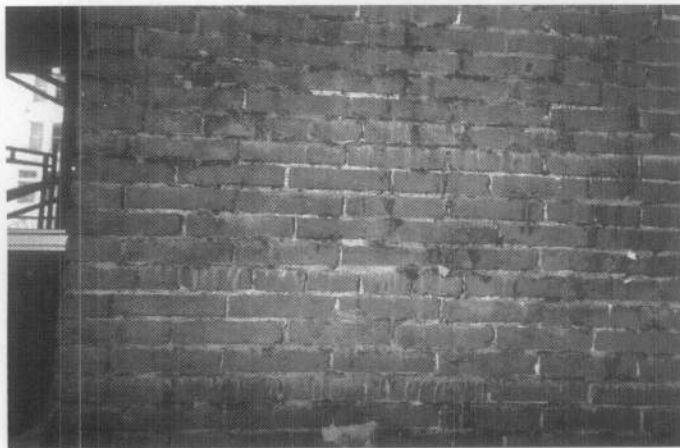


Figure 13. Sometimes it may be preferable to paint over a thick asphaltic coating rather than try to remove it, because it can be difficult to remove completely. However, in this case, many layers of asphaltic coating were removed through multiple applications of a heavy duty chemical cleaner. Each application of the cleaner was left to dwell following the manufacturer's recommendations, and then rinsed thoroughly. (As much as possible of the asphalt was first removed with wooden scrapers.) Although not all the asphalt was removed, this was determined to be an acceptable level of cleanliness for the project.



Figure 14. Chemical removal of paint from this brick building has revealed that the cornice and window hoods are metal rather than masonry.

Mortar joints, especially those with lime mortar, also can be eroded by abrasive or mechanical cleaning. In some cases, the damage may be visual, such as loss of joint detail or increased joint shadows. As mortar joints constitute a significant portion of the masonry surface (up to 20 per cent in a brick wall), this can result in the loss of a considerable amount of the historic fabric. Erosion of the mortar joints may also permit increased water penetration, which will likely necessitate repointing.

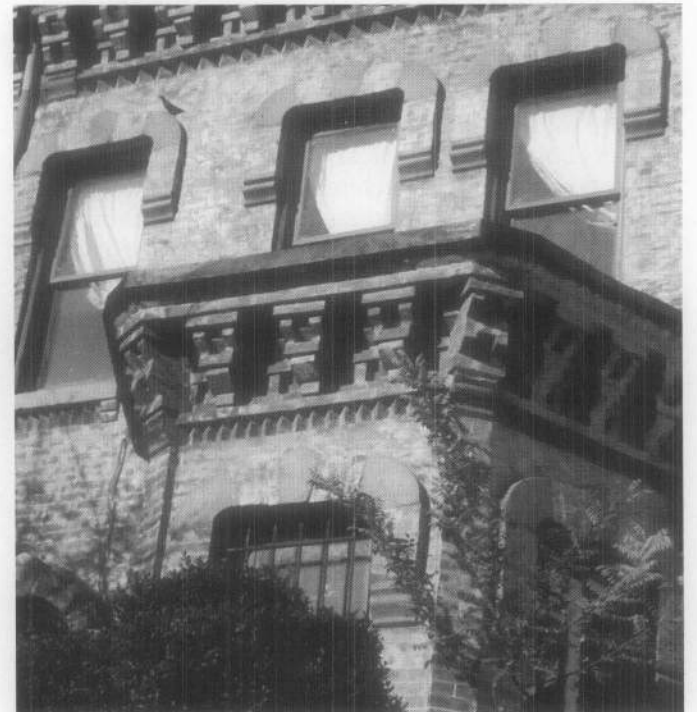


Figure 15. The whitish deposits left on the brick by a chemical paint remover may have resulted from inadequate rinsing or from the chemical being left on the surface too long and may be impossible to remove.

Poulticing to Remove Stains and Graffiti

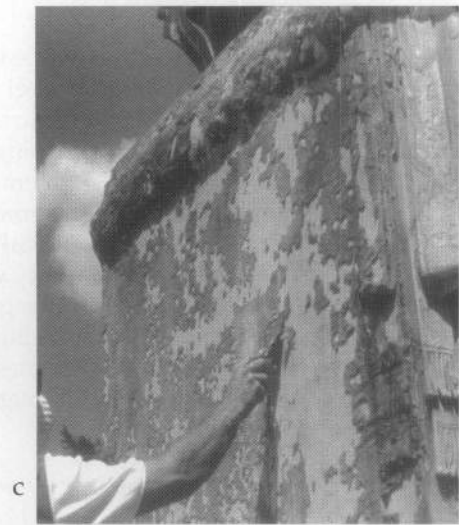


Figure 16. (a) The limestone base was heavily stained by runoff from the bronze statue above. (b) A poultice consisting of copper stain remover and ammonia mixed with fuller's earth was applied to the stone base and covered with plastic sheeting to keep it from drying out too quickly. (c) As the poultice dried, it pulled the stain out of the stone. (d) The poultice residue was removed carefully from the stone surface with wooden scrapers and the stone was rinsed with water. Photos: John Dugger.

Graffiti and stains, which have penetrated into the masonry, often are best removed by using a poultice. A poultice consists of an absorbent material or clay powder (such as kaolin or fuller's earth, or even shredded paper or paper towels), mixed with a liquid (solvent or other remover) to form a paste which is applied to the stain (Figs. 16-17). As it dries, the paste absorbs the staining material so that it is not redeposited on the masonry surface. Some commercial cleaning products and paint removers are specially formulated as a paste or gel that will cling to a vertical surface and remain moist for a longer period of time in order to prolong the action of the chemical on the stain. Pre-mixed poultices are also available as a paste or in powder form needing only the addition of the appropriate liquid. The masonry must be pre-wet before applying an alkaline cleaning agent, but not when using a solvent. Once the stain has been removed, the masonry must be rinsed thoroughly.



Figure 17. A poultice is being used to remove salts from the brownstone statuary on the facade of this late-19th century stone church. Photo: National Park Service Files.



Figure 18. The glazed bricks in the center of the pier were covered by a signboard that protected them being damaged by the sandblasting which removed the glaze from the surrounding bricks.

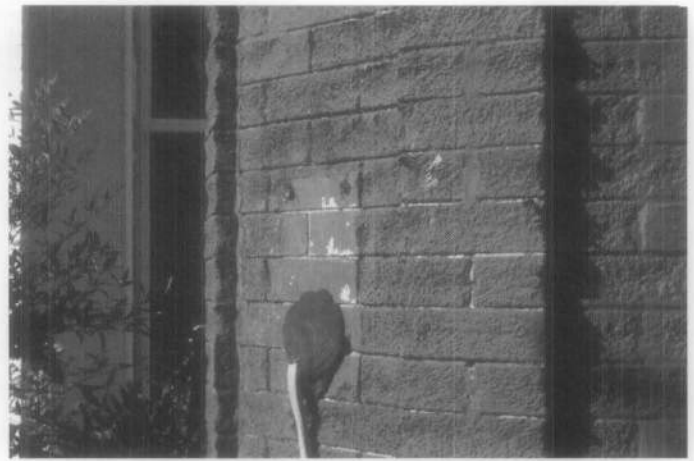


Figure 19. A comparison of undamaged bricks surrounding the electrical conduit with the rest of the brick facade emphasizes the severity of the erosion caused by sandblasting.

Abrasive Blasting. Blasting with abrasive grit or another abrasive material is the most frequently used abrasive method. *Sandblasting* is most commonly associated with abrasive cleaning. Finely ground silica or glass powder, glass beads, ground garnet, powdered walnut and other ground nut shells, grain hulls, aluminum oxide, plastic particles and even tiny pieces of sponge, are just a few of the other materials that have also been used for abrasive cleaning. Although abrasive blasting is not an appropriate method of cleaning historic masonry, it can be safely used to clean some materials. Finely-powdered walnut shells are commonly used for cleaning monumental bronze sculpture, and skilled conservators clean delicate museum objects and finely detailed, carved stone features with very small, micro-abrasive units using aluminum oxide.

A number of current approaches to abrasive blasting rely on materials that are not usually thought of as abrasive, and not as commonly associated with traditional abrasive grit cleaning. Some patented abrasive cleaning processes—one dry, one wet—use finely-ground glass powder intended to “erase” or remove dirt and surface soiling only, but not paint or stains (Fig. 20). Cleaning with baking soda (sodium bicarbonate) is another patented process. Baking soda blasting is being used in some communities as a means of quick graffiti removal. However, it should not be used on historic masonry which it can easily abrade and can permanently “etch” the graffiti into the stone; it can also leave potentially damaging salts in the stone which cannot be removed. Most of these abrasive grits may be used either dry or wet, although dry grit tends to be used more frequently.

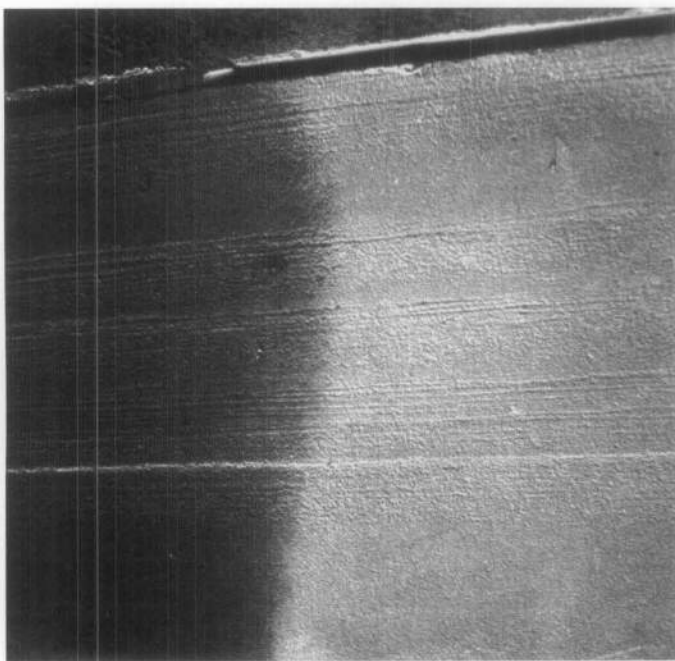


Figure 20. (Left) A comparison of the limestone surface of a 1920s office building before and after “cleaning” with a proprietary abrasive process using fine glass powder clearly shows the effectiveness of this method. But this is an abrasive technique and it has “cleaned” by removing part of the masonry surface with the dirt. Because it is abrasive, it is generally not recommended for large-scale cleaning of historic masonry, although it may be suitable to use in certain, very limited cases under controlled circumstances. (Right) A vacuum chamber where the used glass powder is collected for environmentally safe disposal is a unique feature of this particular process. The specially-trained operators in the chamber wear protective clothing, masks and breathing equipment. Photos: Tom Keohan.

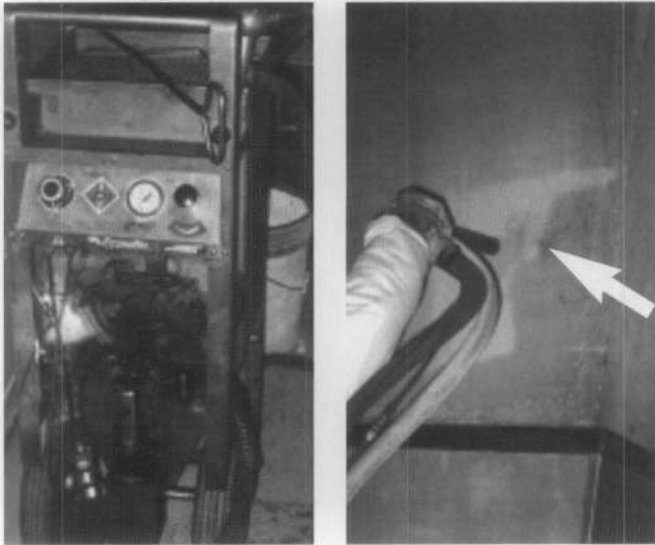


Figure 21. Low-pressure blasting with ice pellets or ice crystals (left) is an abrasive cleaning method that is sometimes recommended for use on interior masonry because it does not involve large amounts of water. However, like other abrasive materials, ice crystals "clean" by removing a portion of the masonry surface with the dirt, and may not remove some stains that have penetrated into the masonry without causing further abrasion (right). Photos: Audrey T. Tepper.

Ice particles, or pelletized dry ice (carbon dioxide or CO₂), are another medium used as an abrasive cleaner (Fig. 21). This is also too abrasive to be used on most historic masonry, but it may have practical application for removing mastics or asphaltic coatings from some substrates.

Some of these processes are promoted as being more environmentally safe and not damaging to historic masonry buildings. However, it must be remembered that they are abrasive and that they "clean" by removing a small portion of the masonry surface, even though it may be only a minuscule portion. The fact that they are essentially abrasive treatments must always be taken into consideration when planning a masonry cleaning project. *In general, abrasive methods should not be used to clean historic masonry buildings.* In some, very limited instances, highly-controlled, gentle abrasive cleaning may be appropriate on selected, hard-to-clean areas of a historic masonry building if carried out under the watchful supervision of a professional conservator. But, abrasive cleaning should never be used on an entire building.

Grinders and Sanding Disks. Grinding the masonry surface with mechanical grinders and sanding disks is another means of abrasive cleaning that should not be used on historic masonry. Like abrasive blasting, grinders and disks do not really clean masonry but instead grind away and abrasively remove and, thus, damage the masonry surface itself rather than remove just the soiling material.

Planning A Cleaning Project

Once the masonry and soiling material or paint have been identified, and the condition of the masonry has been evaluated, planning for the cleaning project can begin.

Testing cleaning methods. In order to determine the *gentlest means possible*, several cleaning methods or materials may have to be tested prior to selecting the best one to use on the building. Testing should always begin with the gentlest and least invasive method proceeding gradually, if necessary, to more complicated methods, or a combination of methods. All too often simple methods, such as low-pressure water wash, are not even considered, yet they frequently are effective, safe, and not expensive. Water of slightly higher pressure or with a non-ionic detergent additive also may be effective. It is worth repeating that these methods should always be tested prior to considering harsher methods; they are safer for the building and the environment, often safer for the applicator, and relatively inexpensive.

The level of cleanliness desired also should be determined prior to selection of a cleaning method. Obviously, the intent of cleaning is to remove most of the dirt, soiling material, stains, paint or other coating. A "brand new" appearance, however, may be inappropriate for an older building, and may require an overly harsh cleaning method to be achieved. When undertaking a cleaning project, it is important to be aware that some stains simply may not be removable. It may be wise, therefore, to agree upon a slightly lower level of cleanliness that will serve as the standard for the cleaning project. The precise amount of residual dirt considered acceptable may depend on the type of masonry, the type of soiling and difficulty of total removal, and local environmental conditions.

Cleaning tests should be carried out in an area of sufficient size to give a true indication of their effectiveness. It is preferable to conduct the test in an inconspicuous location on the building so that it will not be obvious if the test is not successful. A test area may be quite small to begin, sometimes as small as six square inches, and gradually may be increased in size as the most appropriate methods and cleaning agents are determined. Eventually the test area may be expanded to a square yard or more, and it should include several masonry units and mortar joints (Fig. 22). It should be remembered that a single building may have several types of masonry and that even similar materials may have different surface finishes. Each material and different finish should be tested separately. Cleaning tests should be evaluated only after the masonry has dried completely. *The results of the tests may indicate that several methods of cleaning should be used on a single building.*

When feasible, test areas should be allowed to weather for an extended period of time prior to final evaluation. A waiting period of a full year would be ideal in order to expose the test patch to a full range of seasons. If this is not possible, the test patch should weather for at least a month or two. For any building which is considered historically important, the delay is insignificant compared to the potential damage and disfigurement which may result from using an incompletely tested method. *The successfully cleaned test patch should be protected as it will serve as a standard against which the entire cleaning project will be measured.*

Environmental considerations. The potential effect of any method proposed for cleaning historic masonry should be evaluated carefully. Chemical cleaners and paint removers may damage trees, shrubs, grass, and plants. A plan must be provided for environmentally safe removal and disposal of the cleaning materials and the rinsing effluent before beginning the cleaning project. Authorities from the local regulatory agency – usually under the jurisdiction of the federal or state Environmental Protection Agency (EPA) should be consulted prior to beginning a cleaning project, especially if it involves anything more than plain water washing. This advance planning will ensure that the cleaning effluent or run-off, which is the combination of the cleaning agent and the substance removed from the masonry, is handled and disposed of in an environmentally sound and legal manner. Some alkaline and acidic cleaners can be neutralized so that they can be safely discharged into storm sewers. However, most solvent-based cleaners cannot be neutralized and are categorized as pollutants, and must be disposed of by a licensed transport, storage and disposal facility. Thus, it is always advisable to consult with the appropriate agencies before starting to clean to ensure that the project progresses smoothly and is not interrupted by a stop-work order because a required permit was not obtained in advance.

Vinyl guttering or polyethylene-lined troughs placed around the perimeter of the base of the building can serve to catch chemical cleaning waste as it is rinsed off the building. This will reduce the amount of chemicals entering and polluting the soil, and also will keep the cleaning waste contained until it can be removed safely. Some patented cleaning systems have developed special equipment to facilitate the containment and later disposal of cleaning waste.

Concern over the release of volatile organic compounds (VOCs) into the air has resulted in the manufacture of new, more environmentally responsible cleaners and paint removers, while some materials traditionally used in cleaning may no longer be available for these same reasons. Other health and safety concerns have created additional cleaning challenges, such as lead paint removal, which is likely to require special removal and disposal techniques.

Cleaning can also cause damage to non-masonry materials on a building, including glass, metal and wood. Thus, it is usually necessary to cover windows and doors, and other features that may be vulnerable to chemical cleaners. They should be covered with plastic or polyethylene, or a masking agent that is applied as a liquid which dries to form a thin protective film on glass, and is easily peeled off after the cleaning is finished. Wind drift, for example, can also damage other property by carrying cleaning chemicals onto nearby automobiles, resulting in etching of the glass or spotting of the paint finish. Similarly, airborne dust can enter surrounding buildings, and excess water can collect in nearby yards and basements.

Safety considerations. Possible health dangers of each method selected for the cleaning project must be considered before selecting a cleaning method to avoid harm to the

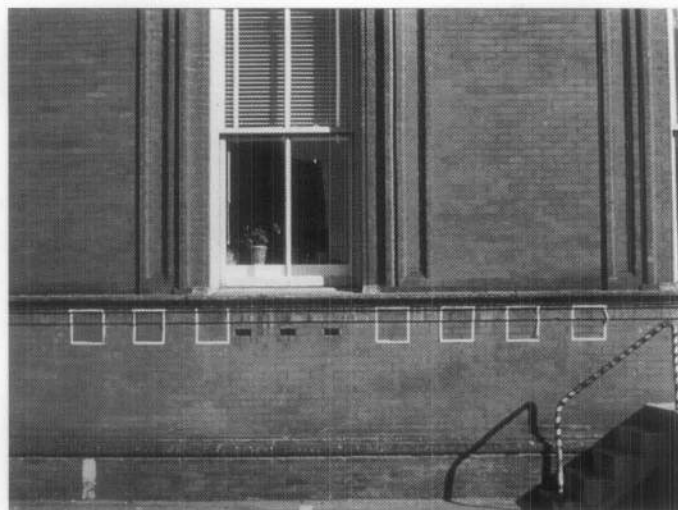


Figure 22. Cleaning test areas may be quite small at first and gradually increase in size as testing determines the "gentlest means possible".
Photo: Frances Gale.

cleaning applicators, and the necessary precautions must be taken. The precautions listed in Material Safety Data Sheets (MSDS) that are provided with chemical products should always be followed. Protective clothing, respirators, hearing and face shields, and gloves must be provided to workers to be worn at all times. Acidic and alkaline chemical cleaners in both liquid and vapor forms can also cause serious injury to passers-by (Fig. 23). It may be necessary to schedule cleaning at night or weekends if the building is located in a busy urban area to reduce the potential danger of chemical overspray to pedestrians. Cleaning during non-business hours will allow HVAC systems to be turned off and vents to be covered to prevent dangerous chemical fumes from entering the building which will also ensure the safety of the building's occupants. Abrasive and mechanical methods produce dust which can pose a serious health hazard, particularly if the abrasive or the masonry contains silica.

Water-Repellent Coatings and Waterproof Coatings

To begin with, it is important to understand that waterproof coatings and water-repellent coatings are not the same. Although these terms are frequently interchanged and commonly confused with one another, they are completely different materials. **Water-repellent coatings** –often referred to incorrectly as "sealers", but which do not or should not seal– are intended to keep liquid water from penetrating the surface but to allow water vapor to enter and leave, or pass through, the surface of the masonry (Fig. 24). Water-repellent coatings are generally *transparent*, or clear, although once applied some may darken or discolor certain types of masonry while others may give it a glossy or shiny appearance. **Waterproof coatings** seal the surface from liquid water and from water vapor. They are usually *opaque*, or pigmented, and include bituminous coatings and some elastomeric paints and coatings.

Water-Repellent Coatings

Water-repellent coatings are formulated to be vapor permeable, or "breathable". They do not seal the surface completely to water vapor so it can enter the masonry wall as well as leave the wall. While the first water-repellent coatings to be developed were primarily acrylic or silicone resins in organic solvents, now most water-repellent coatings are water-based and formulated from modified siloxanes, silanes and other alkoxysilanes, or metallic stearates. While some of these products are shipped from the factory ready to use, other waterborne water repellents must be diluted at the job site. Unlike earlier water-repellent coatings which tended to form a "film" on the masonry surface, modern water-repellent coatings actually penetrate into the masonry substrate slightly and, generally, are almost invisible if properly applied to the masonry. They are also more vapor permeable than the old coatings, yet they still reduce the vapor permeability of the masonry. Once inside the wall, water vapor can condense at cold spots producing liquid water which, unlike water vapor, cannot escape through a water-repellent coating. The liquid water within the wall, whether from condensation, leaking gutters, or other sources, can cause considerable damage.

Water-repellent coatings are not consolidants. Although modern water repellents may penetrate slightly beneath the masonry surface, instead of just "sitting" on top of it, they do not perform the same function as a consolidant which is to "consolidate" and replace lost binder to strengthen deteriorating masonry. Even after many years of laboratory study and testing few consolidants have proven very effective. The composition of fired products such as brick and architectural terra cotta, as well as many types of building stone, does not lend itself to consolidation.

Some modern water-repellent coatings which contain a binder intended to replace the natural binders in stone that have been lost through weathering and natural erosion are described in product literature as both a water repellent and a consolidant. The fact that newer water-repellent coatings penetrate beneath the masonry surface instead of just forming a layer on top of the surface may indeed convey at least some consolidating properties to certain stones. However, a water-repellent coating cannot be considered a consolidant. In some instances, a water-repellent or "preservative" coating, if applied to already damaged or spalling stone, may form a surface crust which, if it fails, may exacerbate the deterioration by pulling off even more of the stone (Fig. 25).

Is a Water-Repellent Treatment Necessary?

Water-repellent coatings are frequently applied to historic masonry buildings for the wrong reason. They also are often applied without an understanding of what they are and what they are intended to do. And these coatings can be very difficult, if not impossible, to remove from the masonry if they fail or become discolored. Most importantly, the application of water-repellent coatings to historic masonry is usually unnecessary.



Figure 23. A tarpaulin protects and shields pedestrians from potentially harmful spray while chemical cleaning is underway on the granite exterior of the U.S. Treasury Building, Washington, D.C.

Most historic masonry buildings, unless they are painted, have survived for decades without a water-repellent coating and, thus, probably do not need one now. Water penetration to the interior of a masonry building is seldom due to porous masonry, but results from poor or deferred maintenance. Leaking roofs, clogged or deteriorated gutters and downspouts, missing mortar, or cracks and open joints around door and window openings are almost always the cause of moisture-related problems in a historic masonry building. **If historic masonry buildings are kept watertight and in good repair, water-repellent coatings should not be necessary.**

Rising damp (capillary moisture pulled up from the ground), or condensation can also be a source of excess moisture in masonry buildings. A water-repellent coating will not solve this problem either and, in fact, may be likely to exacerbate it. Furthermore, a water-repellent coating should never be applied to a damp wall. Moisture in the wall would reduce the ability of a coating to adhere to the masonry and to penetrate below the surface. But, if it did adhere, it would hold the moisture inside the masonry because, although a water-repellent coating is permeable to water vapor, liquid water cannot pass through it. In the case of rising damp, a coating may force the moisture to go even higher in the wall because it can slow down evaporation, and thereby retain the moisture in the wall.

Excessive moisture in masonry walls may carry waterborne soluble salts from the masonry units themselves or from the mortar through the walls. If the water is permitted to come to the surface, the salts may appear on the masonry surface as efflorescence (a whitish powder) upon evaporation. However, the salts can be potentially dangerous if they remain in the masonry and crystallize



Figure 24. Although the application of a water-repellent coating was probably not needed on either of these buildings, the coating on the brick building (above), is not visible and has not changed the character of the brick. But the coating on the brick column (below), has a high gloss that is incompatible with the historic character of the masonry.



beneath the surface as subflorescence. Subflorescence eventually may cause the surface of the masonry to spall, particularly if a water-repellent coating has been applied which tends to reduce the flow of moisture out from the subsurface of the masonry. Although many of the newer water-repellent products are more breathable than their predecessors, they can be especially damaging if applied to masonry that contains salts, because they limit the flow of moisture through masonry.

When a Water-Repellent Coating May be Appropriate
There are some instances when a water-repellent coating may be considered appropriate to use on a historic masonry building. Soft, incompletely fired brick from the 18th- and early-19th centuries may have become so porous that paint or some type of coating is needed to protect it from further deterioration or dissolution. When a masonry building has been neglected for a long period of time, necessary repairs may be required in order to make it watertight. If, following a reasonable period of time after the building has been made watertight and has dried out completely, moisture appears actually to be penetrating through the repointed and repaired masonry walls, then the application of a water-repellent coating may be considered *in selected areas only*. This decision should be made in consultation with an architectural conservator. And, if such a treatment is undertaken, it should not be applied to the entire exterior of the building.

Anti-graffiti or barrier coatings are another type of clear coating—although barrier coatings can also be pigmented—that may be applied to exterior masonry, but they are not formulated primarily as water repellents. The purpose of these coatings is to make it harder for graffiti to stick to a masonry surface and, thus, easier to clean. But, like water-repellent coatings, in most cases the application of anti-graffiti coatings is generally not recommended for historic masonry buildings. These coatings are often quite shiny which can greatly alter the appearance of a historic masonry surface, and they are not always effective (Fig. 26). Generally, other ways of discouraging graffiti, such as improved lighting, can be more effective than a coating. However, the application of anti-graffiti coatings may be appropriate in some instances on vulnerable areas of historic masonry buildings which are frequent targets of graffiti that are located in out-of-the-way places where constant surveillance is not possible.

Some water-repellent coatings are recommended by product manufacturers as a means of keeping dirt and pollutants or biological growth from collecting on the surface of masonry buildings and, thus, reducing the need for frequent cleaning. While this at times may be true, in some cases a coating may actually retain dirt more than uncoated masonry. Generally, the application of a water-repellent coating is not recommended on a historic masonry building as a means of preventing biological growth. Some water-repellent coatings may actually encourage biological growth on a masonry wall. Biological growth on masonry buildings has traditionally been kept at bay through regularly-scheduled cleaning as part of a maintenance plan. Simple cleaning of the masonry with low-pressure water using a natural- or synthetic-bristled scrub brush can be very effective if done on a regular basis. Commercial products are also available which can be sprayed on masonry to remove biological growth.

In most instances, a water-repellent coating is not necessary if a building is watertight. The application of a water-repellent coating is not a recommended treatment for historic masonry buildings unless there is a specific



Figure 25. The clear coating applied to this limestone molding has failed and is taking off some of the stone surface as it peels. Photo: Frances Gale.

problem which it may help solve. If the problem occurs on only part of the building, it is best to treat only that area rather than an entire building. Extreme exposures such as parapets, for example, or portions of the building subject to driving rain can be treated more effectively and less expensively than the entire building. Water-repellent coatings are not permanent and must be reapplied

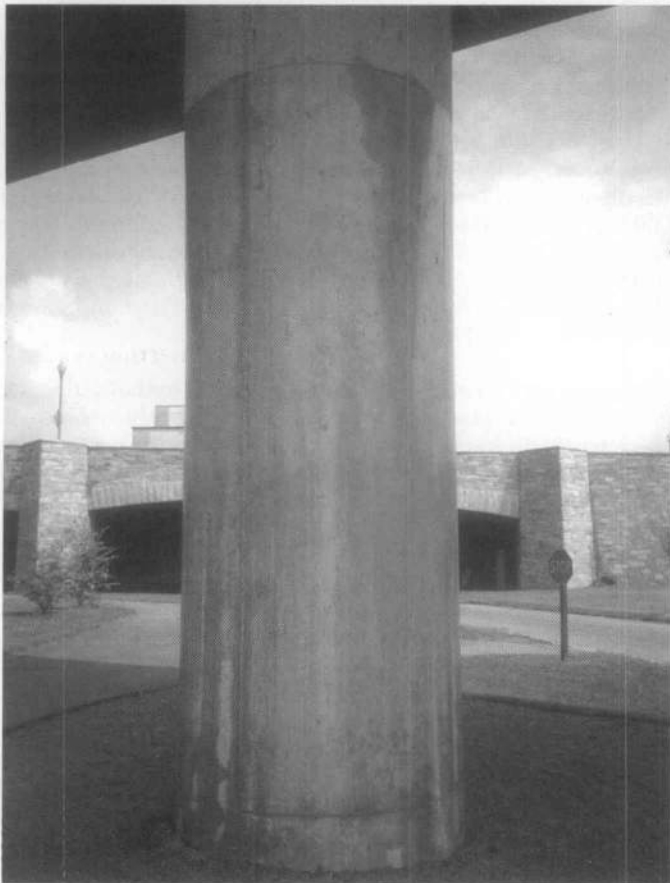


Figure 26. The anti-graffiti or barrier coating on this column is very shiny and would not be appropriate to use on a historic masonry building. The coating has discolored as it has aged and whitish streaks reveal areas of bare concrete where the coating was incompletely applied.

periodically although, if they are truly invisible, it can be difficult to know when they are no longer providing the intended protection.

Testing a water-repellent coating by applying it in one small area may not be helpful in determining its suitability for the building because a limited test area does not allow an adequate evaluation of such a treatment. Since water may enter and leave through the surrounding untreated areas, there is no way to tell if the coated test area is "breathable." But trying a coating in a small area may help to determine whether the coating is visible on the surface or if it will otherwise change the appearance of the masonry.

Waterproof Coatings

In theory, waterproof coatings usually do not cause problems as long as they exclude all water from the masonry. If water does enter the wall from the ground or from the inside of a building, the coating can intensify the damage because the water will not be able to escape. During cold weather this water in the wall can freeze causing serious mechanical disruption, such as spalling.

In addition, the water eventually will get out by the path of least resistance. If this path is toward the interior, damage to interior finishes can result; if it is toward the exterior, it can lead to damage to the masonry caused by built-up water pressure (Fig. 27).

In most instances, waterproof coatings should not be applied to historic masonry. The possible exception to this might be the application of a waterproof coating to below-grade exterior foundation walls as a last resort to stop water infiltration on interior basement walls. **Generally, however, waterproof coatings, which include elastomeric paints, should almost never be applied above grade to historic masonry buildings.**



Figure 27. Instead of correcting the roof drainage problems, an elastomeric coating was applied to the already saturated limestone cornice. An elastomeric coating holds moisture in the masonry because it does not "breathe" and does not allow liquid moisture to escape. If the water pressure builds up sufficiently it can cause the coating to break and pop off as shown in this example, often pulling pieces of the masonry with it. Photo: National Park Service Files.

Summary

A well-planned cleaning project is an essential step in preserving, rehabilitating or restoring a historic masonry building. Proper cleaning methods and coating treatments, when determined necessary for the preservation of the masonry, can enhance the aesthetic character as well as the structural stability of a historic building. Removing years of accumulated dirt, pollutant crusts, stains, graffiti or paint, if done with appropriate caution, can extend the life and longevity of the historic resource. Cleaning that is carelessly or insensitively prescribed or carried out by inexperienced workers can have the opposite of the intended effect. It may scar the masonry permanently, and may actually result in hastening deterioration by introducing harmful residual chemicals and salts into the masonry or causing surface loss. Using the wrong cleaning method or using the right method incorrectly, applying the wrong kind of coating or applying a coating that is not needed can result in serious damage, both physically and aesthetically, to a historic masonry building. Cleaning a historic masonry building should always be done using the *gentlest means possible* that will clean, but not damage the building. It should always be taken into consideration before applying a water-repellent coating or a waterproof coating to a historic masonry building whether it is really necessary and whether it is in the best interest of preserving the building.

Selected Reading

- Architectural Ceramics: Their History, Manufacture and Conservation*. A Joint Symposium of English Heritage and the United Kingdom Institute for Conservation, September 22-25, 1994. London: English Heritage, 1996.
- Ashurst, Nicola. *Cleaning Historic Buildings. Volume One: Substrates, Soiling & Investigation. Volume Two: Cleaning Materials & Processes*. London: Donhead Publishing Ltd., 1994.
- Association for Preservation Technology. *Special Issue: Preservation of Historic Masonry*. Papers from the Symposium on Preservation Treatments for Historic Masonry: Consolidants, Coatings, and Water Repellents, New York, New York, November 11-12, 1994. *APT Bulletin*. Vol. XXVI, No. 4 (1995).
- Grimmer, Anne E. *Preservation Brief 6: Dangers of Abrasive Cleaning to Historic Buildings*. Washington, D.C.: Preservation Assistance Division, National Park Service, U.S. Department of the Interior, 1979.
- Grimmer, Anne E. *Keeping it Clean: Removing Exterior Dirt, Paint, Stains and Graffiti from Historic Masonry Buildings*. Washington, D.C.: Preservation Assistance Division, National Park Service, U.S. Department of the Interior, 1988.
- Park, Sharon C., AIA. *Preservation Brief 39: Holding the Line: Controlling Unwanted Moisture in Historic Buildings*. Washington, D.C.: Heritage Preservation Services, National Park Service, U.S. Department of the Interior, 1996.
- Powers, Robert M. *Preservation Tech Note, Masonry No. 3, "Water Soak Cleaning of Limestone"*. Washington, D.C.: Preservation Assistance Division, National Park Service, U.S. Department of the Interior, 1992.

Sinvinski, Valerie. "Gentle Blasting." *Old-House Journal*. Vol. XXIV, No. 4 (July-August 1996), pp. 46-49.

Weaver, Martin E. *Conserving Buildings: A Guide to Techniques and Materials*. New York: John Wiley & Sons, Inc., 1993.

Weaver, Martin E. *Preservation Brief 38: Removing Graffiti from Historic Masonry*. Washington, D.C.: Preservation Assistance Division, National Park Service, U.S. Department of the Interior, 1995.

Winkler, E.M. *Stone in Architecture: Properties, Durability*. Third, completely revised and extended edition. Berlin, Germany: Springer-Verlag, 1997.

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Front Cover: Chemical cleaning of the brick and architectural terra cotta frieze on the 1880s Pension Building, Washington, D.C. (now the National Building Museum), is shown here in progress. Photo: Christina Henry.

Photographs used to illustrate this Brief were taken by Anne Grimmer unless otherwise credited.



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PRESERVATION BRIEFS

2

Repointing Mortar Joints in Historic Masonry Buildings

Robert C. Mack, FAIA, and John P. Speweik

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Soft mortar for repointing. Photo: John P. Speweik.

Masonry—brick, stone, terra-cotta, and concrete block—is found on nearly every historic building. Structures with all-masonry exteriors come to mind immediately, but most other buildings at least have masonry foundations or chimneys. Although generally considered "permanent," masonry is subject to deterioration, especially at the mortar joints. Repointing, also known simply as "pointing" or—somewhat inaccurately—"tuck pointing"*, is the process of removing deteriorated mortar from the joints of a masonry wall and replacing it with new mortar. Properly done, repointing restores the visual and physical integrity of the masonry. Improperly done, repointing not only detracts from the appearance of the building, but may also cause physical damage to the masonry units themselves.

The purpose of this Brief is to provide general guidance on appropriate materials and methods for repointing historic masonry buildings and it is intended to benefit building owners, architects, and contractors. The Brief should serve as a guide to prepare specifications for repointing historic masonry buildings. It should also help develop sensitivity to the particular needs of historic masonry, and to assist historic building owners in working cooperatively with architects, architectural conservators and historic preservation consultants, and contractors. Although specifically intended for historic buildings, the guidance is appropriate for other masonry buildings as well. This publication updates *Preservation Briefs 2: Repointing Mortar Joints in Historic Brick Buildings* to include all types of historic unit masonry. The scope of the earlier Brief has also been expanded to acknowledge that the many buildings constructed in the first half of the 20th century are now

historic and eligible for listing in the National Register of Historic Places, and that they may have been originally constructed with portland cement mortar.

**Tuckpointing technically describes a primarily decorative application of a raised mortar joint or lime putty joint on top of flush mortar joints.*

Historical Background

Mortar consisting primarily of lime and sand has been used as an integral part of masonry structures for thousands of years. Up until about the mid-19th century, lime or quicklime (sometimes called lump lime) was delivered to construction sites, where it had to be slaked, or combined with water. Mixing with water caused it to boil and resulted in a wet lime putty that was left to mature in a pit or wooden box for several weeks, up to a year. Traditional mortar was made from lime putty, or slaked lime, combined with local sand, generally in a ratio of 1 part lime putty to 3 parts sand by volume. Often other ingredients, such as crushed marine shells (another source of lime), brick dust, clay, natural cements, pigments, and even animal hair were also added to mortar, but the basic formulation for lime putty and sand mortar remained unchanged for centuries until the advent of portland cement or its forerunner, Roman cement, a natural, hydraulic cement.

Portland cement was patented in Great Britain in 1824. It was named after the stone from Portland in Dorset which it resembled when hard. This is a fast-curing, hydraulic cement which hardens under water. Portland cement was first manufactured in the United States in 1872, although it was imported before this date. But it was not in common use throughout the country until the early 20th century. Up until the turn of the century portland cement was considered primarily an additive, or "minor ingredient" to help accelerate mortar set time. By the 1930s, however, most masons used a mix of equal parts portland cement and lime putty. Thus, the mortar found in masonry structures built between 1873 and 1930 can range from pure lime and sand mixes to a wide variety of lime, portland cement, and sand combinations.

In the 1930s more new mortar products intended to hasten and simplify masons' work were introduced in the U.S. These included **masonry cement**, a premixed, bagged mortar which is a combination of portland cement and ground limestone, and **hydrated lime**, machine-slaked lime that eliminated the necessity of slaking quicklime into putty at the site.

Identifying the Problem Before Repointing

The decision to repoint is most often related to some obvious sign of deterioration, such as disintegrating mortar, cracks in mortar joints, loose bricks or stones, damp walls, or damaged plasterwork. It is, however, erroneous to assume that repointing alone will solve deficiencies that result from other problems. The root cause of the deterioration—leaking roofs or gutters, differential settlement of the building, capillary action causing rising damp, or extreme weather exposure—should always be dealt with prior to beginning work.

Without appropriate repairs to eliminate the source of the problem, mortar deterioration will continue and any repointing will have been a waste of time and money.

Use of Consultants

Because there are so many possible causes for deterioration in historic buildings, it may be desirable to retain a consultant, such as a historic architect or architectural conservator, to analyze the building. In addition to determining the most appropriate solutions to the problems, a consultant can prepare specifications which reflect the particular requirements of each job and can provide oversight of the work in progress. Referrals to preservation consultants frequently can be obtained from State Historic Preservation Offices, the American Institute for Conservation of Historic and Artistic Works (AIC), the Association for Preservation Technology (APT), and local chapters of the American Institute of Architects (AIA).



Masons practice using lime putty mortar to repair historic marble. Photo: NPS files.

Finding an Appropriate Mortar Match

Preliminary research is necessary to ensure that the proposed repointing work is both physically and visually appropriate to the building. Analysis of unweathered portions of the historic mortar to which the new mortar will be matched can suggest appropriate mixes for the repointing mortar so that it will not damage the building because it is excessively strong or vapor impermeable.

Examination and analysis of the masonry units—brick, stone or terra cotta—and the techniques used in the original construction will assist in maintaining the building's historic appearance. A simple, non-technical, evaluation of the masonry units and mortar can provide information concerning the relative strength and permeability of each—critical factors in

selecting the repointing mortar—while a visual analysis of the historic mortar can provide the information necessary for developing the new mortar mix and application techniques.

Although not crucial to a successful repointing project, for projects involving properties of special historic significance, a mortar analysis by a qualified laboratory can be useful by providing information on the original ingredients. However, there are limitations with such an analysis, and replacement mortar specifications should not be based solely on laboratory analysis. Analysis requires interpretation, and there are important factors which affect the condition and performance of the mortar that cannot be established through laboratory analysis. These may include: the original water content, rate of curing, weather conditions during original construction, the method of mixing and placing the mortar, and the cleanliness and condition of the sand. *The most useful information that can come out of laboratory analysis is the identification of sand by gradation and color.* This allows the color and the texture of the mortar to be matched with some accuracy because sand is the largest ingredient by volume.



This late 19th century granite has recently been repointed with the joint profile and mortar color carefully matched to the original. Photo: NPS files.

In creating a repointing mortar that is compatible with the masonry units, the objective is to achieve one that matches the historic mortar as closely as possible, so that the new material can coexist with the old in a sympathetic, supportive and, if necessary, sacrificial capacity. The exact physical and chemical properties of the historic mortar are not of major significance as long as the new mortar conforms to the following criteria:

- The new mortar must match the historic mortar in **color, texture and tooling**. (If a laboratory analysis is undertaken, it may be possible to match the binder components and their proportions with the historic mortar, if those materials are available.)
- The **sand must match the sand** in the historic mortar. (The color and texture of the new mortar will usually fall into place if the sand is matched successfully.)
- The new mortar must have **greater vapor permeability** and be **softer** (measured in compressive strength) than the masonry units.
- The new mortar must be **as vapor permeable** and **as soft or softer** (measured in compressive strength) than the historic mortar. (Softness or hardness is not necessarily an indication of permeability; old, hard lime mortars can still retain high permeability.)

Mortar Analysis

Methods for analyzing mortars can be divided into two broad categories: **wet chemical** and **instrumental**. Many laboratories that analyze historic mortars use a simple **wet-chemical** method called acid digestion, whereby a sample of the mortar is crushed and then mixed with a dilute acid. The acid dissolves all the carbonate-containing minerals not only in the binder, but also in the aggregate (such as oyster shells, coral sands, or other carbonate-based materials), as well as any other acid-soluble materials. The sand and fine-grained acid-insoluble material is left behind. There are several variations on the simple acid digestion test. One involves collecting the carbon dioxide gas given off as the carbonate is digested by the acid; based on the gas volume the carbonate content of the mortar can be accurately determined (Jedrzejewska, 1960). Simple acid digestion methods are rapid, inexpensive, and easy to perform, but the information they provide about the original composition of a mortar is limited to the color and texture of the sand. The gas collection method provides more information about the binder than a simple acid digestion test.

Instrumental analysis methods that have been used to evaluate mortars include polarized light or thin-section microscopy, scanning electron microscopy, atomic absorption spectroscopy, X-ray diffraction, and differential thermal analysis. All instrumental methods require not only expensive, specialized equipment, but also highly-trained experienced analysts. However, instrumental methods can provide much more information about a mortar. Thin-section microscopy is probably the most commonly used instrumental method. Examination of thin slices of a mortar in transmitted light is often used to supplement acid digestion methods, particularly to look for carbonate-based aggregate. For example, the new ASTM test method, ASTM C 1324-96 "Test Method for Examination and Analysis of Hardened Mortars" which was designed specifically for the analysis of modern lime-cement and masonry cement mortars, combines a complex series of wet chemical analyses with thin-section microscopy.

The drawback of most mortar analysis methods is that mortar samples of known composition have not been analyzed in order to evaluate the method. Historic mortars were not prepared to narrowly defined specifications from materials of uniform quality; they contain a wide array of locally derived materials combined at the discretion of the mason. While a



This mortar is the proper consistency for repointing historic brick. Photo: John P. Speweik.

particular method might be able to accurately determine the original proportions of a lime-cement-sand mortar prepared from modern materials, the usefulness of that method for evaluating historic mortars is questionable unless it has been tested against mortars prepared from materials more commonly used in the past.

Properties of Mortar

Mortars for repointing should be softer or more permeable than the masonry units and no harder or more impermeable than the historic mortar to prevent damage to the masonry units. It is a common error to assume that hardness or high strength is a measure of appropriateness, particularly for lime-based historic mortars. Stresses within a wall caused by expansion, contraction, moisture migration, or settlement must be accommodated in some manner; in a masonry wall, these stresses should be relieved by the mortar rather than by the masonry units. A mortar that is stronger in compressive strength than the masonry units will not "give," thus causing stresses to be relieved through the masonry units—resulting in permanent damage to the masonry, such as cracking and spalling, that cannot be repaired easily.

While stresses can also break the bond between the mortar and the masonry units, permitting water to penetrate the resulting hairline cracks, this is easier to correct in the joint through repointing than if the break occurs in the masonry units.

Permeability, or rate of vapor transmission, is also critical. High lime mortars are more permeable than denser cement mortars. Historically, mortar acted as a bedding material—not unlike an expansion joint—rather than a "glue" for the masonry units, and moisture was able to migrate through the mortar joints rather than the masonry units. When moisture evaporates from the masonry it deposits any soluble salts either on the surface as *efflorescence* or below the surface as *subflorescence*. While salts deposited on the surface of masonry units are usually relatively harmless, salt crystallization within a masonry unit creates pressure that can cause parts of the outer surface to spall off or delaminate. If the mortar does not permit moisture or moisture vapor to migrate out of the wall and evaporate, the result will be damage to the masonry units.

Components of Mortar

Sand

Sand is the largest component of mortar and the material that gives mortar its distinctive color, texture and cohesiveness. Sand must be free of impurities, such as salts or clay. The three key characteristics of sand are: particle shape, gradation and void ratios.

When viewed under a magnifying glass or low-power microscope, particles of sand generally have either rounded edges, such as found in beach and river sand, or sharp, angular edges, found in crushed or manufactured sand. For repointing mortar, rounded or natural sand is preferred for two reasons. It is usually similar to the sand in the historic mortar and provides a better visual match. It also has better working qualities or plasticity and can thus be forced into the joint more easily, forming a good contact with the remaining historic mortar and the surface of the adjacent masonry units. Although manufactured sand is frequently more readily available, it is usually possible to locate a supply of rounded sand.

The gradation of the sand (particle size distribution) plays a very important role in the durability and cohesive properties of a mortar. Mortar must have a certain percentage of large to small particle sizes in order to deliver the optimum performance. Acceptable guidelines on particle size distribution may be found in ASTM C 144 (American Society for Testing and Materials). However, in actuality, since neither historic nor modern sands are always in compliance with ASTM C 144, matching the same particle appearance and gradation usually requires sieving the sand.

A scoop of sand contains many small voids between the individual grains. A mortar that performs well fills all these small voids with binder (cement/lime combination or mix) in a balanced manner. Well-graded sand generally has a 30 per cent void ratio by volume. Thus, 30 per cent binder by volume generally should be used, unless the historic mortar had a different binder: aggregate ratio. This represents the 1:3 binder to sand ratios often seen in mortar specifications.

For repointing, sand generally should conform to ASTM C 144 to assure proper gradation and freedom from impurities; some variation may be necessary to match the original size and gradation. Sand color and texture also should match the original as closely as possible to provide the proper color match without other additives.

Lime

Mortar formulations prior to the late-19th century used lime as the primary binding material. Lime is derived from heating limestone at high temperatures which burns off the carbon dioxide, and turns the limestone into quicklime. There are three types of limestone—calcium, magnesium, and dolomitic—differentiated by the different levels of magnesium carbonate they



This early 19th century building is being repointed with lime mortar. Photo: Travis McDonald.

contain which impart specific qualities to mortar. Historically, calcium lime was used for mortar rather than the dolomitic lime (calcium magnesium carbonate) most often used today. But it is also important to keep in mind the fact that the historic limes, and other components of mortar, varied a great deal because they were natural, as opposed to modern lime which is manufactured and, therefore, standardized. Because some of the kinds of lime, as well as other components of mortar, that were used historically are no longer readily available, even when a conscious effort is made to replicate a "historic" mix, this may not be achievable due to the differences between modern and historic materials.

Lime, itself, when mixed with water into a paste is very plastic and creamy. It will remain workable and soft indefinitely, if stored in a sealed container. Lime (calcium hydroxide) hardens by carbonation absorbing carbon dioxide primarily from the air, converting itself to calcium carbonate. Once a lime and sand mortar is mixed and placed in a wall, it begins the process of carbonation. If lime mortar is left to dry too rapidly, carbonation of the mortar will be reduced, resulting in poor adhesion and poor durability. In addition, lime mortar is slightly water soluble and thus is able to re-seal any hairline cracks that may develop during the life of the mortar. Lime mortar is soft, porous, and changes little in volume during temperature fluctuations thus making it a good choice for historic buildings. *Because of these qualities, high calcium lime mortar may be considered for many repointing projects, not just those involving historic buildings.*



Caulking was inappropriately used here in place of mortar on the top of the wall. As a result, it has not been durable. Photo: NPS files.

For repointing, lime should conform to ASTM C 207, Type S, or Type SA, Hydrated Lime for Masonry Purposes. This machine-slaked lime is designed to assure high plasticity and water retention. The use of quicklime which must be slaked and soaked by hand may have advantages over hydrated lime in some restoration projects if time and money allow.

Lime Putty

Lime putty is slaked lime that has a putty or paste-like consistency. It should conform to ASTM C 5. Mortar can be mixed using lime putty according to ASTM C 270 property or proportion specification.

Portland Cement

More recent, 20th-century mortar has used portland cement as a primary binding material. A straight portland cement and sand mortar is extremely hard, resists the movement of water, shrinks upon setting, and undergoes relatively large thermal movements. When mixed with water, portland cement forms a harsh, stiff paste that is quite unworkable, becoming hard very quickly. (Unlike lime, portland cement will harden regardless of weather conditions and does not require wetting and drying cycles.) Some portland cement assists the workability and plasticity of the mortar without adversely affecting the finished project; it also provides early strength to the mortar and speeds setting. Thus, it may be appropriate to add some portland cement to an essentially lime-based mortar even when repointing relatively soft 18th or 19th century brick under some circumstances when a slightly harder mortar is required. The more portland cement that is added to a mortar formulation the harder it becomes—and the faster the initial set.

For repointing, portland cement should conform to ASTM C 150. White, non-staining portland cement may provide a better color match for some historic mortars than the more commonly available grey portland cement. But, it should not be assumed, however, that white portland cement is always appropriate for all historic buildings, since the original mortar may have been mixed with grey cement. The cement should not have more than 0.60 per cent alkali to help avoid efflorescence.

Masonry Cement

Masonry cement is a preblended mortar mix commonly found at hardware and home repair stores. It is designed to produce mortars with a compressive strength of 750 psi or higher when mixed with sand and water at the job site. It may contain hydrated lime, but it always contains a large amount of portland cement, as well as ground limestone and other workability agents, including air-entraining agents. Because masonry cements are not required to contain hydrated lime, and generally do not contain lime, they produce high strength mortars that can damage historic masonry. *For this reason, they generally are not recommended for use on historic masonry buildings.*

Lime Mortar (pre-blended)

Hydrated lime mortars, and pre-blended lime putty mortars with or without a matched sand are commercially available. Custom mortars are also available with color. In most instances, pre-blended lime mortars containing sand may not provide an exact match; however, if the project calls for total repointing, a pre-blended lime mortar may be worth considering as long as the mortar is compatible in strength with the masonry. If the project involves only selected, "spot" repointing, then it may be better to carry out a mortar analysis which can provide a custom pre-blended lime mortar with a matching sand. In

either case, if a preblended lime mortar is to be used, it should contain Type S or SA hydrated lime conforming to ASTM C 207.

Water

Water should be potable—clean and free from acids, alkalis, or other dissolved organic materials.

Other Components

Historic components

In addition to the color of the sand, the texture of the mortar is of critical importance in duplicating historic mortar. Most mortars dating from the mid-19th century on—with some exceptions—have a fairly homogeneous texture and color. Some earlier mortars are not as uniformly textured and may contain lumps of partially burned lime or "dirty lime", shell (which often provided a source of lime, particularly in coastal areas), natural cements, pieces of clay, lampblack or other pigments, or even animal hair. The visual characteristics of these mortars can be duplicated through the use of similar materials in the repointing mortar.

Replicating such unique or individual mortars will require writing new specifications for each project. If possible, suggested sources for special materials should be included. For example, crushed oyster shells can be obtained in a variety of sizes from poultry supply dealers.

Pigments

Some historic mortars, particularly in the late 19th century, were tinted to match or contrast with the brick or stone. Red pigments, sometimes in the form of brick dust, as well as brown, and black pigments were commonly used. Modern pigments are available which can be added to the mortar at the job site, but they should not exceed 10 per cent by weight of the portland cement in the mix, and carbon black should be limited to 2 per cent. Only synthetic mineral oxides, which are alkali-proof and sun-fast, should be used to prevent bleaching and fading.

Modern Components

Admixtures are used to create specific characteristics in mortar, and whether they should be used will depend upon the individual project. *Air entraining agents*, for example, help the mortar to resist freeze-thaw damage in northern climates. *Accelerators* are used to reduce mortar freezing prior to setting while *retarders* help to extend the mortar life in hot climates. Selection of admixtures should be made by the architect or architectural conservator as part of the specifications, not something routinely added by the masons.

Generally, modern chemical additives are unnecessary and may, in fact, have detrimental effects in historic masonry projects. The use of antifreeze compounds is not recommended. They are not very effective with high lime mortars and may introduce salts, which may cause efflorescence later. A better practice is to warm the sand and water, and to protect the completed work from freezing. No definitive study has determined whether air-entraining additives should be used to resist frost action and enhance plasticity, but in areas of extreme exposure requiring high-strength mortars with lower permeability, air-entrainment of 10-16 percent may be desirable (see formula for "severe weather exposure" in Mortar Type and Mix). Bonding agents are not a substitute for proper joint preparation, and they should generally be avoided. If the joint is properly prepared, there will be a good bond between the new mortar and the adjacent surfaces. In addition, a bonding agent is difficult to remove if smeared on a masonry surface.

Mortar Type and Mix

Mortars for repointing projects, especially those involving historic buildings, typically are custom mixed in order to ensure the proper physical and visual qualities. These materials can be combined in varying proportions to create a mortar with the desired performance and durability. The actual specification of a particular mortar type should take into consideration all of the factors affecting the life of the building including: current site conditions, present condition of the masonry, function of the new mortar, degree of weather exposure, and skill of the mason.

Thus, no two repointing projects are exactly the same. Modern materials specified for use in repointing mortar should conform to specifications of the American Society for Testing and Materials (ASTM) or comparable federal specifications, and the resulting mortar should conform to ASTM C 270, Mortar for Unit Masonry.

Specifying the proportions for the repointing mortar for a specific job is not as difficult as it might seem. Five mortar types, each with a corresponding recommended mix, have been established by ASTM to distinguish high strength mortar from soft flexible mortars. The ASTM designated them in decreasing order of approximate general strength as Type M (2,500 psi), Type S (1,800 psi), Type N (750 psi), Type O (350 psi) and Type K (75 psi). (The letters identifying the types are from the words MASON WORK using every other letter.) Type K has the highest lime content of the mixes that contain portland cement, although it is seldom used today, except for some historic preservation projects. The designation "L" in the accompanying chart identifies a straight lime and sand mix. Specifying the appropriate ASTM mortar by proportion of



Here, a hammer and chisel are being correctly used to prepare a joint for repointing. Photo: John P. Spweik.

ingredients, will ensure the desired physical properties. Unless specified otherwise, measurements or proportions for mortar mixes are always given in the following order: cement-lime-sand. Thus, a Type K mix, for example, would be referred to as 1-3-10, or 1 part cement to 3 parts lime to 10 parts sand. Other requirements to create the desired visual qualities should be included in the specifications.

The strength of a mortar can vary. If mixed with higher amounts of portland cement, a harder mortar is obtained. The more lime that is added, the softer and more plastic the mortar becomes, increasing its workability. A mortar strong in compressive strength might be desirable for a hard stone (such as granite) pier holding up a bridge deck, whereas a softer, more permeable lime mortar would be preferable for a historic wall of soft brick. Masonry deterioration caused by salt deposition results when the mortar is less permeable than the masonry unit. A strong mortar is still more permeable than hard, dense stone. However, in a wall constructed of soft bricks where the masonry unit itself has a relatively high permeability or vapor transmission rate, a soft, high lime mortar is necessary to retain sufficient permeability.

Budgeting and Scheduling

Repointing is both expensive and time consuming due to the extent of handwork and special materials required. It is preferable to repoint only those areas that require work rather than an entire wall, as is often specified. But, if 25 to 50 per cent or more of a wall needs to be repointed, repointing the entire wall may be more cost effective than spot repointing.

Total repointing may also be more sensible when access is difficult, requiring the erection of expensive scaffolding (unless the majority of the mortar is sound and unlikely to require replacement in the foreseeable future). Each project requires judgement based on a variety of factors. Recognizing this at the outset will help to prevent many jobs from becoming prohibitively expensive.

In scheduling, seasonal aspects need to be considered first. Generally speaking, wall temperatures between 40 and 95 degrees F (8 and 38 degrees C) will prevent freezing or excessive evaporation of the water in the mortar. Ideally, repointing should be done in shade, away from strong sunlight in order to slow the drying process, especially during hot weather. If necessary, shade can be provided for large-scale projects with appropriate modifications to scaffolding.

The relationship of repointing to other work proposed on the building must also be recognized. For example, if paint removal or cleaning is anticipated, and if the mortar joints are basically sound and need only selective repointing, it is generally better to postpone repointing until after completion of these activities. However, if the mortar has eroded badly, allowing moisture to penetrate deeply into the wall, repointing should be accomplished before cleaning. Related work, such as structural or roof repairs, should be scheduled so that they do not interfere with repointing and so that all work can take maximum advantage of erected scaffolding.



When repairing this stone wall, the mason matched the raised profile of the original tuckpointing. Photo: NPS files.

Building managers also must recognize the difficulties that a repointing project can create. The process is time consuming, and scaffolding may need to remain in place for an extended period of time. The joint preparation process can be quite noisy and can generate large quantities of dust which must be controlled, especially at air intakes to protect human health, and also where it might damage operating machinery. Entrances may be blocked from time to time making access difficult for both building tenants and visitors. Clearly, building managers will need to coordinate the repointing work with other events at the site.

Contractor Selection

Contractor Selection The ideal way to select a contractor is to ask knowledgeable owners of recently repointed historic buildings for recommendations. Qualified contractors then can provide lists of other repointing projects for inspection. More commonly, however, the contractor for a repointing project is selected through a competitive bidding process over which the client or consultant has only limited control. In this situation it is important to ensure that the specifications stipulate that masons must have a minimum of five years' experience with repointing historic masonry buildings to be eligible to bid on the project. Contracts are awarded to the lowest responsible bidder, and bidders who have performed poorly on other projects usually can be eliminated from consideration on this basis, even if



A mechanical grinder improperly used to cut out the horizontal joint and incompatible repointing have seriously damaged the 19th century brick. Photo: NPS files.

they have the lowest prices.

The contract documents should call for unit prices as well as a base bid. Unit pricing forces the contractor to determine in advance what the cost addition or reduction will be for work which varies from the scope of the base bid. If, for example, the contractor has fifty linear feet less of stone repointing than indicated on the contract documents but thirty linear feet more of brick repointing, it will be easy to determine the final price for the work. Note that each type of work—brick repointing, stone repointing, or similar items—will have its own unit price. The unit price also should reflect quantities; one linear foot of pointing in five different spots will be more expensive than five contiguous linear feet.

Execution of the Work

Test Panels

These panels are prepared by the contractor using the same techniques that will be used on the remainder of the project. Several panel locations—preferably not on the front or other highly visible location of the building—may be necessary to include all types of masonry, joint styles, mortar colors, and other problems likely to be encountered on the job.



Unskilled repointing has negatively impacted the character of this late-19th century building. Photo: NPS files.

If cleaning tests, for example, are also to be undertaken, they should be carried out in the same location. Usually a 3 foot by 3 foot area is sufficient for brickwork, while a somewhat larger area may be required for stonework. These panels establish an acceptable standard of work and serve as a benchmark for evaluating and accepting subsequent work on the building.

Joint Preparation

Old mortar should be removed to a minimum depth of 2 to 2-1/2 times the width of the joint to ensure an adequate bond and to prevent mortar "popouts." For most brick joints, this will require removal of the mortar to a depth of approximately 1 to 1 1/2 inch; for stone masonry with wide joints, mortar may need to be removed to a depth of several inches. Any loose or disintegrated mortar beyond this minimum depth also should be removed.

Although some damage may be inevitable, careful joint preparation can help limit damage to masonry units. The traditional manner of removing old mortar is through the use of hand chisels and mash hammers. Though labor-intensive, in most instances this method poses the least threat for damage to historic masonry units and produces the best final product.

The most common method of removing mortar, however, is through the use of power saws or grinders. The use of power tools by unskilled masons can be disastrous for historic masonry, particularly soft brick. Using power saws on walls with thin joints, such as most brick walls, almost always will result in damage to the masonry units by breaking the edges and by overcutting on the head, or vertical joints.

However, small pneumatically-powered chisels generally can be used safely and effectively to remove mortar on historic buildings as long as the masons maintain appropriate control over the equipment. Under certain circumstances, thin diamond-bladed grinders may be used to cut out *horizontal* joints only on hard portland cement mortar common to most early-20th century masonry buildings. Usually, automatic tools most successfully remove old mortar without damaging the masonry units when they are used in combination with hand tools in preparation for repointing. Where horizontal joints are uniform and fairly wide, it may be possible to use a power masonry saw to assist the removal of mortar, such as by cutting along the middle of the joint; final mortar removal from the sides of the joints still should be done with a hand chisel and hammer. Caulking cutters with diamond blades can sometimes be used successfully to cut out joints without damaging the masonry. Caulking cutters are slow; they do not rotate, but vibrate at very high speeds, thus minimizing the possibility of damage to masonry units. Although mechanical tools may be safely used in limited circumstances to cut out horizontal joints in preparation for repointing, they should never be used on vertical joints because of the danger of slipping and cutting into the brick above or below the vertical joint. Using power tools to remove mortar without damaging the surrounding masonry units also necessitates highly skilled masons experienced in working on historic masonry buildings. Contractors should demonstrate proficiency with power tools before their use is approved.

Using any of these power tools may also be more acceptable on hard stone, such as quartzite or granite, than on terra cotta with its glass-like glaze, or on soft brick or stone. The test panel should determine the acceptability of power tools. If power tools are to be permitted, the contractor should establish a quality control program to account for worker fatigue and similar variables.

Mortar should be removed cleanly from the masonry units, leaving square corners at the back of the cut. Before filling, the joints should be rinsed with a jet of water to remove all loose particles and dust. At the time of filling, the joints should be damp, but with no standing water present. For masonry walls—limestone, sandstone and common brick—that are extremely absorbent, it is recommended that a continual mist of water be applied for a few hours before repointing begins.

Mortar Preparation

Mortar components should be measured and mixed carefully to assure the uniformity of visual and physical characteristics. Dry ingredients are measured by volume and thoroughly mixed before the addition of any water. Sand must be added in a damp, loose condition to avoid over sanding. Repointing mortar is typically pre-hydrated by adding water so it will just hold together, thus allowing it to stand for a period of time before the final water is added. Half the water should be added, followed by mixing for approximately 5 minutes. The remaining water should then be added in small portions until a mortar of the desired consistency is reached. The total volume of water necessary may vary from batch to batch, depending on weather conditions. It is important to keep the water to a minimum for two reasons: first, a drier mortar is cleaner to work with, and it can be compacted tightly into the joints; second, with no excess water to evaporate, the mortar cures without shrinkage cracks. Mortar should be used within approximately 30 minutes of final mixing, and "retempering," or adding more water, should not be permitted.

Using Lime Putty to Make Mortar

Mortar made with lime putty and sand, sometimes referred to as roughage or course stuff, should be measured by volume, and may require slightly different proportions from those used with hydrated lime. No additional water is usually needed to achieve a workable consistency because enough water is already contained in the putty. Sand is proportioned first, followed by the lime putty, then mixed for five minutes or until all the sand is thoroughly coated with the lime putty. But mixing, in the familiar sense of turning over with a hoe, sometimes may not be sufficient if the best possible performance is to be obtained from a lime putty mortar. Although the old practice of chopping, beating and ramming the mortar has largely been forgotten, recent field work has confirmed that lime putty and sand rammed and beaten with a wooden mallet or ax handle, interspersed by chopping with a hoe, can significantly improve workability and performance. The intensity of this action increases the overall lime/sand contact and removes any surplus water by compacting the other ingredients. It may also be advantageous for larger projects to use a mortar pan mill for mixing. Mortar pan mills which have a long tradition in Europe produce a superior lime putty mortar not attainable with today's modern paddle and drum type mixers.

For larger repointing projects the lime putty and sand can be mixed together ahead of time and stored indefinitely, on or off site, which eliminates the need for piles of sand on the job site. This mixture, which resembles damp brown sugar, must be protected from the air in sealed containers with a wet piece of burlap over the top or sealed in a large plastic bag to prevent evaporation and premature carbonation. The lime putty and sand mixture can be recombined into a workable plastic state months later with no additional water.

If portland cement is specified in a lime putty and sand mortar—Type O (1:2:9) or Type K (1:3:11)—the portland cement should first be mixed into a slurry paste before adding it to the lime putty and sand. Not only will this ensure that the portland cement is evenly distributed throughout the mixture, but if dry portland cement is added to wet ingredients it tends to "ball up," jeopardizing dispersion. (Usually water must be added to the lime putty and sand anyway once the portland cement is introduced.) Any color pigments should be added at this stage and mixed for a full five minutes. The mortar should be used within 30 minutes to 1 hour and it should not be retempered. Once portland cement has been added the mortar can no longer be stored.

Filling the Joint

Where existing mortar has been removed to a depth of greater than 1 inch, these deeper areas should be filled first, compacting the new mortar in several layers. The back of the entire joint should be filled successively by applying approximately 1/4 inch of mortar, packing it well into the back corners. This application may extend along the wall for several feet. As soon as the mortar has reached thumb-print hardness, another 1/4 inch layer of mortar—approximately the same thickness—may be applied. Several layers will be needed to fill the joint flush with the outer surface of the masonry. It is important to allow each layer time to harden before the next layer is applied; most of the mortar shrinkage occurs during the hardening process and layering thus minimizes overall shrinkage.

When the final layer of mortar is thumb-print hard, the joint should be tooled to match the historic joint. Proper timing of the tooling is important for uniform color and appearance. If tooled when too soft, the color will be lighter than expected, and hairline cracks may occur; if tooled when too hard, there may be dark streaks called "tool burning," and good closure of the mortar against the masonry units will not be achieved.

If the old bricks or stones have worn, rounded edges, it is best to recess the final mortar slightly from the face of the masonry. This treatment will help avoid a joint which is visually wider than the actual joint; it also will avoid creation of a large, thin featheredge which is easily damaged, thus admitting water. After tooling, excess mortar can be removed from the edge of the joint by brushing with a natural bristle or nylon brush. Metal bristle brushes should never be used on historic masonry.

Curing Conditions

The preliminary hardening of high-lime content mortars—those mortars that contain more lime by volume than portland cement, i.e., Type O (1:2:9), Type K (1:3:11), and straight lime/sand, Type "L" (0:1:3)—takes place fairly rapidly as water in the mix is lost to the porous surface of the masonry and through evaporation. A high lime mortar (especially Type "L") left to dry out too rapidly can result in chalking, poor adhesion, and poor durability. Periodic wetting of the repointed area after the mortar joints are thumb-print hard and have been finish tooled may significantly accelerate the carbonation process. When feasible, misting using a hand sprayer with a fine nozzle can be simple to do for a day or two after repointing. Local conditions will dictate the frequency of wetting, but initially it may be as often as every hour and gradually reduced to every three or four hours. Walls should be covered with burlap for the first three days after repointing. (Plastic may be used, but it should be tented out and not placed directly against the wall.) This helps keep the walls damp and protects them from direct sunlight. Once carbonation of the lime has begun, it will continue for many years and the lime will gain strength as it reverts back to calcium carbonate within the wall.

Aging the Mortar

Even with the best efforts at matching the existing mortar color, texture, and materials, there will usually be a visible difference between the old and new work, partly because the new mortar has been matched to the unweathered portions of the historic mortar. Another reason for a slight mismatch may be that the sand is more exposed in old mortar due to the slight erosion of the lime or cement. Although spot repointing is generally preferable and some color difference should be acceptable, if the difference between old and new mortar is too extreme, it may be advisable in some instances to repoint an entire area of a wall, or an entire feature such as a bay, to minimize the difference between the old and the new mortar. If the mortars have been properly matched, usually the best way to deal with surface color differences is to let the mortars age naturally. Other treatments to overcome these differences, including cleaning the non-repointed areas or staining the new mortar, should be carefully tested prior to implementation.



This 18th century pediment and surrounding wall exhibit distinctively different mortar joints. Photo: NPS files.

Staining the new mortar to achieve a better color match is generally not recommended, but it may be appropriate in some instances. Although staining may provide an initial match, the old and new mortars may weather at different rates, leading to visual differences after a few seasons. In addition, the mixtures used to stain the mortar may be harmful to the masonry; for example, they may introduce salts into the masonry which can lead to efflorescence.

Cleaning the Repointed Masonry

If repointing work is carefully executed, there will be little need for cleaning other than to remove the small amount of mortar from the edge of the joint following tooling. This can be done with a stiff natural bristle or nylon brush after the mortar has dried, but before it is initially set (1-2 hours). Mortar that has hardened can usually be removed with a wooden paddle or, if necessary, a chisel.

Further cleaning is best accomplished with plain water and natural bristle or nylon brushes. If chemicals must be used, they should be selected with extreme caution. Improper cleaning can lead to deterioration of the masonry units, deterioration of the mortar, mortar smear, and efflorescence. New mortar joints are especially susceptible to damage because they do not become fully cured for several months. Chemical cleaners, particularly acids, should never be used on dry masonry. The masonry should always be completely soaked once with water before chemicals are applied. After cleaning, the walls should be flushed again with plain water to remove all traces of the chemicals.

Several precautions should be taken if a freshly repointed masonry wall is to be cleaned. First, the mortar should be fully hardened before cleaning. Thirty days is usually sufficient, depending on weather and exposure; as mentioned previously, the mortar will continue to cure even after it has hardened. Test panels should be prepared to evaluate the effects of different cleaning methods. Generally, on newly repointed masonry walls, only very low pressure (100 psi) water washing supplemented by stiff natural bristle or nylon brushes should be used, except on glazed or polished surfaces, where only soft cloths should be used.**

New construction "bloom" or efflorescence occasionally appears within the first few months of repointing and usually disappears through the normal process of weathering. If the efflorescence is not removed by natural processes, the safest way to remove it is by dry brushing with stiff natural or nylon bristle brushes followed by wet brushing. Hydrochloric (muriatic) acid, is generally ineffective, and it should not be used to remove efflorescence. It may liberate additional salts, which, in turn, can lead to more efflorescence.

Surface grouting is sometimes suggested as an alternative to repointing brick buildings, in particular. This process involves the application of a thin coat of cement-based grout to the mortar joints and the mortar/brick interface. To be effective, the grout must extend slightly onto the face of the masonry units, thus widening the joint visually. The change in the joint appearance can alter the historic character of the structure to an unacceptable degree. In addition, although

masking of the bricks is intended to keep the grout off the remainder of the face of the bricks, some level of residue, called "veiling," will inevitably remain. Surface grouting cannot substitute for the more extensive work of repointing, and it is not a recommended treatment for historic masonry.

***Additional information on masonry cleaning is presented in Preservation Briefs 1: Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings, Robert C. Mack, FAIA, and Anne E. Grimmer, Washington, D.C.: Technical Preservation Services, National Park Service, U.S. Department of the Interior, 2000; and Keeping it Clean: Removing Exterior Dirt, Paint, Stains & Graffiti from Historic Masonry Buildings, Anne E. Grimmer, Washington, D.C.: Technical Preservation Services, National Park Service, U.S. Department of the Interior, 1988.*

Visually Examining the Mortar and the Masonry Units

A simple *in situ* comparison will help determine the hardness and condition of the mortar and the masonry units. Begin by scraping the mortar with a screwdriver, and gradually tapping harder with a cold chisel and mason's hammer. Masonry units can be tested in the same way beginning, even more gently, by scraping with a fingernail. This relative analysis which is derived from the 10-point hardness scale used to describe minerals, provides a good starting point for selection of an appropriate mortar. It is described more fully in "The Russack System for Brick & Mortar Description" referenced in [Reading List](#) at the end of this Brief.

Mortar samples should be chosen carefully, and picked from a variety of locations on the building to find unweathered mortar, if possible. Portions of the building may have been repointed in the past while other areas may be subject to conditions causing unusual deterioration. There may be several colors of mortar dating from different construction periods or sand used from different sources during the initial construction. Any of these situations can give false readings to the visual or physical characteristics required for the new mortar. Variations should be noted which may require developing more than one mix.

1. Remove with a chisel and hammer three or four unweathered samples of the mortar to be matched from several locations on the building. (Set the largest sample aside--this will be used later for comparison with the repointing mortar). Removing a full representation of samples will allow selection of a "mean" or average mortar sample.
2. Mash the remaining samples with a wooden mallet, or hammer if necessary, until they are separated into their constituent parts. There should be a good handful of the material.
3. Examine the powdered portion—the lime and/or cement matrix of the mortar. Most particularly, note the color. There is a tendency to think of historic mortars as having white binders, but grey portland cement was available by the last quarter of the 19th century, and traditional limes were also sometimes grey. Thus, in some instances, the natural color of the historic binder may be grey, rather than white. The mortar may also have been tinted to create a colored mortar, and this color should be identified at this point.
4. Carefully blow away the powdery material (the lime and/or cement matrix which bound the mortar together).
5. With a low power (10 power) magnifying glass, examine the remaining sand and other materials such as lumps of lime or shell.
6. Note and record the wide range of color as well as the varying sizes of the individual grains of sand, impurities, or other materials.

Other Factors to Consider

Color

Regardless of the color of the binder or colored additives, the sand is the primary material that gives mortar its color. A surprising variety of colors of sand may be found in a single sample of historic mortar, and the different sizes of the grains of sand or other materials, such as incompletely ground lime or cement, play an important role in the texture of the repointing mortar. Therefore, when specifying sand for repointing mortar, it may be necessary to obtain sand from several sources and to combine or screen them in order to approximate the range of sand colors and grain sizes in the historic mortar sample.

Pointing Style

Close examination of the historic masonry wall and the techniques used in the original construction will assist in maintaining the visual qualities of the building. Pointing styles and the methods of producing them should be examined. It is important to look at both the horizontal and the vertical joints to determine the order in which they were tooled and whether they were the same style. Some late-19th and early-20th century buildings, for example, have horizontal joints that were raked back

while the vertical joints were finished flush and stained to match the bricks, thus creating the illusion of horizontal bands. Pointing styles may also differ from one facade to another; front walls often received greater attention to mortar detailing than side and rear walls. **Tuckpointing** is not true repointing but the application of a raised joint or lime putty joint on top of flush mortar joints. **Penciling** is a purely decorative, painted surface treatment over a mortar joint, often in a contrasting color.

Masonry Units

The masonry units should also be examined so that any replacement units will match the historic masonry. Within a wall there may be a wide range of colors, textures, and sizes, particularly with hand-made brick or rough-cut, locally-quarried stone. Replacement units should blend in with the full range of masonry units rather than a single brick or stone.

Matching Color and Texture of the Repointing Mortar

New mortar should match the unweathered interior portions of the historic mortar. The simplest way to check the match is to make a small sample of the proposed mix and allow it to cure at a temperature of approximately 70 degrees F for about a week, or it can be baked in an oven to speed up the curing; this sample is then broken open and the surface is compared with the surface of the largest "saved" sample of historic mortar.

If a proper color match cannot be achieved through the use of natural sand or colored aggregates like crushed marble or brick dust, it may be necessary to use a modern mortar pigment.

During the early stages of the project, it should be determined how closely the new mortar should match the historic mortar. Will "quite close" be sufficient, or is "exactly" expected? The specifications should state this clearly so that the contractor has a reasonable idea how much time and expense will be required to develop an acceptable match.

The same judgment will be necessary in matching replacement terra cotta, stone or brick. If there is a known source for replacements, this should be included in the specifications. If a source cannot be determined prior to the bidding process, the specifications should include an estimated price for the replacement materials with the final price based on the actual cost to the contractor.

Mortar Types (Measured by volume)

Designation	Cement	Hydrated Lime or Lime Putty	Sand
M	1	1/4	3 - 3 3/4
S	1	1/2	4-4 1/2
N	1	1	5-6
O	1	2	8-9
K	1	3	10-12
"L"	0	1	2 1/4-3

Suggested Mortar Types for Different Exposures

Masonry Material	Exposure		
	Sheltered	Moderate	Severe
Very durable: granite, hard-cored brick, etc.	O	N	S
Moderately durable: limestone, durable stone, molded brick	K	O	N
Minimally durable: soft hand-made brick	"L"	K	O

Summary and References

For the Owner/Administrator

The owner or administrator of a historic building should remember that repointing is likely to be a lengthy and expensive process. First, there must be adequate time for evaluation of the building and investigation into the cause of problems. Then, there will be time needed for preparation of the contract documents. The work itself is precise, time-consuming and

noisy, and scaffolding may cover the face of the building for some time. Therefore, the owner must carefully plan the work to avoid problems. Schedules for both repointing and other activities will thus require careful coordination to avoid unanticipated conflicts. The owner must avoid the tendency to rush the work or cut corners if the historic building is to retain its visual integrity and the job is to be durable.

For the Architect/Consultant

Because the primary role of the consultant is to ensure the life of the building, a knowledge of historic construction techniques and the special problems found in older buildings is essential. The consultant must assist the owner in planning for logistical problems relating to research and construction. It is the consultant's responsibility to determine the cause of the mortar deterioration and ensure that it is corrected before the masonry is repointed. The consultant must also be prepared to spend more time in project inspections than is customary in modern construction.

For the Masons

Successful repointing depends on the masons themselves. Experienced masons understand the special requirements for work on historic buildings and the added time and expense they require. The entire masonry crew must be willing and able to perform the work in conformance with the specifications, even when the specifications may not be in conformance with standard practice. At the same time, the masons should not hesitate to question the specifications if it appears that the work specified would damage the building.

Conclusion

A good repointing job is meant to last, at least 30 years, and preferably 50- 100 years. Shortcuts and poor craftsmanship result not only in diminishing the historic character of a building, but also in a job that looks bad, and will require future repointing sooner than if the work had been done correctly. The mortar joint in a historic masonry building has often been called a wall's "first line of defense." Good repointing practices guarantee the long life of the mortar joint, the wall, and the historic structure. Although careful maintenance will help preserve the freshly repointed mortar joints, it is important to remember that mortar joints are intended to be sacrificial and will probably require repointing some time in the future. Nevertheless, if the historic mortar joints proved durable for many years, then careful repointing should have an equally long life, ultimately contributing to the preservation of the entire building.

Useful Addresses

Brick Institute of America

11490 Commerce Park Drive
Reston, VA 22091

National Lime Association

200 N. Glebe Road, Suite 800
Arlington, VA 22203

Portland Cement Association

5420 Old Orchard Road
Skokie, IL 60077

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This publication has been prepared pursuant to the National Historic Preservation Act of 1966, as amended, which directs the Secretary of the Interior to develop and make available information concerning historic properties. Technical Preservation Services (TPS), National Park Service prepares standards, guidelines, and other educational materials on responsible historic preservation treatments for a broad public.

October 1998

Reading List

Ashurst, John & Nicola. *Practical Building Conservation. Vol. 3: Mortars, Plasters and Renders*. New York: Halsted Press, a Division of John Wiley & Sons, Inc., 1988.

Cliver, E. Blaine. "Tests for the Analysis of Mortar Samples." *Bulletin of the Association for Preservation Technology*. Vol. 6, No. 1 (1974), pp. 68-73.

Coney, William B., AIA. *Masonry Repointing of Twentieth-Century Buildings*. Illinois Preservation Series. Number 10. Springfield, IL: Division of Preservation Services, Illinois Historic Preservation Agency, 1989.

Davidson, J.I. "Masonry Mortar." *Canadian Building Digest*. CBD 163. Ottawa, ONT: Division of Building Research, National Research Council of Canada, 1974.

Ferro, Maximillian L., AIA, RIBA. "The Russack System for Brick and Mortar Description: A Field Method for Assessing Masonry Hardness." *Technology and Conservation*. Vol. 5, No. 2 (Summer 1980), pp. 32-35.

Hooker, Kenneth A. "Field Notes on Repointing." *Aberdeen's Magazine of Masonry Construction*. Vol. 4, No. 8 (August 1991), pp. 326-328.

Jedrzejewska, H. "Old Mortars in Poland: A New Method of Investigation." *Studies in Conservation*. Vol. 5, No. 4 (1960), pp. 132-138.

"Lime's Role in Mortar." *Aberdeen's Magazine of Masonry Construction*. Vol. 9, No. 8 (August 1996), pp. 364-368.

Phillips, Morgan W. "Brief Notes on the Subjects of Analyzing Paints and Mortars and the Recording of Moulding Profiles: The Trouble with Paint and Mortar Analysis." *Bulletin of the Association for Preservation Technology*. Vol. 10, No. 2 (1978), pp. 77-89.

Preparation and Use of Lime Mortars: An Introduction to the Principles of Using Lime Mortars. Scottish Lime Centre for Historic Scotland. Edinburgh: Historic Scotland, 1995.

Schierhorn, Carolyn. "Ensuring Mortar Color Consistency." *Aberdeen's Magazine of Masonry Construction*. Vol. 9, No. 1 (January 1996), pp. 33-35.

"Should Air-Entrained Mortars Be Used?" *Aberdeen's Magazine of Masonry Construction*. Vol. 7, No. 9 (September 1994), pp. 419-422.

Sickels-Taves, Lauren B. "Creep, Shrinkage, and Mortars in Historic Preservation." *Journal of Testing and Evaluation, JTEVA*. Vol. 23, No. 6 (November 1995), pp. 447-452.

Spewiek, John P. *The History of Masonry Mortar in America, 1720-1995*. Arlington, VA: National Lime Association, 1995.

Spewiek, John P. "Repointing Right: Why Using Modern Mortar Can Damage a Historic House." *Old-House Journal*. Vol. XXV, No. 4 (July-August 1997), pp. 46-51.

Technical Notes on Brick Construction. Brick Institute of America, Reston, VA.

"Moisture Resistance of Brick Masonry: Maintenance." 7F. February 1986.

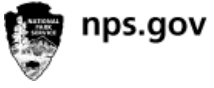
"Mortars for Brick Masonry." 8 Revised II. November 1989.

"Standard Specification for Portland Cement-Lime Mortar for Brick Masonry." 8A Revised. September 1988.

"Mortar for Brick Masonry-Selection and Controls." 8B Reissued. September 1988. (July/August 1976).

"Guide Specifications for Brick Masonry, Part V Mortar and Grout." 11E Revised. September 1991.

"Bonds and Patterns in Brickwork." 30 Reissued. September 1988.



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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 applied on site.
 - 2. Interior adhesives and sealants applied on site, 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 applied on site;.
 - 2. Exterior and interior adhesives and sealants applied on site, 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.scs-certified.com.
- K. UL (GGG) - GREENGUARD Gold Certified Products; current listings at <http://http://productguide.ulenvironment.com/QuickSearch.aspx>.

1.05 SUBMITTALS

- A. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.
- B. Sustainable Design Reporting: Submit evidence of compliance.
- C. 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 installer's 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.scs-certified.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 02 41 00
SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of built site elements.
- B. Selective demolition of building elements for alteration purposes.

1.02 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

- A. Remove portions of existing buildings in the following sequence:
 - 1. Interior salvage and demolition.
 - 2. Exterior salvage of building elements and demolition.
 - 3. Outlying structures or buildings, sidewalks, paving, and site features.
- B. External fire escape stairs, framing, braces and hangers and associated items.
- C. Remove roofing, underlayment, flashing and all associated items to accomplish new work.
- D. Remove Scuppers, flashings, downspouts, and associated items.
- E. Remove paving, curbs, and sidewalks as indicated on drawings.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Comply with applicable requirements of NFPA 241.
 - 3. Provide, erect, and maintain temporary barriers and security devices.
 - 4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 6. Do not close or obstruct roadways or sidewalks without permit.
 - 7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Do not begin removal until built elements to be salvaged or relocated have been removed.
- D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include, but are not limited to, regulated asbestos containing materials, lead, PCB's, and mercury.
- F. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Dismantle existing construction and separate materials.
 - 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
- G. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

- B. Protect existing utilities to remain from damage.
- C. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- D. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- E. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- F. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and/or existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction sufficient to withstand construction activities in locations where required.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Remove and store existing elements designated to be salvaged or re-used.
 - 1. Protect salvaged items from damage due to construction activities, theft, and weather until re-installed or returned to Owner.
- E. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 - 2. Remove items indicated on drawings.
- F. Services (Including, but not limited to, HVAC, Plumbing, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - 3. Verify that abandoned services serve only abandoned facilities before removal.
 - 4. Remove abandoned pipe, ducts, conduits, and equipment; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- G. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Prevent damage to existing elements and features, such as woodwork, fixtures, doors, and windows designated to remain
 - 3. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 4. Repair adjacent construction and finishes damaged during removal work.
 - 5. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site and dispose of legally.
- B. Remove from site all materials not to be reused on site; do not burn or bury.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 02 74 10
HOT MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hot-mix asphalt paving.
 - 2. Hot-mix asphalt patching.
 - 3. Pavement-marking paint.
 - 4. Subgrade modification.
- B. Related Sections include the following:
 - 1. Division 31 2000 Section "Earthwork".

1.3 QUALITY ASSURANCE

- A. STATE OF OKLAHOMA, DEPARTMENT OF TRANSPORTATION, Standard Specifications for Construction and Materials, Current standards, as amended to date.

1.4 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
- B. Job-Mix Designs: Certification of approval of each job mix proposed for the Work.
- C. Job-Mix Designs: For each job mix proposed for the Work.
- D. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international graphics symbol, spaces dedicated to people with disabilities.

- E. Qualification Data: For manufacturer.
- F. Pavement Markings product information.
- G. In place material testing procedures.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer.
 - 1. Manufacturer shall be a paving-mix manufacturer registered with and approved by authorities having jurisdiction in which Project is located.
- B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated, as documented according to ASTM E 548.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:
 - 1. Prime and Tack Coats: Minimum surface temperature of 40 deg F.
 - 2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 - 3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.

- B. Coarse and Fine Aggregate: shall be in accordance with the requirements of ODOT Standards for Construction, as amended to date, for hot-mixed asphalt.

2.2 ASPHALT MATERIALS

- A. Prime Coat: ASTM D 2027, medium-curing cutback asphalt, MC-30 or MC-70.
- B. Tack Coat: AASHTO M 140, emulsified asphalt slow setting, diluted in water, of suitable grade and consistency for application – ASHTO MP1.
- C. Water: Potable.

2.3 STABILIZED SUBGRADE MATERIAL

- A. Fly Ash: Shall meet the requirements of ASTM C 618, Class “C” and be mixed at a rate of 10 to 14%.
- B. Cement Kiln Dust (CKD): Fine grained, solid, highly alkaline material removed from cement kiln exhaust. CKD shall be mixed at a rate of 10 to 14%.

2.4 AUXILIARY MATERIALS

- A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.
- B. Joint Sealant: ASTM D 3405 or AASHTO M 301, hot-applied, single-component, polymer-modified bituminous sealant.
- C. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, with drying time of less than 45 minutes.
 - 1. Colors: White, Yellow, Red and Blue.

2.5 MIXES

- A. Hot-Mix – Hot Lay Asphalt:
 - 1. Oklahoma Department of Transportation (ODOT) Type “A” Asphalt Concrete:

Sieve Size (inch)	Passing (%)
1-1/2”	100
1	90-100
3/4	-
1/2	70-90
3/8	-
No. 4	40-65
No. 10	25-45
No. 40	10-26
No. 200	-

Asphalt Cement

% of mix mass 3.8 – 6.5

2. Oklahoma Department of Transportation (ODOT) Type “B” Asphalt Concrete:

Sieve Size (inch) Passing (%)

1-1/2”	-
1	-
3/4	100
1/2	90-100
3/8	70-90
No. 4	45-70
No. 10	25-50
No. 40	12-30
No. 200	7-20

Asphalt Cement

% of mix mass 4.7 – 7.5

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
- B. Proof-roll subbase using a loaded, tandem-axle dump truck weighing at least 25 tons to locate areas that are unstable or that require further compaction.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 REPAIRS

- A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.
 - 1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.
- B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch.
 - 1. Clean cracks and joints in existing hot-mix asphalt pavement.
 - 2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
 - 3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.3 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd.. Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure for 72 hours minimum.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.
- C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.4 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 - 2. Place hot-mix asphalt surface course in single lift.
 - 3. Spread mix at minimum temperature of 250 deg F.
 - 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
 - 5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
 - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 - 4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
 - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.6 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 1. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
 - 2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.7 INSTALLATION TOLERANCES

- A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus 1/2 inch.
 - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch.
 - 2. Surface Course: 1/8 inch.
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.8 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for at least 15 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. 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.

3.9 WHEEL STOPS

- A. Securely attach wheel stops into pavement with not less than two galvanized steel dowels embedded at one-quarter to one-third points. Securely install dowels into pavement and through wheel stop. Recess head of dowel beneath top of wheel stop.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
 - 1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
- B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

- C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to CBDPW specifications.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 DISPOSAL

- A. Except for material indicated to be recycled, excessive asphalt shall be removed from Project site and legally dispose of them.

END OF SECTION

**SECTION 033000
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Sections:
 - 1. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.
- C. Floor surface flatness and levelness measurements.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- D. Concrete Testing Service: Owner engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

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

2.3 CONCRETE MATERIALS

- A. **Cementitious Material:** Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. **Portland Cement:** ASTM C 150 Type I/II, gray. Supplement with the following:
 - a. **Fly Ash:** ASTM C 618, Class F or C.
 - b. **Ground Granulated Blast-Furnace Slag:** ASTM C 989, Grade 100 or 120.
- B. **Normal-Weight Aggregates:** ASTM C 33, graded.
 - 1. **Maximum Coarse-Aggregate Size:** 1-1/2 inches (38 mm) nominal.
 - 2. **Fine Aggregate:** Free of materials with deleterious reactivity to alkali in cement.
- C. **Water:** ASTM C 94/C 94M and potable.

2.4 ADMIXTURES

- A. **Chemical Admixtures:** Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. **Water-Reducing Admixture:** ASTM C 494/C 494M, Type A.
 - 2. **Retarding Admixture:** ASTM C 494/C 494M, Type B.
 - 3. **Water-Reducing and Retarding Admixture:** ASTM C 494/C 494M, Type D.
 - 4. **High-Range, Water-Reducing Admixture:** ASTM C 494/C 494M, Type F.
 - 5. **High-Range, Water-Reducing and Retarding Admixture:** ASTM C 494/C 494M, Type G.
 - 6. **Plasticizing and Retarding Admixture:** ASTM C 1017/C 1017M, Type II.

2.5 WATERSTOPS

- A. **Self-Expanding Butyl Strip Waterstops:** Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).
- B. **Self-Expanding Rubber Strip Waterstops:** Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch (10 by 19 mm).

2.6 VAPOR RETARDERS

- A. **Sheet Vapor Retarder:** ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.7 CURING MATERIALS

- A. **Evaporation Retarder:** Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. **Absorptive Cover:** AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. **Moisture-Retaining Cover:** ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. **Water:** Potable.

- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.9 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 20 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete, as required, for placement and workability.
- D. Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: As required by prints at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.50 – footings; 0.45 – all other mixes
 - 3. Slump Limit: 4 inches (125 mm) or 8 inches (200 mm for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 - 4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
 - 5. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
 - a. Add water vapor reducing admixture per manufacturers specified dosage rate to ready mix truck at the batch plant, or jobsite before discharge, mix rapidly for 7 minutes. (Follow Manufacturer's Instructions).

2.10 FABRICATING REINFORCEMENT

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

2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.**
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.**
- C. Chamfer exterior corners and edges of permanently exposed concrete.**

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.**

3.3 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.**
 - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.**

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.**
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.**

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.**
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.**
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:**
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.**
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.**
- E. Waterstops: Install in construction joints and at other joints indicated according to manufacturer's written instructions.**

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.**
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.**
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.**
- C. Cold-Weather Placement: Comply with ACI 306.1.**

- D. **Hot-Weather Placement:** Comply with ACI 301.

3.7 FINISHING FORMED SURFACES

- A. **Rough-Formed Finish:** As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. **Smooth-Formed Finish:** As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view.
- C. **Related Unformed Surfaces:** At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. **General:** Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. **Trowel Finish:** After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighen until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - 2. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch (3.2 mm) at the gymnasium floor and 1/4" (6.4mm) at all other locations.

3.9 CONCRETE PROTECTING AND CURING

- A. **General:** Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. **Evaporation Retarder:** Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. **Cure concrete according to ACI 308.1, by one or a combination of the following methods:**
 - 1. **Moisture Curing:** Keep surfaces continuously moist for not less than seven days.
 - 2. **Moisture-Retaining-Cover Curing:** Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. **Curing Compound:** Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

- a. **Removal:** After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
- 4. **Curing and Sealing Compound:** Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 CONCRETE SURFACE REPAIRS

- A. **Defective Concrete:** Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

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

END OF SECTION 033000

SECTION 03 35 11
CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clear penetrating sealers.

1.02 RELATED REQUIREMENTS

PART 2 PRODUCTS

2.01 COATINGS

- A. Curing and Sealing Compound, Moisture Emission-Reducing, Membrane-Forming: 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.
 - 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.
- B. Curing and Sealing Compound, Low Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.
 - 1. Application: Use at exposed slabs and toppings not scheduled to receive finish flooring.
 - 2. Vehicle: Water-based.
 - 3. VOC Content: OTC compliant.
 - 4. Manufacturers:
 - a. Dayton Superior Corporation; Cure & Seal 1315 EF: www.daytonsuperior.com/#sle.
 - b. Euclid Chemical Company; DIAMOND CLEAR VOX: www.euclidchemical.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

- A. Apply materials in accordance with manufacturer's instructions.

3.03 COATING APPLICATION

- A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
- C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

END OF SECTION

SECTION 03 54 00
CAST UNDERLAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Liquid-applied self-leveling floor underlayment.
 - 1. Use gypsum-based type at all interior locations where indicated on the drawings.
 - a. For all UL Design fire-rated assemblies shown/referenced on the Drawings, provide conforming gypsum-based underlayment material.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry.
- B. Section 09 65 00 - Resilient Flooring.

1.03 REFERENCE STANDARDS

- A. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).
- C. 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 manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.
- C. Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Instructions.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section, and approved by manufacturer using manufacturer approved mixing and pumping equipment.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

1.07 FIELD CONDITIONS

- A. Do not install underlayment until floor penetrations and peripheral work are complete.
- B. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.
- C. During the curing process, ventilate spaces to remove excess moisture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gypsum Underlayment:
 - 1. ARDEX Engineered Cements; ARDEX K15: www.ardexamericas.com.
 - 2. Maxxon Corporation; Gyp-Crete: www.maxxon.com.
 - 3. USG; Levelrock® Series 2500 Floor Underlayment: www.usg.com.

2.02 MATERIALS

- A. Cast Underlayments, General:
 - 1. Comply with applicable code for combustibility or flame spread requirements.

- B. Gypsum-Based Underlayment: Gypsum based mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
 - 1. Compressive Strength: Minimum 2500 pounds per square inch, tested per ASTM C472.
 - 2. Density: Maximum 120 pounds per cubic foot.
 - 3. Surface Burning Characteristics: Flame spread/Smoke developed/Fuel Contribution index of 0/0/0 in accordance with ASTM E84.
 - 4. Material shall not contain any source of nutrients to sustain mold growth.
- C. Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch in size and acceptable to underlayment manufacturer.
- D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.
- E. Primer: Manufacturer's recommended type.
- F. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

2.03 MIXING

- A. Site mix materials in accordance with manufacturer's instructions.
- B. Add aggregate for areas where thickness will exceed 1-1/2 inch. Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.
- C. Mix to self-leveling consistency without over-watering.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

3.02 PREPARATION

- A. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.
- B. Vacuum clean surfaces.
- C. Prime substrate in accordance with manufacturer's instructions. Allow to dry.
- D. Close floor openings.
- E. Expansion Joints: Allow expansion joints to continue through cast underlayment at same width as joint.

3.03 APPLICATION

- A. Scheduling: Application of cast underlayment shall not occur until building is enclosed; including roof, windows, doors, and other fenestration.
 - 1. Install cast underlayment after drywall installation unless tenant finish requirements identify partitioning after the pour.
- B. Install underlayment in accordance with manufacturer's instructions.
- C. Pump or pour material onto substrate. Do not retemper or add water.
 - 1. Pump, move, and screed while the material is still highly flowable.
 - 2. Be careful not to create cold joints, except where authorized.
 - 3. Except at authorized cold joints, place as continuously as possible until application is complete.
- D. Place to indicated thickness, with top surface level to 1/8 inch in 10 ft.

3.04 CURING

- A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.
- B. Air cure in accordance with manufacturer's instructions.
 - 1. Ventilation and adequate heat shall be provided continuously to rapidly remove moisture from the area until the cast underlayment is dry.
 - a. Confirm with manufacturer on recommended drying time requirements.

- b. Test for dryness in accordance with manufacturer's instructions prior to conducting further work in area.

3.05 PROTECTION

- A. Place temporary wood planking over cast underlayment wherever it will be subjected to heavy wheeled, or concentrated loads.
 - 1. Refer to manufacturer's recommendations for additional requirements for protection prior to finish floor installation.

END OF SECTION

SECTION 04 01 00
MASONRY RESTORATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water cleaning of exterior surfaces.
- B. Replacement of heavily spalled or deteriorated units.
- C. Repointing mortar joints.
- D. Repair of damaged stone.
- E. Replacement of damaged and deteriorated masonry.

1.02 RELATED REQUIREMENTS

- A. National Park Service Preservation Briefs:
 - 1. PB-1 - Cleaning and Water-Repellent Treatments for Historic Masonry Buildings.
 - 2. PB-2 - Repointing Mortar Joints in Historic Masonry Buildings.
 - 3. PB-6 - Dangers of Abrasive Cleaning to Historic Buildings.
- B. Section 04 20 00 - Unit Masonry: Brick masonry units.

1.03 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2013.
- B. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.
- C. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- D. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
- E. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include mortar design mix and indicate whether Proportion or Property specification of ASTM C270 is to be used. Also include environmental condition and admixture limitations.
- C. Samples: Submit four samples of face brick and stone units to illustrate matching color, texture and extremes of color range.
- D. Manufacturer's Instructions: For cleaning materials and bonding agents; indicate special procedures, conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of Contract Documents.

1.06 MOCK-UP

- A. Restore and repoint an existing masonry wall area sized 4 feet long by 4 feet high; include in mock-up area instances of mortar, accessories, wall openings, and flashings.
- B. Clean a 4 ft by 4 ft panel of wall to determine extent of cleaning; include in cleaning area instances of masonry and cast stone.
 - 1. Repeat, using different cleaning methods for up to three different panels.
 - 2. Additional test areas may be required to determine the most appropriate cleaning method.
- C. Locate where directed.
- D. Acceptable panel and procedures employed will become the standard for work of this section.
- E. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry neatly stacked and tied on pallets. Store clear of ground with adequate waterproof covering.
- B. Store tuckpointing mortar materials in manufacturer's packaging.

1.08 FIELD CONDITIONS

- 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Restoration and Cleaning Chemicals:
 - 1. Diedrich Technologies, Inc: www.diedrichtechnologies.com/#sle.
 - 2. HMK Stone Care System: www.hmkstonecare.com/#sle.
 - 3. PROSOCO: www.prosoco.com/#sle.
 - 4. Or approved equal.
- B. Masonry Pointing, Bonding, and Repair Agents:
 - 1. Cathedral Stone Products, Inc.: www.cathedralstone.com
 - 2. Edison Coatings, Inc.: www.edisoncoatings.com
 - 3. U.S. Heritage Group: www.usheritage.com.
 - 4. Or approved equal.

2.02 CLEANING MATERIALS

- A. Cleaning Agent: Detergent type.

2.03 REPAIR MATERIALS

- A. Stone Bonding Adhesive: Single component, cementitious-based adhesive, containing no latex or acrylic bonding agents.
 - 1. Compressive strength: 9,000 psi approximate at 28 days.
 - 2. Tensile Strength: 360 psi.
 - 3. Specific Gravity: 1.77.
 - 4. Basis of Design: Jahn CPS Adhesive.
- B. Stone Patching Compound: Premixed mineral-based, cementitious repair mortar formulated to match the color and texture of limestone and terracotta/brick.
 - 1. Compressive strength (dry): 2,600 psi minimum.
 - 2. Tensile Strength: 145 psi minimum.
 - 3. Thermal Expansion (in/in/ °F): 0.00002 maximum.
 - 4. Porosity (%): 32 minimum.
 - 5. Specific Gravity: 1.4.
 - 6. Basis of Design: Jahn Restoration Mortar (M70).
- C. Crack Repair: Single component, water-based cementitious injection grout.
 - 1. Compressive strength: 9,000 psi approximate at 28 days.
 - 2. Tensile Strength: 360 psi.
 - 3. Viscosity: 80 cps.
 - 4. Specific Gravity: 1.77.
 - 5. Basis of Design: Jahn Injection Grout (M30).

2.04 MORTAR MIX DESIGNS

- A. Mix mortar materials in the following proportions:
 - 1. Pointing Mortar (cement/lime/sand): 1:1:6 (Type N).

2.05 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M.
 - 1. Type: Type II - Moderate; ASTM C150/C150M.
 - 2. Color: White.

- B. Hydrated Lime: ASTM C207; Type S.
- C. Mortar Aggregate: ASTM C144: Natural sand, color and texture to match existing.
- D. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
 - 1. Color(s): To exactly match existing.
- E. Water: Clean and potable.

2.06 MASONRY MATERIALS

- A. Brick: Replacement brick shall match existing brick in color, size, and texture.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify installed work of other trades effecting this work is complete and ready for work of this section to begin.
- B. Verify that surfaces to be cleaned and restored are ready for work of this section.

3.02 PREPARATION

- A. Protect surrounding elements from damage due to restoration procedures.
- B. Carefully remove and store removable items located in areas to be restored, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.
- C. Cover existing landscaping with tarpaulins or similar covers.
- D. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.
- E. Close off adjacent occupied areas with dust proof and weatherproof partitions.

3.03 REBUILDING

- A. Cut out damaged and deteriorated masonry with care in a manner to prevent damage to any adjacent remaining materials.
- B. Cut away loose or unsound adjoining masonry and mortar as directed.
- C. Mortar Mix: Colored and proportioned to match existing work.
- D. Ensure that anchors are correctly located and built in.

3.04 REPOINTING

- A. Perform repointing prior to cleaning masonry surfaces.
- B. Remove loose or disintegrated mortar in joints to minimum 1/2 inch depth or until sound mortar is reached in joints less than 3/8 inch thick.
- C. Remove loose or disintegrated mortar in joints to minimum 1 inch depth or until sound mortar is reached in joints 3/8 inch thick or greater.
- D. Use hand tools only. Do not use power tools.
- E. Do not damage masonry units.
- F. Remove dust and loose particles from joints with air jet.
- G. Premoisten joint and apply mortar. Pack tightly in maximum 1/4 inch layers. Form a smooth, compact concave joint to match existing.
- H. Moist cure for 72 hours.

3.05 STONE REPAIR

- A. Carefully remove loose stone fragments in areas indicated to be repaired. Reuse only stone fragments that are in sound condition.
- B. Remove soil, loose stone particles, mortar, and other debris or foreign material from fragment surfaces to be bonded and stone from which fragments were removed by cleaning with stiff-fiber brush.
- C. Apply stone-to-stone adhesive to comply with adhesive manufacturer's written instructions, completely filling all crevices and voids.

- D. Clean residual adhesive from exposed surfaces and patch chipped areas and drilled holes as specified.

3.06 CLEANING EXISTING MASONRY

- A. Cleaning Detergent: Spray clean masonry surfaces at all locations with cleaning agent in accordance with the manufacturer's instructions. Saturate masonry with clean water and flush loose mortar and dirt.

3.07 CLEANING NEW (INFILL) MASONRY

- A. Verify mortar is fully set and cured.
- B. Clean surfaces and remove large particles with wood scrapers, brass or nylon wire brushes.
- C. Scrub walls with cleaning agent solution using stiff brush. Thoroughly rinse and wash off cleaning solution, dirt and mortar crumbs using clean, pressurized water.

3.08 RESTORATION CLEANING

- A. Clean surfaces and remove large particles with wood scrapers or non-ferrous wire brush.
- B. Spray or Brush coat masonry with approved restoration cleaner, mixed into solution in accordance with manufacturer's instructions.
- C. Provide a second application if required to match mock-up area.
- D. Allow sufficient time for solution to remain on masonry and agitate with soft fiber brush or sponge.
- E. Rinse from the bottom up with potable water applied at 300-350 psi and at a rate of 4 gal/min.

3.09 AGING

- A. Rub in new masonry work to match, as close as possible, adjacent original work.
 - 1. Use colored stain in small amounts, rubbing in well with burlap rags.
- B. After each application, dust off surplus and wash down with low pressure hose. Allow surface to dry before proceeding with succeeding applications.
- C. Continue process until acceptance.

3.10 CLEANING

- A. Immediately remove stains, efflorescence, or other excess resulting from the work of this section.
- B. Remove excess mortar, smears, and droppings as work proceeds and upon completion.
- C. Clean surrounding surfaces.

END OF SECTION

SECTION 04 20 00

UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
- B. Clay facing brick.
- C. Mortar.
- D. Reinforcement and anchorage.
- E. Flashings.
- F. Lintels.
- G. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Loose steel lintels.
- B. 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 A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.
- C. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a (Reapproved 2014).
- D. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2016.
- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- F. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2016.
- G. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- H. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.
- I. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- J. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2016.
- K. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
- L. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
- M. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2016.
- N. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2005.
- O. BIA Technical Notes No. 18A - Accommodating Expansion of Brickwork; 2006.
- P. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.
- Q. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2005.

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

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

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. Concrete Masonry Units: Store cubes in single stacks on level ground, covered and protected from inclement weather.
 - 2. Veneer Brick: Inspect bricks upon delivery at site and immediately inform manufacturer or supplier of any observed defects.
 - 3. Protect bagged materials and brick siding units from rain and groundwater by covering and storing on pallets or other means.
 - 4. Carefully stack and store all flashings and metal trim to prevent creasing, twisting, or other damage.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
 - 2. Load-Bearing Units: ASTM C90, medium weight.
 - a. Exposed Faces: Manufacturer's standard color and texture where indicated.

2.02 BRICK UNITS

- A. Manufacturers:
 - 1. Belden Brick: www.beldenbrick.com.
 - 2. Endicott Clay Products Co: www.endicott.com.
 - 3. Meridian Brick LLC (formerly Boral USA); : www.meridianbrick.com.
 - 4. Sioux City Brick and Tile Co: www.siouxcitybrick.com
 - 5. _____.
- B. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
 - 1. Color and texture: As selected by Owner.
 - 2. Actual size: 3-5/8 inches x 2-1/4 inches x 7-5/8 inches.

2.03 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Mortar Aggregate: ASTM C144.
- D. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
- E. Water: Clean and potable.
- F. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Type: Type N.
 - 2. Color: Standard gray.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi), deformed billet bars; galvanized.
- B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

- C. Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
 - 1. Type: Truss.
 - 2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M, Class 3.
 - 3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.
- D. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch of mortar coverage from masonry face.
- E. Residential Wall Ties: Corrugated formed sheet metal, 7/8 inch wide by 0.05 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to extend at least 1-1/2 inches into the veneer with at least 5/8 inch of mortar coverage from masonry face.

2.05 THROUGH-WALL FLASHINGS

- A. Membrane Non-Asphaltic Flashing Materials:
 - 1. Composite Polymer Flashings - Self-Adhering: Composite PVC with Elvaloy KEE; 30 mil thick with pressure-sensitive adhesive and release paper.
 - a. Manufacturers:
 - 1) Nervastral Inc.; Nervastral 300 : www.nervastral.com.
 - 2) Wire-Bond Inc.; 30 Mil PVC Flashing: www.wirebond.com.
 - 3) Polyguard Products Inc.; Polyguard Thru Wall flashing Membrane: www.polyguardproducts.com.
- B. Factory-Fabricated Flashing Corners and End Dams: by flashing manufacturer.
- C. Flashing Sealant/Adhesives: VOC-compliant sealants and adhesives as supplied or recommended by flashing manufacturer.
- 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.

2.06 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. Weeps:
 - 1. Type: Polyester mesh.
- D. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
 - 1. Manufacturers:
 - a. PROSOCO Inc.; SureKlean No. 600: www.prosoco.com
 - b. Dietrich Technologies Inc.; 202 New Masonry Detergent: www.dietrichtechnologies.com.
 - c. Cleans It All Global Inc; Envirosafe Mansonry Cleaner: www.cleansitall.com.
- E. 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. Applied Technologies; A-Tech Masonry and Brick Sealer: www.appliedtechnologies.com.
 - c. Pecora Corp.; KlereSeal 910-W/920-W: www.pecora.com.

2.07 LINTELS

- A. Prefabricated Steel Lintels, Galvanized: Install loose steel lintels over masonry openings where indicated on plans, or as required. As specified in Section 05 50 00.

2.08 MORTAR MIXING

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 - 1. Exterior, non-loadbearing masonry: Type N.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
- C. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- D. Mixing: Use mechanical batch mixer and comply with referenced standards.

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. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches, vertical dimension typical.
 - 3. Mortar Joints: 3/8 inch Concave/Rodded.
- D. Brick Units:
 - 1. Bond: Running.
 - 2. Coursing: Three units and three mortar joints to equal 8 inches.
 - 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 and mortar smears as work progresses.
- E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- F. Interlock intersections and external corners.
- G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

- I. Horizontal surfaces exposed to weather: Where water may collect on ledges, caps, or other horizontal surfaces, uniformly slope top surface to provide positive drainage.

3.06 WEEPS

- A. Install weeps in cavity walls at 16 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

3.07 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 24 inches horizontally and 16 inches vertically.
- F. Embed ties and anchors in mortar joint and extend into masonry unit a minimum of 1-1/2 inches with at least 5/8 inch mortar cover to the outside face of the anchor.

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 REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHE UNIT MASONRY

- A. Use individual metal ties installed in horizontal joints to bond wythes together. Provide ties spaced as indicated on drawings.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

3.10 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 flashing ends at least 4 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. Extend plastic, laminated, and EPDM flashings to within 1/4 inch of exterior face of masonry.
- C. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.
- D. 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.
- E. 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.
- F. Do not expose flashing membrane to sunlight for more than thirty days prior to enclosure.
 - G. 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.

3.11 LINTELS

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

3.12 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. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- F. Form expansion joint as detailed on the Drawings, or in accordance with BIA Technical Notes No. 18A.
- G. Uniformly install rod at level recommended by sealant manufacturer (minimum – depth of joint after backer rod is installed is one half the width).

3.13 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.

3.14 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.

3.15 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.

3.16 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.

3.17 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. Lintels and angles.
- B. Shop fabricated aluminum items, including:
 - 1. Condensing Unit screens.
- C. Downspout boots.
- D. Miscellaneous structural connectors.

1.02 RELATED REQUIREMENTS

- A. Section 04 01 00 - Masonry Restoration: Placement of metal fabrications in masonry.
- B. Section 07 71 23 - Manufactured Gutters and Downspouts: Downspout boots.
- C. Section 09 91 13 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2012).
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
- G. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.
- H. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2019.
- I. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.
- J. ASTM B85/B85M - Standard Specification for Aluminum-Alloy Die Castings; 2013.
- K. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021.
- L. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- M. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- N. 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.
- O. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2014.
- P. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (Errata 2016).
- Q. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2008.
- R. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- S. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- T. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

1.04 SELECTION AND REVIEW OF MATERIALS

- A. Coordinate selection of materials and colors with Historic Preservation consultant.

1.05 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.
- D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Plates: ASTM A283/A283M.
- C. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- D. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- E. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- F. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- I. 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/B209M, 5052 alloy, H32 or H22 temper.
- C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, 6063 alloy, T6 temper.
- D. Aluminum-Alloy Bars: ASTM B211/B211M, 6061 alloy, T6 temper.
- E. Aluminum-Alloy Die Castings: ASTM B85/B85M.
- F. Bolts, Nuts, and Washers: Stainless steel.
- G. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

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. Furnish 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. Ledge Angles, Shelf Angles, and Lintels Not Attached to Structural Framing: For support of masonry; prime paint finish.

- B. Condensing Unit Screens: Extruded aluminum tube shapes and sheet metal vanes as detailed. Refer to drawings.

2.05 DOWNSPOUT BOOTS

- A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots and tamper proof fasteners.
 - 1. Configuration: Restore or match existing.
 - 2. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
 - 3. Finish: Manufacturer's standard factory applied primer finish.
 - 4. Color: Selected by Owner.

2.06 FINISHES - STEEL

- A. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete and items to be imbedded in masonry.
- 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.

2.07 FINISHES - ALUMINUM

- A. Exterior Aluminum Surfaces: Class II color anodized.
- B. Class II Color Anodized Finish: AAMA 611 AA-M12C22A34 Electrolytically deposited colored anodic coating not less than 0.4 mils thick; Color as selected by Owner.

2.08 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. Furnish 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 05 52 13
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall mounted handrails.
- B. Free-standing railings at site steps and access ramps.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Installation of blocking for wall-mounted rails and guards.
- B. Section 09 91 13 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- C. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.
- D. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- E. UFAS - Uniform Federal Accessibility Standards - HUD 24 CFR part 40; 1984.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.
- B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 50 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
- C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
- D. Allow for expansion and contraction of members and building movement without damage to connections or members.
- E. Dimensions: See drawings for Pipe and Tube railing configurations and heights.
 - 1. Hand Rails and Wall Rails: 1-1/2 inches, diameter round.
 - 2. Top and Intermediate Rails (Site Stairs/Ramps): 1-1/2 inches diameter, round.
 - 3. Posts (Site Stairs/Ramps): 1-1/2 inches diameter, round.
- F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.
 - 2. For anchorage to stud walls, provide backing plates, for bolting anchors.
 - 3. Posts: Provide adjustable flanged brackets.
- G. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 STEEL RAILING SYSTEM

- A. Steel Tube: ASTM A500/A500M, Grade B cold-formed structural tubing.

- B. Welding Fittings: Factory or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- C. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
- D. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.03 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
 - 1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
 - 2. 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.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Install railings in compliance with UFAS and ADA Standards for accessible design at applicable locations.
- D. Anchor railings securely to structure.
- E. Field weld anchors as indicated on shop drawings. Grind welds smooth; Touch-up welds with primer.
- F. Conceal anchor bolts and screws whenever possible.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, 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. Nonstructural dimension lumber framing.
- C. Sheathing.
- D. Roof-mounted curbs.
- E. Roofing nailers.
- F. Preservative treated wood materials.
- G. Communications and electrical room mounting boards.
- H. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Miscellaneous steel connectors for wood framing.
- B. Section 07 25 00 - Weather Barriers: Water-resistive air barrier over sheathing.
- C. Section 07 46 33 - Vinyl Siding.
- D. Section 07 62 00 - Sheet Metal Flashing and Trim: Sill flashings.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- 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 E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- D. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2015.
- E. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.
- F. PS 1 - Structural Plywood; 2009.
- G. PS 20 - American Softwood Lumber Standard; 2010.
- H. 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
- C. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- D. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

1.05 QUALITY ASSURANCE

- A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:
 - 1. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.06 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 species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
 - 3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at 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. Provide wood harvested within a 500 mile radius of the project site where available.

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

- A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry (23 percent maximum).
- D. Posts 4 inches and over in thickness:
 - 1. Species: Douglas Fir.
 - 2. Grade: Dense No. 1.

2.04 CONSTRUCTION PANELS

- A. Roof Sheathing: 19/32 inch Structural 1 Sheathing, Oriented strand board wood structural panel or plywood; PS 2.
 - 1. Grade: Structural 1 Sheathing.
 - 2. Bond Classification: Exposure 1.
 - 3. Span Rating: 24/16.
 - 4. Edges: Square.

5. Exposure Time: Sheathing will not delaminate or require sanding due to moisture absorption from exposure to weather for up to 500 days.
- 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. Cleveland 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.
 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
 3. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.
- C. 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.
- D. Post/Beam Connectors: Hot dipped galvanized steel, 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. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
- G. Sill Flashing: See Section 07 62 00.
- H. Construction Adhesives: Waterproof, air cure type, cartridge dispensed.
- I. Water-Resistive Air 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. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.
- D. All rough framing installations shall be in accordance with Architectural Drawings and/or respective code requirements whichever is most restrictive.

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 authorities having jurisdiction 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 nonstructural 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. 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 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 061753
SHOP-FABRICATED WOOD TRUSSES**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood roof trusses.
2. Wood floor trusses.
3. Wood girder trusses.
4. Wood truss bracing.
5. Metal truss accessories.

B. Allowances: Provide wood truss bracing under the Metal-Plate-Connected Truss Bracing Allowance as specified in Division 01 Section "Allowances."

1.2 ACTION SUBMITTALS

A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.

B. Shop Drawings: Show fabrication and installation details for trusses.

1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
2. Indicate sizes, stress grades, and species of lumber.
3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
6. Show splice details and bearing details.

C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

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

1. Metal-plate connectors.
2. Metal truss accessories.

1.4 QUALITY ASSURANCE

A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.

1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

B. Fabricator Qualifications: Shop that [participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-

party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. **Delegated Design:** Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design metal-plate-connected wood trusses.
- B. **Structural Performance:** Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.

2.2 DIMENSION LUMBER

- A. **Certified Wood:** For metal-plate-connected wood trusses and permanent bracing, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- B. **Lumber:** DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- C. **Permanent Bracing:** Provide wood bracing that complies with requirements for miscellaneous lumber in Division 06 Section "Rough Carpentry."

2.3 METAL CONNECTOR PLATES

- A. **Manufacturers:** Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
 - 1. Alpine Engineered Products, Inc.; an ITW company.
 - 2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
 - 3. CompuTrus, Inc.
 - 4. Eagle Metal Products.
 - 5. Jager Building Systems, Inc.; a Tembec/SGF Rexfor company.
 - 6. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
 - 7. Robbins Engineering, Inc.
 - 8. Truswal Systems Corporation; an ITW company.
- B. **General:** Fabricate connector plates to comply with TPI 1.
- C. **Hot-Dip Galvanized-Steel Sheet:** ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.

2.4 FASTENERS

- A. **General:** Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

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

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

A. **Manufacturers:** Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

B. **Basis-of-Design Product:** Subject to compliance with requirements, provide [product indicated on Drawings] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

1. Cleveland Steel Specialty Co.
2. KC Metals Products, Inc.
3. Phoenix Metal Products, Inc.
4. Simpson Strong-Tie Co., Inc.
5. USP Structural Connectors.

C. **Allowable Design Loads:** Provide products with allowable design loads, as published by manufacturer, that meet or exceed those [indicated] [of basis-of-design products] [of products of manufacturers listed]. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

D. **Galvanized-Steel Sheet:** Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

2.6 FABRICATION

A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.

1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to TPI recommendations and as indicated.

E. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.

F. Securely connect each truss ply required for forming built-up girder trusses.

- G. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.**
 - 1. Install bracing to comply with Division 06 Section "Rough Carpentry."**
 - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.**
- H. Install wood trusses within installation tolerances in TPI 1.**
- I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.**
- J. Replace wood trusses that are damaged or do not meet requirements.**

END OF SECTION 061753

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Wood casings and moldings.
- C. Stair railings and Handrails.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Support framing, furring, and concealed blocking.
- B. Section 09 91 13 - Exterior Painting: Painting of finish carpentry items.
- C. Section 09 91 23 - Interior Painting: Painting of finish carpentry items.

1.03 REFERENCE STANDARDS

1.04 SELECTION AND REVIEW OF MATERIALS

- A. Coordinate selection of materials with Historic Preservation consultant.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Samples: Submit two samples of wood trim 6 inch long.

1.06 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.
- B. 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. Door and Window Trim: Match heights and profiles of existing trim to greatest extent possible.
 - b. Baseboard Trim: Match heights and profiles of existing trim to greatest extent possible.
 - c. Window Sill: Composite Resin (Cultured Marble) as specified in Section 12 35 30.
 - 1) Width: 4 inch.
 - 2) Profile: Eased edges.
 - 3) Skirt under sill: Same as window casing specified above.
- C. Interior Finish Carpentry Items (Tenant Spaces and Common Areas):
 - 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. Door and Window Trim: Refurbish and re-use existing to greatest extent possible, or match existing.

- b. Baseboard Trim: Refurbish and re-use existing to greatest extent possible, or match existing.
- 3. Stair Railings and Gaurds: Refer to drawings profile and configurations for top rails at stairs.

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.
- B. Hardwood Lumber: tight grained species, plain sawn, maximum moisture content of 6 percent; with flat grain.

2.03 ACCESSORIES

- A. Lumber for Shimming, Blocking, and Bracing: Softwood lumber of indicated species.
- B. Primer: As specified in Section 09 91 23.
- C. Wood Filler: Solvent base, tinted to match surface finish color.
- D. Epoxy Filler: As recommended by composite resin manufacturer, to match color of window sills.

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.
- C. Install prefinished paneling with full bed contact adhesive applied to substrate.

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 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Batt insulation in new wall and window infill construction.
- B. Foam insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants.
- B. Section 09 21 16 - Gypsum Board Assemblies: Insulation inside walls and partitions.

1.03 REFERENCE STANDARDS

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

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 Metal Framed Walls: Batt insulation with no vapor retarder.

2.02 BATT INSULATION MATERIALS

- A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 - 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. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 4. Thermal Resistance at new exterior walls: R-value of 19 minimum.
 - 5. Thermal Resistance at new exterior window infill: R-value of 13 minimum.
 - 6. Thermal Resistance at new interior walls: R-value 13 minimum.
 - 7. Facing: Aluminum foil, flame spread 25 rated; one side.
 - 8. Products:

- a. CertainTeed Corporation: www.certainteed.com.
- b. Johns Manville: www.jm.com.
- c. Owens Corning Corporation: www.ocbuildingspec.com.

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. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
 - 1. Application: Sealing of interior circular penetrations, such as pipes or cables.
 - 2. Width: Are required for application.
- B. Insulation Fasteners: Lengths of unfinished, 13 gauge, 0.072 inch high carbon spring steel with chisel or mitered tips, held in place by tension, length to suit insulation thickness and substrate, capable of securely supporting insulation in place.

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 new interior wall and window infill 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. Retain insulation batts in place with spindle fasteners at 12 inches on center.

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 PROTECTION

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

END OF SECTION

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water-resistive, vapor-permeable air and water barriers.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Water-resistive barrier under exterior cladding.

1.03 DEFINITIONS

- A. Weather Barriers: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Water-Resistive Barrier: A material behind an exterior wall covering that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the exterior wall assembly.

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 E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- E. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
- F. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

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.

1.06 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 WATER-RESISTIVE AIR BARRIER MATERIALS

- A. Water-Resistive Air Barrier: For use in Construction Types I, II, III, and IV on buildings greater than 40 feet in height.
 - 1. Comply with NFPA 285 wall assembly requirements in accordance with local building code and authorities having jurisdiction (AHJ).
- B. Water-Resistive and Air Barrier, Multilayers: Outer layers of nonwoven, spunbonded polypropylene with vapor permeable, watertight polymeric middle layer.
 - 1. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
 - 2. Water Vapor Permeance: 54 perms, minimum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F.
 - 3. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 3 months of weather exposure.
 - 4. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.

5. Water Resistance: Withstand hydrostatic head of 21 inches, minimum, for at least five hours; pass test method in accordance with AATCC Test Method 127.
6. Seam and Perimeter Tape: As recommended by sheet manufacturer.
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.

2.02 ACCESSORIES

- A. Sealants, Tapes, and Accessories Used for Sealing Water-Resistive Barrier and Adjacent Substrates: As indicated or complying with water-resistive barrier manufacturer's installation instructions.
- B. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.
 1. Width: 4 inches.
- C. Thinners and Cleaners: As recommended by water-resistive barrier manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions comply with requirements 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 installation instructions.
- B. Water-Resistive Air Barriers: Install continuous water-resistive barrier over surfaces indicated, with sheets lapped to shed water and with seams and joints sealed to adjacent surfaces..
- C. Mechanically Fastened Exterior Sheets:
 1. Install sheets shingle-fashion to shed water, with seams aligned horizontal.
 2. Overlap seams as recommended by manufacturer, 6 inches, minimum.
 3. Overlap at outside and inside corners as recommended by manufacturer, 12 inches, minimum.
 4. Attach to framed construction with fasteners extending through sheathing into framing, and space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.
 5. For applications indicated to be airtight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners as recommended by manufacturer.
 6. Where stud framing rests on concrete or masonry substrate, extend lower edge of barrier sheets at least 4 inches below bottom of framing and seal to substrate with sealant or approved mounting tape.
 7. Install water-resistive barrier over jamb flashings.
 8. Install head flashings under water-resistive barrier.
 9. At framed openings with frames having nailing flanges, extend sheet into opening and over flanges; at head of opening, seal sheet over flange and flashing.
- D. Openings and Penetrations in Exterior Water-Resistive Air Barriers:
 1. Install flashing over sills, covering entire sill framing member, and extend at least 5 inches onto water-resistive barrier and at least 6 inches up jambs; mechanically fasten stretched edges.

2. At openings filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
3. At openings filled with nonflanged frames, seal water-resistive barrier to each side of framing at opening using flashing at least 9 inches wide, and covering entire depth of framing.
4. At head of openings, install flashing under water-resistive barrier extending at least 2 inches beyond face of jambs; seal water-resistive barrier to flashing.
5. At interior face of openings, seal gaps between window and door frames and rough framing using appropriate joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating items and seal to surface of water-resistive barrier.

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, underlayment, and head wall flashing.
- 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 22 00 00 - Plumbing: Plumbing 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 D3462/D3462M - Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules; 2010a.
- D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).
- E. ASTM D7158/D7158M - Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method); 2017.
- F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- G. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2011.
- H. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples; 2015.
- I. NRCA (RM) - The NRCA Roofing Manual; 2017.
- J. 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; Landmark Series: www.certainteed.com.
 - 3. GAF; Timberline American Harvest: www.gaf.com/sle.
 - 4. Owens Corning Corp; Oakridge: 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, complying with ASTM E108.
 - 2. Wind Resistance (Uplift): Class D, when tested in accordance with ASTM D7158/D7158M.
 - 3. Warranted Wind Speed: Not greater than 115 mph.
 - 4. Fungal/Algae Resistant.
 - 5. Self-sealing type.
 - 6. Style: Laminated overlay.

2.03 SHEET MATERIALS

- A. Eave and Valley Protection Membrane: 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.
- B. Underlayment: Synthetic non-asphaltic sheet, intended by manufacturer for mechanically fastened roofing underlayment without sealed seams and meeting requirements of ASTM D226/D226M.
 - 1. Type: Woven polypropylene with anti-slip polyolefin coating on both sides.
 - 2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 - 3. Ultraviolet (UV) Resistance and Weatherability: Approved in writing by manufacturer for exposure to weather for minimum of two months.
 - 4. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
 - 5. Water Vapor Permeance: Vapor retarder; maximum of 1 perm, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
 - 6. Fasteners: As recommended by manufacturer or building code qualification report or approval.
 - 7. Manufacturers:
 - a. Beacon Roofing Supply Inc; Tri-Built Synthetic Underlayment: www.becn.com.
 - b. Or approved equal.
- C. Underlayment: Asphalt-saturated organic roofing felt, unperforated, complying with ASTM D226/D226M, Type I ("No.15").

2.04 ACCESSORIES

- A. Roofing Nails: Standard round wire shingle type, galvanized steel, minimum 3/8 inch head diameter, 12 gauge, 0.109 inch nail shank diameter, 1-1/2 inch long and complying with ASTM F1667.
- 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): 18 square inches per linear foot.
 - 2. Size: 1 inch high x 11-7/16 inch wide.
- E. Roof Vents: Aluminum construction with nailing flange and insect screen; equal to Model RVA 50 manufactured by Air Vent Inc.

1. Free Vent Area (net): 50 square inches.
2. Size of Roof Opening: 8 inch round.
3. Color: Color as selected by Owner/Architect.

2.05 METAL FLASHINGS

- A. General: Provide prefinished aluminum sheet metal flashing at eave edge, gable edge, fascia, and gable face, color as selected by Owner/Architect.
- B. Drip Flashings: Pre-formed drip-edge strips, 28 gauge, 0.0149 inch, furnished in 10 foot lengths minimum.
 1. Profile: Equal to Amerimax profile # FHA
 2. Manufacturers:
 - a. Amerimax: www.amerimax.com
 - b. Or approved equal.
- C. Fascia and Gable Flashing: Pre-formed or site-fabricated sheet metal fascia and gable board cladding, 24 gauge, 0.0201 inch minimum thickness.
 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 roof 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. Remove existing roofing, underlayment, flashings, nails, and all accessories to existing roof deck.
- B. Seal roof deck joints wider than 1/16 inch as recommended by shingle manufacturer.
- C. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.
- D. Broom clean deck surfaces before installing underlayment or eave protection.
- E. 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 Up to 4:12: Install two layers of underlayment over area not protected by eave protection, with ends and edges weather lapped minimum 6 inches. Stagger end laps of each consecutive layer. Nail in place through metal disks at 12 inches on center.
- B. 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.
- C. Weather lap and seal watertight with plastic cement any items projecting through or mounted on roof.

3.05 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, and 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

3.06 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.

3.07 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 two nails per shingle, or as required by manufacturer and local building code, whichever is greater.
 - 2. Fasten strip shingles using four nails per strip, or as required by manufacturer and local building code, whichever is greater.
- C. Place shingles in straight coursing pattern with 5 inch weather exposure to produce double thickness over full roof area, and 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, and concealing 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 33

VINYL SIDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vinyl siding and trim.
- B. Aluminum soffit and trim

1.02 RELATED REQUIREMENTS

- A. Section 294 - 294: Water-resistive air barrier under siding.

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 D3679 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Siding; 2013.
- D. ASTM D5206 - Standard Test Method for Windload Resistance of Rigid Plastic Siding; 2013.
- E. 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: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Color Charts: Where colors are not specified, provide samples of manufacturer's entire color line for selection.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Not less than three years of experience with products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Alside, Inc; Odyssey Plus: www.alside.com/#sle.
- B. CertainTeed Corporation; Monogram: www.certainteed.com/#sle.
- C. Ply Gem Industries, Inc; Carvedwood: www.plygem.com/#sle.
- D. VariForm Brand Siding by Ply Gem; Camden Pointe: www.plygem.com.

2.02 MATERIALS

- A. General Requirements:
 - 1. Siding: Complying with ASTM D3679.
 - 2. Wind Resistance: Capable of withstanding minimum of 40 psf negative pressure, when tested in accordance with ASTM D5206.
 - 3. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
- B. Horizontal Vinyl Siding:
 - 1. Profile: Clapboard, Double 5-Inch; 5 inches wide; 10 inch exposure.

2. Thickness: 0.044 inch (nominal), minimum.
 3. Length: 12 feet, minimum.
 4. Nailing Hem: Single layer, with 1-1/8 inch long nail holes at maximum 18 inch on center.
 5. Finish: Woodgrain.
 6. Color: As selected by Architect from manufacturers full range of available colors.
- 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.

2.03 ACCESSORIES

- A. Accessories: Provide coordinating accessories made of same material as required for complete and proper installation whether or not specifically indicated on drawings.
1. Color: Match adjacent siding or soffit panels.
 2. Length:
 - a. Corner Posts: 10 feet, minimum.
 - b. Other Trim: 12-1/2 feet, minimum.
 3. Profiles: Provide types as indicated on drawings.
 4. Starter Strip: Single-row nailing hem with elongated nailing holes 1-1/4 inch long at 18 inch on center, with 1/4 inch base projection.
 5. J-Channel Trim: Wide flange.
 6. Corner Posts:
 - a. Outside: Universal.
 7. Window and Door Surround: 2-1/2 inch wide.
 8. Other Linear Trim: 3-1/2 inch wide, unless otherwise indicated.
 9. H-Molding.
 10. Back Plate: Universal light fixture mounting base/surround, color to match adjacent siding or soffit panels.
 11. Finishing Trim.
- B. Fasteners: Aluminum nails, alloy 5056 or 6110, with minimum tensile strength of 63,000 pounds per square inch; length as required to penetrate framing at least 3/4 inch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate conditions before beginning installation; verify dimensions and acceptability of substrate.
- B. Verify that water-resistive air barrier has been installed over substrate completely and correctly; see Section 07 25 00.
- C. Do not proceed with installation 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 INSTALLATION

- A. Install siding, soffit, and trim in accordance with manufacturer's printed installation instructions.
- B. Attach securely to framing, not sheathing, with horizontal components true to level and vertical components true to plumb, 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 indicated on drawings.
- C. Clean dirt from surface of installed products, using mild soap and water.

3.03 PROTECTION

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

END OF SECTION

SECTION 07 54 00
THERMOPLASTIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Adhered system with thermoplastic roofing membrane.
- B. Insulation, tapered.
- C. Cover boards.
- D. Flashings.
- E. Roofing cant strips, stack boots, and roofing expansion joints.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood nailers and curbs.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Counterflashings, reglets and scuppers.

1.03 REFERENCE STANDARDS

- A. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2016.
- B. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing; 2013.
- C. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011.
- D. FM (AG) - FM Approval Guide; current edition.
- E. NRCA (RM) - The NRCA Roofing Manual; 2017.
- F. NRCA (WM) - The NRCA Waterproofing Manual; 2005.
- G. 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 indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
- C. Shop Drawings: Submit drawings that indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, and walk pad locations.
- D. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Warranty Documentation:
 - 1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 2. Submit installer's certification that installation complies with warranty conditions for waterproof membrane.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this section with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- B. Store materials in weather protected environment, clear of ground and moisture.

- C. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.
- D. Protect foam insulation from direct exposure to sunlight.

1.07 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F or above 90 degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- E. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
 - 1. Warranty Term: 20 years.
 - 2. For repair and replacement include costs of both material and labor in warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Thermoplastic Polyolefin (TPO) Membrane Roofing Materials:
 - 1. Carlisle Roofing Systems, Inc; Sure-Weld TPO: www.carlisle-syntec.com/#sle.
 - 2. Firestone Building Products, LLC; UltraPly Platinum: www.firestonebpc.com.
 - 3. GAF; EverGuard Extreme TPO 60 mil: www.gaf.com/#sle.
 - 4. GenFlex Roofing Systems, LLC; EZ TPO Plus: www.genflex.com.
 - 5. Johns Manville; JM TPO - 60 mil: www.jm.com/#sle.
 - 6. Versico Roofing Systems; VersiFleece RL TPO RapidLock Membrane: www.versico.com/#sle.
- B. Insulation:
 - 1. Carlisle SynTec; SecurShield Insulation: www.carlisle-syntec.com/#sle.
 - 2. GAF; EnergyGuard Polyiso: www.gaf.com/#sle.
 - 3. Versico Roofing Systems; SecurShield Insulation: www.versico.com/#sle.

2.02 ROOFING - UNBALLASTED APPLICATIONS

- A. Thermoplastic Membrane Roofing: One ply membrane, fully adhered, over insulation.
- B. Roofing Assembly Requirements:
 - 1. Solar Reflectance Index (SRI): Minimum of 64 based on three-year aged value; if three-year aged data is not available, minimum of 82 initial value.
 - a. Calculate SRI in accordance with ASTM E1980.
 - b. Field applied coating may not be used to achieve specified SRI.
 - 2. Roof-Ceiling Fire Resistance Rating: Comply with UL (FRD) Assembly Design No. ____.
 - 3. Insulation Thermal Resistance (R-Value): 5 per inch, minimum; provide insulation of thickness required.
- C. Acceptable Insulation Types - Tapered Application:
 - 1. Uniform thickness polyisocyanurate board covered with tapered polyisocyanurate board.

2.03 MEMBRANE ROOFING AND ASSOCIATED MATERIALS

- A. Membrane Roofing Materials:
 - 1. TPO: Thermoplastic polyolefin (TPO) complying with ASTM D6878/D6878M, sheet contains reinforcing fabrics or scrim.
 - a. Thickness: 60 mil, 0.060 inch, minimum.
 - 2. Sheet Width:

- B. Seaming Materials: As recommended by membrane manufacturer.
- C. Flexible Flashing Material: Same material as membrane.

2.04 COVER BOARDS

- A. Cover Board: High compressive strength polyisocyanurate (ISO) board insulation complying with ASTM C1289, and the following characteristics:
 - 1. Classification: Type II, Class 4 - Faced with coated or uncoated polymer-bonded glass fiber mat facers on both major surfaces of the core foam.
 - 2. Compressive Strength: 80 psi.
 - 3. Board Size: 48 by 96 inches.
 - 4. Board Thickness: 1/2 inch.

2.05 INSULATION

- A. Total Thermal Resistance: Provide a minimum R-value of 30 above all conditioned spaces.
- B. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
 - 1. Classifications:
 - a. Type II:
 - 1) Class 1 - Faced with glass fiber reinforced cellulosic felt facers on both major surfaces of core foam.
 - 2) Compressive Strength: Class 4, Grade 1, 80 psi (551 kPa), minimum.
 - 3) Thermal Resistance, R-value: At 1-1/2 inches thick; Class 4, 2.0 (0.35) at 1/2 inch (12.7 mm) thick, minimum, at 75 degrees F.
 - 2. Board Size: 48 by 96 inches.
 - 3. Tapered Board: Slope as indicated; minimum thickness 6 inch; fabricate of fewest layers possible.
 - 4. Board Edges: Square.

2.06 ACCESSORIES

- A. Roofing Expansion Joint Flashing: Sheet butyl.
- B. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
- C. Cant and Edge Strips: Wood fiberboard, compatible with roofing materials; cants formed to 45 degree angle.
- D. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.
- E. Membrane Adhesive: As recommended by membrane manufacturer.
- F. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
- G. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.
- H. Insulation Adhesive: As recommended by insulation manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 PREPARATION - WOOD DECK

- A. Verify flatness and tightness of joints of wood decking, and fill knot holes with latex filler.
- B. Confirm dry deck by moisture meter with 12 percent moisture maximum.

3.03 INSTALLATION - GENERAL

- A. Perform work in accordance with manufacturer's instructions, NRCA (RM), and NRCA (WM) applicable requirements.
- B. Do not apply roofing membrane during cold or wet weather conditions.
- C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

3.04 VAPOR RETARDER AND INSULATION - UNDER MEMBRANE

- A. Attachment of Insulation: Embed insulation in adhesive in full contact, in accordance with roofing and insulation manufacturers' instructions.
- B. Cover Boards: Mechanically fasten cover boards in accordance with roofing manufacturer's instructions and FM (AG) Factory Mutual requirements.
- C. Lay subsequent layers of insulation with joints staggered minimum 6 inches from joints of preceding layer.
- D. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.
- E. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.
- F. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- G. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.
- H. Do not install more insulation than can be covered with membrane in same day.

3.05 INSTALLATION - MEMBRANE

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Fully Adhered Application: Apply adhesive to substrate at rate of 110 sq ft/gal. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- D. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.
- E. At intersections with vertical surfaces:
 - 1. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
 - 2. Fully adhere flexible flashing over membrane and up to nailing strips.
- F. Around roof penetrations, seal flanges and flashings with flexible flashing.
- G. Install roofing expansion joints where indicated. Make joints watertight.
- H. Coordinate installation of roof drains and sumps and related flashings.

3.06 CLEANING

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Remove bituminous markings from finished surfaces.
- C. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.
- D. Repair or replace defaced or damaged finishes caused by work of this section.

3.07 PROTECTION

- A. Protect installed roofing and flashings from construction operations.

- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

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 at masonry.
- B. Section 07 31 13 - Asphalt Shingles: Installation of flashings specified in this section.
- C. Section 07 46 46 - Fiber-Cement Siding: Flashings associated with siding installation.
- D. Section 07 92 00 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014a.
- B. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a.
- C. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).
- D. CDA A4050 - Copper in Architecture - Handbook; current edition.
- E. 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. Pre-Finished Aluminum: ASTM B209M; 24 gauge, 0.024 inch thick; plain finish shop pre-coated with silicone modified polyestermodified silicone coating.

2.02 FABRICATION

- A. General: Provide prefinished aluminum sheet metal flashing at changes in adjacent siding materials and other flashing indicated, color as selected by Owner/Architect.
- B. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- E. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- F. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- G. 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: 6 inch K-style profile.
- B. Downspouts: 3 inch by 4 inch Rectangular profile, 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. Size: 3 inch by 12 inch by 30 inch
 - 2. Manufacturer: Equal to Modern Precast Inc: www.modernprecast.com.
 - 3. Model No: 30" Splash Block.

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 complying with 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, 0.015 inch.

3.03 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Slope gutters 1/8 inch per foot, 2 percent minimum.
- C. Set splash blocks under downspouts.

END OF SECTION

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof hatches.

1.02 RELATED REQUIREMENTS

- A. 07 54 00 - Thermoplastic Membrane Roofing

1.03 REFERENCE STANDARDS

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.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.

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.

PART 2 PRODUCTS

2.01 ROOF HATCHES AND VENTS

- A. Roof Hatch Manufacturers:
- B. Roof Hatches and Smoke Vents: Factory-assembled aluminum frame and cover, complete with operating and release hardware.
 - 1. Style: Provide flat metal covers unless otherwise indicated.
 - 2. Mounting: Provide frames and curbs suitable for mounting conditions as indicated on drawings.
 - 3. Thermally Broken Hatches: Provide insulation within frame and cover.
 - 4. For Ladder Access: Single leaf; 30 by 36 inches.
- C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
 - 1. Material: Mill finished aluminum, 11 gauge, 0.0907 inch thick.
 - 2. Insulation: Manufacturer's standard; 1 inch rigid glass fiber, located on outside face of curb.
- D. Metal Covers: Flush, insulated, hollow metal construction.
 - 1. Capable of supporting 40 psf live load.
 - 2. Material: Mill finished aluminum; outer cover 11 gauge, 0.0907 inch thick, liner 0.04 inch thick.
 - 3. Insulation: Manufacturer's standard 1 inch rigid glass fiber.
 - 4. Gasket: Neoprene, continuous around cover perimeter.
- E. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
 - 1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
 - 2. Hinges: Heavy duty pintle type.
 - 3. Hold open arm with vinyl-coated handle for manual release.
 - 4. Latch: Upon closing, engage latch automatically and reset manual release.
 - 5. Manual Release: Pull handle on interior.
 - 6. Locking: Padlock hasp on interior.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

- A. Clean installed work to like-new condition.

3.05 PROTECTION

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

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 nonpreformed materials.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Certificate from authority having jurisdiction indicating approval of materials used.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.

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 three 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.
 - 5. RectorSeal Corporation; FlameSafe: www.flamesafe.rectorseal.com
 - 6. Specified Technologies Inc; SpecSeal: www.stifirestop.com.
 - 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. 2 Hour Construction: UL System W-L-1001; 3M CP 25 WB.
 - b. 2 Hour Construction: UL System W-L-1312; RectorSeal FlameSafe Silicone NS.
 - c. 2 Hour Construction: UL System W-L-1222; STI SpecSeal LCI sealant.
 - d. 2 Hour Construction: UL System W-L-1066; A/D Fire Protection FireBarrier Silicone.
 - e. 1 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - f. 1 Hour Construction: UL System W-L-1001; 3M CP 25 WB.
 - g. 1 Hour Construction: UL System W-L-1312; RectorSeal FlameSafe Silicone NS.
 - h. 1 Hour Construction: UL System W-L-1222; STI SpecSeal LCI sealant.
 - i. 1 Hour Construction: UL System W-L-1066; A/D Fire Protection FireBarrier Silicone.
 - 2. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System W-L-1038; RectorSeal FS 1900 Sealant.
 - b. 2 Hour Construction: UL System W-L-2167; RectorSeal FlameSafe Wrap Strip.
 - c. 2 Hour Construction: UL System W-L-2048; STI SpecSeal BLU or RED.
 - d. 2 Hour Construction: UL System W-L-2155; A/D Fire Protection FireBarrier Collar.
 - e. 2 Hour Construction: UL System W-L-2270; ProMat PROMASTOP UniCollar.
 - f. 1 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop.
 - g. 1 Hour Construction: UL System W-L-1038; RectorSeal FSP 1100 Putty.
 - h. 1 Hour Construction: UL System W-L-2167; RectorSeal FlameSafe Wrap Strip.
 - i. 1 Hour Construction: UL System W-L-2048; STI SpecSeal BLU or RED.
 - j. 1 Hour Construction: UL System W-L-2155; A/D Fire Protection FireBarrier Collar.
 - 3. Electrical Cables Not In Conduit:
 - a. 2 Hour Construction: UL System W-L-3076; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System W-L-3395; Hilti CP653 Speed Sleeve.
 - c. 1 and 2 Hour Construction: UL System W-L-3453; HoldRite HydroFlame 200 Intumescent Firestop Sealant.
 - d. 1 Hour Construction: UL System W-L-3024; Specified Technologies Inc. SSP Firestop Putty.
 - e. 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.

- f. 1 Hour Construction: UL System W-L-3076; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
- g. 1 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
- h. 1 Hour Construction: UL System W-L-3376; Specified Technologies Inc. Ready-Sleeve.

2.05 FIRESTOPPING PENETRATIONS THROUGH FLOOR-CEILING ASSEMBLIES

- A. Penetrations by:
 - 1. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System F-C-1002; 3M CP 25WB+.
 - b. 2 Hour Construction: UL System F-C-1020; RectorSeal FlameSafe FS 1900, Metacaulk 1000.
 - c. 2 Hour Construction: UL System F-C-1149; A/D Fire Protection A/D FireBarrier Intumescent Sealant.
 - d. 1 Hour Construction: UL System F-C-1002; 3M CP 25WB+.
 - e. 1 Hour Construction: UL System F-C-1053; STI SpecSeal WF300 Caulk.
 - f. 1 Hour Construction: UL System F-C-1150; A/D Fire Protection A/D FireBarrier Intumescent Sealant.
 - 2. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System F-C-2002; 3M FS-195+.
 - b. 2 Hour Construction: UL System F-C-2115; 3M FS-195+, Ultra GS.
 - c. 2 Hour Construction: UL System F-C-2041; RectorSeal FS 1900 Sealant, Metacaulk MC 150+, FSD Devise.
 - d. 2 Hour Construction: UL System F-C-2020; STI SpecSeal SSS Sealant, LCI Sealant, Firestop collar, LCC Firestop collar.
 - e. 1 Hour Construction: UL System F-C-2002; 3M FS-195+, CP 25WB.
 - f. 1 Hour Construction: UL System F-C-2115; 3M FS-195+, Ultra GS.
 - g. 1 Hour Construction: UL System F-C-2041; RectorSeal FS 1900 Sealant, Metacaulk MC 150+, FSD Devise.
 - h. 1 Hour Construction: UL System F-C-2091; RectorSeal FS 1900 Sealant, Metacaulk MC 1000.
 - i. 1 Hour Construction: UL System F-C-2020; STI SpecSeal SSS Sealant, LCI Sealant, Firestop collar, LCC Firestop collar.
 - j. 1 Hour Construction: UL System F-C-2158; STI SpecSeal RED Wrap Strip, RED2, BLU Wrap Strip, BLU2 Wrap Strip, SpecSeal Firestop collar, LCC collar.

2.06 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 materials 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. Non-sag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.
- B. Section 03 30 00 - Cast-in-Place Concrete: Sealants required for through-penetrations.
- C. Section 06 10 00 - Rough Carpentry: Sealing joints between built-up framing members.
- D. Section 294 - 294: Sealants required in conjunction with water-resistive air barriers.
- E. Section 08 11 20 - Residential Steel Entry Doors.
- F. Section 08 53 13 - Vinyl Windows.
- G. Section 09 21 16 - Gypsum Board Assemblies: Sealants required for through-penetrations.
- H. Section 32 13 13 - Concrete Paving: Traffic-rated, self-leveling sealants for pavement.

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 C834 - Standard Specification for Latex Sealants; 2014.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014a.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- E. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002 (Reapproved 2013).
- F. 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.
 - 7. Sample product warranty.
- 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.
- D. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation; see Section 01 61 16.

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 Chemical Company: www.dow.com.
 - 3. GE Silicones Inc.: www.ge.com.
 - 4. Pecora Corporation: www.pecora.com.
 - 5. Sika Corporation: www.usa-sika.com.
 - 6. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
 - 7. Or approved equal.
- B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
 - 1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 2. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
 - 3. Dow Chemical Company:
consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - 4. Pecora Corporation: www.pecora.com.
 - 5. Sika Corporation: www.usa-sika.com.
 - 6. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
 - 7. W.R. Meadows, Inc: www.wrmeadows.com.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on 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) Vertical siding/masonry joints.
 - 3) Sleeves or pipes penetrating exterior walls.
 - 4) 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:
 - 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. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - b. 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 polyurethane sealant, unless otherwise indicated.
- 1. Masonry Expansion Joints: Two-part polyurethane.
 - 2. Metal to Masonry: Two-part polyurethane.
 - 3. Lap Joints in Sheet Metal Fabrications: Two-part polyurethane, non-curing.
 - 4. General Flashing and Flashing to Brick: One-part polyurethane.
 - 5. Sleeves in Walls: One-part polyurethane.
- C. Interior Joints: Use non-sag acrylic sealant, unless otherwise indicated.
- 1. Gypsum Board or Plaster to Masonry or Wood: Acrylic.
 - 2. Metal to Gypsum Board, Plaster or Masonry: Acrylic.
 - 3. Metal to Brick: Two-part polyurethane.
 - 4. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.

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. 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. Manufacturers:
 - a. Dow Chemical Company; 732 Silicone: www.dow.com.
 - b. GE Silicones, Inc; Silicone II: www.ge.com.
 - c. Or approved equal.
- B. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
- 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
 - 3. Color: To be selected by Architect from manufacturer's standard range.
 - 4. Manufacturers:
 - a. Pecora Corporation; Dynatrol, or GC-9 polysulfide: www.pecora.com/#sle.
 - b. Tremco Commercial Sealants & Waterproofing; Dymeric or Moro: www.tremcosealants.com/#sle.
- C. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
- 1. Manufacturers:
 - a. Pecora Corporation; AC-20 Acrylic: www.pecora.com/#sle.
 - b. Sherwin-Williams Company; 850A Acrylic Latex Caulk: www.sherwin-williams.com/#sle.
 - c. Tremco Commercial Sealants & Waterproofing; Tremflex 834: www.tremcosealants.com/#sle.

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 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire-rated hollow metal doors and frames.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants.
- B. Section 08 71 00 - Door Hardware.
- C. Section 09 91 23 - Interior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- F. 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.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2015.
- H. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- I. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- K. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- L. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- M. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, gauges, reinforcements, cutouts, installation and anchorage details, and any indicated finish requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Fleming Door Products, an Assa Abloy Group company: www.assaabloydss.com.

2. Republic Doors, an Allegion brand: www.republicdoor.com.
3. Steelcraft, an Allegion brand: www.allegion.com.
4. Or approved equal.

2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 3. Door Edge Profile: Manufacturers standard for application indicated.
 4. Typical Door Face Sheets: Flush.
 5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
 6. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
 - a. Based on SDI Standards: Provide at least A40/ZF120 (galvanized) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvanized) for corrosive locations.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Fire-Rated Doors:
 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 1 - Standard-duty.
 - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 20 gauge, 0.032 inch, minimum.
 2. Fire Rating: 1 hour, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 3. Temperature-Rise Rating (TRR) Across Door Thickness: In accordance with local building code and authorities having jurisdiction.
 4. Provide units listed and labeled by UL (DIR).
 - a. Attach fire rating label to each fire rated unit.
 5. Door Thickness: 1-3/4 inches, nominal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Door Frames, Fire-Rated: Knock-down type.
 1. Fire Rating: Same as door, labeled.
 2. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
 3. Frame Finish: Factory primed and field finished.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

- A. Glazing: Fire-rated safety glazing, factory installed.

- B. Removable Stops: Formed sheet steel, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- D. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Install door hardware as specified in Section 08 71 00.
- E. Coordinate installation of electrical connections to electrical hardware items.

3.03 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.04 ADJUSTING

- A. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08 11 16
ALUMINUM DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glazed aluminum doors.
- B. Aluminum frames.
- C. Glazing.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware: Hardware for aluminum doors.
- B. Section 28 10 00 - Access Control.

1.03 REFERENCE STANDARDS

- A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
- C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- F. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- I. 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).
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

1.04 SUBMITTALS

- A. Refer to Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's descriptive literature for each type of door; include information on installation and maintenance instructions.
- C. Shop Drawings: Include elevations of each opening type.
 - 1. Verify dimensions by field measurements before fabrication and indicate on shop drawings.
- D. Test Report: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Glazed Aluminum Doors and Frames:
 - 1. Cline Aluminum Doors, Inc: www.clinedoors.com/#sle.
 - 2. C.R. Laurence Company, Inc; Series 250 Entry Doors: www.crl-arch.com.
 - 3. Special-Lite, Inc; SL-14 Medium Stile: www.special-lite.com.
 - 4. Tubelite Inc; Standard Medium Stile: www.tubeliteinc.com

2.02 DOORS AND FRAMES

- A. Accessibility: Comply with ICC A117.1 and ADA Standards.

- B. Glazed Aluminum Doors: Extruded aluminum tube frame, full glazed, with middle rail; factory glazed.
 - 1. Thickness: 1-3/4 inches, nominal.
 - 2. Stile Width: 4 inches, nominal.
 - 3. Bottom Rail Height: 10 inch, nominal.
 - 4. Finish: Class I - Color anodized.
 - 5. Seals: Manufacturer's standard.
 - 6. Glazing, Exterior Doors: Sealed insulating units, 1 inch thick, made of clear 1/4 inch thick fully tempered glass.
 - 7. Manufacturer's Door Hardware: Manufacturer's standard.
 - a. Hanging Devices: Butt hinges.
 - 1) Single Door Swing Direction: As indicated on drawings.
 - b. Securing Devices: As required for project applications.
 - 1) Refer to Section 08 71 00.
- C. Aluminum Frames for Doors, Sidelights, or Transoms: Extruded aluminum, non-thermally broken hollow or C-shaped sections; no steel components.
 - 1. Frame Depth: 4-1/4 inches.
 - 2. Finish: Same as doors.
 - 3. Weatherstripping: Replaceable pile type; at jambs and head.
 - 4. Sidelight/Transom Glazing: Sealed insulating glass units, 1 inch overall thickness, with two panes of clear 1/4 inch thick fully tempered glass.
- D. Dimensions and Shapes: As indicated on drawings; dimensions indicated are nominal.
 - 1. Provide the following clearances:
 - a. Hinge and Lock Stiles: 1/8 inch.
 - b. Between Meeting Stiles: 1/4 inch.
 - c. At Top Rail and Bottom Rail: 1/8 inch.

2.03 COMPONENTS

- A. Frames: Extruded aluminum shapes, not less than 0.062 inch thick, reinforced at hinge and strike locations.
 - 1. Corner Brackets: Extruded aluminum, fastened with stainless steel screws.
 - 2. Trim: Extruded aluminum, not less than 0.062 inch thick, removable snap-in type without exposed fasteners.

2.04 PERFORMANCE REQUIREMENTS

- A. Provide door assemblies that have been designed and fabricated in compliance with specified performance requirements.
- B. Air Leakage: Maximum of 0.1 cu ft/min/sq ft at 6.27 psf differential pressure, when tested in accordance with ASTM E283.
- C. Overall U-value, Including Glazing: 0.35, minimum, measured on exterior door size required for this project.

2.05 MATERIALS

- A. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy 5005, temper H14, stretcher leveled.
- B. Extruded Aluminum: ASTM B221 (ASTM B221M), alloy 6063, temper T5, or alloy 6463, temper T5.

2.06 FINISHES

- A. Class I Color Anodized Finish: Electrolytically deposited colored anodic coating; AAMA 611 AA-M12C22A44, minimum dry film thickness (DFT) of 0.7 mils, 0.0007 inch.

2.07 ACCESSORIES

- A. Fasteners: Aluminum, non-magnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components.
- B. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible, otherwise, non-magnetic stainless steel or steel hot-dip galvanized in compliance with ASTM A123/A123M.

- C. Bituminous Coating: Cold-applied asphaltic mastic, compounded for 30-mil thickness per coat.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall surfaces and openings are ready to receive frames and are within tolerances specified in manufacturer's instructions.

3.02 PREPARATION

- A. Perform cutting, fitting, forming, drilling, and grinding of frames as required for project conditions.
- B. Replace components with damage to exposed finishes.
- C. Separate dissimilar metals to prevent electrolytic action between metals.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings.
- B. Set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with manufacturer's recommendations and within specified tolerances.
- C. Where aluminum surfaces contact metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact by painting dissimilar metal with heavy coating of bituminous paint.
- D. Hang doors and adjust hardware to achieve specified clearances and proper door operation.

3.04 CLEANING

- A. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609 & 610.
- B. Do not use abrasive, caustic, or acid cleaning agents.

3.05 PROTECTION

- A. Protect products of this section from damage caused by subsequent construction until Date of Substantial Completion.
- B. Replace damaged or defective components that cannot be repaired to a condition indistinguishable from undamaged components.

END OF SECTION

SECTION 08 14 16

WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pre-hung, molded panel doors; fire-rated and non-rated.

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.
- C. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- D. 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 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 QUALITY ASSURANCE

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, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 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.
 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors; 20-minute Fire-Rated: Molded-panel, solid core construction.

1. Location: School building.
 2. Thickness: 1-3/4 inches, unless otherwise indicated.
 3. Style: 2-Panel as indicated on drawings.
 4. Facing: Wood veneer for field opaque finish.
- C. Interior Doors; non-rated: 1-3/8 inches thick unless otherwise indicated; molded panel construction.
1. Location: School building, Town homes, and Community building.
 2. Style: 2-Panel, 6-Panel, and 3-Panel Shaker as indicated on drawings.
 3. Fire Rated Doors: Tested to 20 minutes in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) labeled without any visible seals when door is open.
 4. Hardboard facing for field opaque finish.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
- B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.
- C. Hollow Core Doors: Type - Standard (FSHC); plies and faces as indicated above.

2.04 DOOR FACINGS

- A. Veneer Facing for Opaque Finish: Medium density overlay (MDO), in compliance with indicated quality standard.
- B. Hardboard Facing for Opaque Finish: ANSI A135.4, Class 2 - Standard, Molded Panel hardboard, 1/8 inch thick.
- C. 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 FINISHES

- 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 16 20
RESIDENTIAL FIBERGLASS ENTRY DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulated fiberglass entry doors and wood frames.
 - 1. Raised in-fill panels.

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 entry door frame and adjacent construction.
- D. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- E. Section 08 71 00 - Door Hardware.
- F. 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 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).
- C. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- D. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- E. 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).
- F. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007 (Reapproved 2016).
- G. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2014.
- H. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014.
- I. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014.
- J. NFRC 400 - Procedure for Determining Fenestration Product Air Leakage.
- K. 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 thickness, 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.

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 25 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 Fiberglass Entry Doors:
 - 1. Therma Tru; Fiber-Classic Series; Mahogany Collection: www.thermatru.com.
 - 2. Bayer Built Inc; Designer Series; 3-Panel BFI: www.bayerbuilt.com.
 - 3. Substitutions: Or Approved Equal

2.02 COMPONENTS

- A. Fiberglass Entry Doors: Insulated fiberglass-skin door entry systems; prehung in wood frames.
 - 1. Style: 3-Panel Shaker.
 - 2. Thickness: 1-3/4 inches, unless otherwise indicated.
 - 3. Exterior Skin: 1/16 inch minimum, fiberglass reinforced thermoset composite.
 - 4. Interior Frame: Kiln-dried pine or engineered lumber; door bottom edge: moisture/decay resistant composite.
 - 5. Core: Foamed-in-place, CFC-free, polyurethane foam bonded to exterior skin; density 1.9 pcf minimum.
 - 6. 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.
 - 7. Finish: Factory primed; ready for field painting.
- B. Fiberglass French Doors: Extruded fiberglass unit frame and operable panel frame, factory fabricated, factory glazed; complete with integral sloped sill/threshold, flashings, and anchorage devices.
 - 1. Type: French Door.
 - 2. Frame Depth: 4-1/2 inches, minimum.
 - 3. Fiberglass Members: Solid sections; doweled or mortise and tenon joinery; factory applied powder coat paint finish.
 - a. Reinforcement: Extruded aluminum profiles at corners and lock. Corner reinforcement shall engage rails minimum 4" and stiles minimum 10".
 - b. Drainage: Provide drainage to exterior for moisture entering glazing rabbet.
 - 4. Panel: Pultruded, multi-chambered fiberglass:
 - a. Top Rail: 4-3/16 inch by 1-3/4 inch.
 - b. Bottom Rail: 8-5/8 inch by 1-3/4 inch.
 - c. Stiles: 4-3/16 inch by 1-3/4 inch.
 - 5. Glass Stops: Same material and color as frame, sloped for wash.
 - 6. Sill/Threshold: Stainless steel; low-profile, ADA accessible.
 - 7. Color: White.
- C. Configurations:
 - 1. Dwelling Unit Entry Doors:
 - a. Configuration: Single door.
 - b. Style: 3-Panel Shaker

- c. Rating: As indicated on drawings.
- 2. Garage Interior Entry Doors:
 - a. Configuration: Single door.
 - b. Style: 3-Panel Shaker
 - c. Rating: 20 minute.
- D. Frames: Manufacturer's standard rot-resistant composite frame, for field finishing.
 - 1. Frame: Laminated Veneer Lumber (LVL) core wrapped in UV-stabilized composite outer layer; profiled 1/2 inch stops with gasket kerf.
 - 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.
- E. Thresholds: Low profile complying with ANSI 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.
- F. Weatherstripping: Jacketed thermoset closed-cell foam, press-fit in kerfs at jamb stops in frames.
- G. Door Sweeps: Extruded thermoplastic elastomer, finned and chambered design, press-fit into bottom edge of doors.
- H. 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.

2.05 FINISHES

- A. Color: To be selected by Owner from manufacturer's standard range.

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 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Ceiling mounted access units.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry.
- B. Section 09 91 23 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Ceiling-Mounted Units:
 - 1. Location: As indicated on drawings.
 - 2. Panel Material: Aluminum.
 - 3. Size - Other Ceilings: 22 by 36 inches.
 - 4. Door/Panel: Hinged, standard duty, with cam lock and no handle.
 - a. All access hatches keyed alike.

2.02 CEILING MOUNTED ACCESS UNITS

- A. Manufacturers:
 - 1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpg.com.
 - a. Multipurpose Access Panel: Activar/JL Industries TM.
 - 2. Babcock-Davis: www.babcockdavis.com.
 - 3. Best Access Doors: www.bestaccessdoors.com.
 - a. Universal Access Panel Drywall: Best Access Doors; Series BA-AHD.
 - 4. Or approved equal.
- B. Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
 - 1. Style: Exposed frame with door surface flush with frame surface.
 - a. Gypsum Board Mounting Criteria: Use drywall bead type frame.
 - 2. Door Style: Single thickness with rolled or turned in edges.
 - 3. Frames: 16 gauge, 0.0598 inch, minimum thickness.
 - 4. Aluminum Finish: Natural brushed.
 - 5. Hardware:
 - a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
 - b. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.
 - 1) All hatches keyed alike.
 - c. Inside Latch Release: Mechanism that allows door/panel to be opened from inside.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

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 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).
- C. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- D. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; 2011.
- E. ITS (DIR) - Directory of Listed Products; current edition.
- F. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- G. 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 DOORS

- 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. Thermal Transmittance: U-factor of 0.16 Btu/hr sq ft degrees F, maximum, in accordance with DASMA 102.
 - 4. Air Leakage Rate: Less than 1.0 cfm/sf when tested in accordance with ASTM E283 at test pressure difference of 1.57 psf.
 - 5. Exterior Finish: Factory finished with polyester baked enamel; color as selected from manufacturers standard line.
 - 6. Interior Finish: Factory finished with polyester baked enamel; white.
 - 7. Electric Operation: Electric control station.
- 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 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 ELECTRIC OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
 - 1. Provide interlock switches on motor operated units.
- B. Electric Operators:
 - 1. Motor Rating: 1/2 hp; continuous duty.
 - 2. Motor Voltage: 120 volts, single phase, 60 Hz.
 - 3. Opening Speed: 9-12 inches per second.
 - 4. Manual override in case of power failure.
- C. 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.
- D. Safety Sensors: Manufacturer's standard contact and non-contact sensors.
- E. Hand Held Transmitter: Digital control, and 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 51 13
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extruded aluminum windows with operating sash designed for historic preservation.
- B. Factory glazing.
- C. Operating hardware.
- D. Insect screens.

1.02 RELATED REQUIREMENTS

- A. Section 07 21 00 - Thermal Insulation: Perimeter foam insulation between frame and adjacent construction.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between window 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 CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- G. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- H. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- I. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2014a.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
- C. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.
- D. 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 minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of AAMA CW-10.

- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

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 24 hours after installation of sealants.

1.08 WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Aluminum Windows Manufacturers:
 - 1. Manko Window Systems, Inc: www.mankowindows.com.
 - 2. Quaker Windows Products: www.quakerwindows.com.
 - 3. Wausau Window and Wall Systems: www.wausauwindow.com.

2.02 ALUMINUM WINDOWS

- A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished for historic renovation, with operating hardware, related flashings, and anchorage and attachment devices.
 - 1. Frame Depth: 3-1/2 inches.
 - 2. Operable Units: Double weatherstripped.
 - 3. Provide units factory glazed.
 - 4. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
 - 5. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
 - 6. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
 - 7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
- B. Single-Hung Type:
 - 1. Construction: Thermally broken.
 - 2. Provide screens.
 - 3. Glazing: Double; clear; low-e.
 - 4. Exterior Finish: High performance organic coatings.

2.03 PERFORMANCE REQUIREMENTS

- A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
 - 1. Performance Grade (PG): Equivalent to or greater than specified design pressure.
- B. Design Pressure (DP): In accordance with applicable codes.
- C. Member Deflection: Limit member deflection to 1/175 in any direction, with full recovery of glazing materials.
- D. Wind-Borne-Debris Resistance: Identical full-size glazed assembly without auxiliary protection, tested by independent agency in accordance with ASTM E1996 for Wind Zone 1 - Enhanced Protection for Large and Small Missile impact and pressure cycling at design wind pressure.
- E. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 26 psf.
- F. Air Leakage: 0.1 cfm/sq ft maximum leakage per unit area of outside window frame dimension when tested at 1.57 psf pressure difference in accordance with ASTM E283/E283M.

- G. Overall Thermal Transmittance (U-value): 0.35, maximum, including glazing, measured on window sizes required for this project.

2.04 COMPONENTS

- A. Frames: Thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on type.
- B. Glazing: High impact rated heat-strengthened.
- C. Sills: Extruded aluminum; sloped for positive wash; fit under sash leg to 1/2 inch beyond wall face; one piece full width of opening; jamb angles to terminate sill end.
- D. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable hardware allowing screen removal without use of tools.
 - 1. Hardware: Spring loaded steel pins; four per screen unit.
 - 2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.
 - 3. Frame Finish: Same as frame and sash.
- E. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to achieve effective weather seal.
- F. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

2.05 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
- B. Concealed Steel Items: Profiled to suit mullion sections; galvanized in accordance with ASTM A123/A123M.

2.06 HARDWARE

- A. Sash lock: Lever handle with cam lock.
- B. Window Opening Control Devices (WOCD): Provide operable window sash hardware that limits openings to only allow passage of 4 inch diameter rigid sphere or less, and are easily releasable to fully open without use of keys, tools, or special knowledge.

2.07 FINISHES

- A. High Performance Organic Coatings: AAMA 2604; multiple coats, thermally cured fluoropolymer system.
- B. Finish Color: As selected by Owner from manufacturer's standard range..

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.02 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install sill and sill end angles.
- E. Provide thermal isolation where components penetrate or disrupt building insulation. inject low pressure-build foam in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Install operating hardware not pre-installed by manufacturer.

3.03 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.04 ADJUSTING

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

3.05 CLEANING

- A. Remove protective material from factory finished aluminum surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

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 04 20 00 - Unit Masonry.
- B. Section 07 21 00 - Thermal Insulation: Perimeter foam insulation air seal between window frame and adjacent construction.
- C. Section 07 25 00 - Weather Barriers: Sealing frames to weather barrier installed on adjacent construction.
- D. 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 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).
- E. ASTM E1423 - Standard Practice for Determining the Steady State Thermal Transmittance of Fenestration Systems; 2014.
- F. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007 (Reapproved 2016).
- G. ASTM F2090-13 - Standard Specification for Window Fall Prevention Devices With Emergency Escape (Egress) Release Mechanisms; 2013.
- H. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact; 2014.
- I. 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 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 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. Alside, Inc; Fusion Series: www.alside.com.
 - 2. All Temp Windows Inc.; Series 1800: www.alltempwindows.com
 - 3. Jeld-Wen Inc.; Builders Vinyl Series: www.jeldwen.com.
 - 4. Milgard Manufacturing; StyleLine Series: www.milgard.com.
 - 5. 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: 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. Energy Star Rating: Provide windows eligible for Energy Star Rating.

2.03 PERFORMANCE REQUIREMENTS

- A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
 - 1. Performance Class (PC): R.
 - 2. Performance Grade (PG): 15, with minimum design pressure (DP) of 15.04 psf.
- 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 0.30, 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.
- D. Solar Heat Gain Coefficient (SHGC): SHGC value of 0.25 maximum.
- E. Visible Light Transmittance: value of 0.52 minimum.
- F. Forced Entry Resistance (FER): Tested to comply with ASTM F588 requirements having at least Grade 10 performance for each required window assembly.

2.04 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.
 - 2. Glass Stops: Snap-on PVC glazing bead with color to match sash and frame.
- B. Frame Depth: 4-1/2 inch minimum.
- C. Divided Lite Grid: Installed on exterior face of insulating glass, 5/8 inch wide sculptured PVC muntins, color to match frame and sash.
 - 1. Pattern: Refer to drawings.
- 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.

2.05 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 hollow metal, aluminum, residential fiberglass entry, and wood doors.
- B. Thresholds.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 11 16 - Aluminum Doors and Frames.
- C. Section 08 14 16 - Wood Doors.
- D. Section 08 16 20 - Residential Fiberglass Entry 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 A156.3 - American National Standard for Exit Devices; 2014.
- 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 A156.16 - American National Standard for Auxiliary Hardware; 2013.
- G. BHMA A156.17 - American National Standard for Self Closing Hinges & Pivots; 2014.
- H. BHMA A156.18 - American National Standard for Materials and Finishes; 2012.
- I. BHMA A156.21 - American National Standard for Thresholds; 2014.
- J. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems; 2013.
- K. BHMA A156.31 - American National Standard for Electric Strikes and Frame Mounted Actuators; 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.
- P. UFAS - Uniform Federal Accessibility Standards - HUD 24 CFR part 40; 1984.
- Q. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Preinstallation Meeting: Convene a preinstallation meeting one weeks prior to commencing work of this section; attendance is required by affected installers and the following:
 - 1. Architect.
 - 2. Installer's Architectural Hardware Consultant (AHC).
 - 3. Hardware Installer.
 - 4. Owner.
- C. Keying Requirements Meeting:
 - 1. Schedule meeting at project site prior to Contractor occupancy.
 - 2. Attendance Required:
 - a. Contractor.
 - b. Owner.
 - c. Architect.

- d. Installer's Architectural Hardware Consultant (AHC).
- e. Hardware Installer.
- 3. Agenda:
 - a. Establish keying requirements.
 - b. Verify locksets and locking hardware are functionally correct for project requirements.
 - c. Verify that keying and programming complies with project requirements.
 - d. Establish keying submittal schedule and update requirements.
- 4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
 - a. Access control requirements.
 - b. Key control system requirements.
 - c. Flow of traffic and extent of security required.
- 5. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
- 6. Deliver established keying requirements to manufacturers.

1.05 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.

1.06 QUALITY ASSURANCE

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

1.07 DELIVERY, STORAGE, AND HANDLING

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

1.08 WARRANTY

- A. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
 - 1. Closers: Five years, minimum.
 - 2. Locksets and Cylinders: Three years, minimum.
 - 3. 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: UFAS, ADA Standards, and ICC A117.1.

3. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR) as suitable for application indicated.
 4. 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/#sle.
 5. Stanley Manufacturing Co.: www.stanleyhardware.com.
- B. Hinges: Comply with BHMA A156.1, Grade 3.
1. Self Closing Hinges: Comply with BHMA A156.17.
 2. Butt Hinges: Comply 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 FLUSH BOLTS

- A. Manufacturers:
1. Adams Rite, an Assa Abloy Group company: www.assaabloydss.com.
 2. Hager Companies: www.hagerco.com/#sle.
 3. Ives, an Allegion brand: www.allegion.com/us.
 4. Trimco: www.trimcohardware.com.

2.04 EXIT DEVICES

- A. Manufacturers:
1. Corbin Russwin, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com.
 2. C. R. Laurence Company, Inc: www.crl-arch.com.
 3. Hager Companies: www.hagerco.com.
 4. Von Duprin, an Allegion brand: www.allegion.com/us.
- B. Exit Devices: Comply with BHMA A156.3, Grade 3.
1. Lever design to match lockset trim.
 2. Provide cylinder with cylinder dogging or locking trim.
 3. Provide exit devices properly sized for door width and height.
 4. Provide strike as recommended by manufacturer for application indicated.
 5. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.

6. For electrical options, provide quick connect plug-in pre-wired connectors.

2.05 ELECTRIC STRIKES

- A. Manufacturers:
 1. Adams Rite, HES, or Securitron; an Assa Abloy Group company; _____: www.assaabloydss.com.
 2. Pamex, Inc; _____: www.pamexinc.com.
 3. Or approved equal.
- B. Electric Strikes: Comply with BHMA A156.31, Grade 1.
 1. Provide UL (DIR) listed burglary-resistant electric strike; style to suit locks.
 2. Provide non-handed 24 VDC electric strike suitable for door frame material and scheduled lock configuration.
 3. Provide field selectable Fail Safe/Fail Secure modes.
 4. Provide transformer and rectifier as necessary for complete installation.

2.06 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): Comply 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.

2.07 AUXILIARY LOCKS (DEADBOLTS)

- 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): Comply 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.

2.08 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: Comply 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. At outswinging exterior doors, mount closer on interior side of door.
4. Provide adapter plate where required.

2.09 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: Comply with BHMA A156.16, Grade 3 and Resilient Material Retention Test as described in this standard.
 1. Provide wall stops to prevent damage to wall surface upon opening door.
 2. Type: Bumper, concave, wall stop.
 3. Material: Stainless steel spring with vinyl cap.

2.10 THRESHOLDS

- A. Manufacturers:
 1. Pemko; an Assa Abloy Group company: www.assaabloydss.com.
 2. Hager Companies: www.hagerco.com.
 3. National Guard Products, Inc: www.ngpinc.com.
- B. Thresholds: Comply 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.

2.11 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.

2.12 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.

2.13 KEY CONTROL SYSTEMS

- A. Key Control Systems: Comply with guidelines of BHMA A156.28.

1. Provide keying information in compliance with DHI (KSN) standards.
2. Keying: All locks Master keyed.
 - a. Provide separate master keyways for residential and lease tenant locks.
3. Supply keys in following quantities:
 - a. 4 each Master keys.
 - b. 2 each Keys for each keyed core.

2.14 FINISHES

- A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
 1. Primary Finish: 619; satin nickel plated, clear coated, with brass or bronze base material; 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: 36 inch.
 - b. Deadlocks (Deadbolts): 41-1/2 inch.
 - c. Door Viewer: accessible unit height 42 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.
- B. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

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. Do not permit adjacent work to damage hardware or finish.

PART 4 SCHEDULES

4.01 HARDWARE SETS

- A. Refer to drawings for specific requirements at Storm shelter door.
- B. Group No 01: Dwelling Unit - Entry Doors
1. Provide self-closing spring hinges at 20-minute fire-rated doors opening onto corridors.
 - 3 EA Hinges - 3-1/2 inch x 3-1/2 inch
 - 1 EA Dead latch - single cylinder w/ thumb turn
 - 1 EA Passage Leverset
 - 1 EA Viewer (peephole) (2 ea. at accessible dwelling units)
 - 1 EA Wall-mounted Stop
- C. Group No 02: Dwelling Unit - Interior Door to Garage
1. Keyed to Dwelling Unit Entry Door.
 - 3 EA Hinges - 3-1/2 inch x 3-1/2 inch
 - 1 EA Locking Leverset
 - 1 EA Wall-mounted Stop
- D. Group No 03: Dwelling Unit - Bedroom and Bath Doors
- 3 EA Hinges - 3-1/2 inch x 3-1/2 inch
 - 1 EA Privacy Leverset w/ push-button latching
 - 1 EA Wall-mounted Stop
- E. Group No 04: Closet Double Swing Doors - Dwelling Unit
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 05: School Building Entry Door - Door 104
1. Electric strike controlled at reception desk
 - 3 EA Hinges - 3-1/2 inch x 3-1/2 inch
 - 1 EA Exit devise w/ exterior keyed lever
 - 1 EA Electric Strike
 - 1 EA Closer
- G. Group No 06: School Building Entry Doors - Doors 105, 120, 122
1. Provide one powered panic bar for each pair controlled by exterior proximity reader.
 - 6 EA Hinges - 3-1/2 inch x 3-1/2 inch
 - 1 EA Exit Devise (Panic bar) w/ head/floor bolts and exterior lever
 - 1 EA Powered Exit Devise w/ head/floor bolts and exterior keyed lever
 - 1 EA Proximity Reader
 - 2 EA Closer
- H. Group No 07: Community Building - Entry Doors
- 3 EA Hinges - 3-1/2 inch x 3-1/2 inch
 - 1 EA Dead latch - double cylinder
 - 1 EA Passage Leverset

1 EA Closer

I. Group No 08: Community Building Stair Tower - Egress Doors

1. Provide Fire-rated hardware.
2. Provide keyed lever at exterior egress door.

3 EA Hinges - 3-1/2 inch x 3-1/2 inch
1 EA Exit devise w/ lever handle on pull side
1 EA Closer

J. Group No 09: Common Area - Public Toilet Room Doors

3 EA Hinges - 3-1/2 inch x 3-1/2 inch
1 EA Privacy Leverset w/ push-button latching
1 EA Wall-mounted Stop

K. Group No 10: Common Area - Secure Interior Doors

1. Provide also Dead Latch - Single cylinder w/ thumb turn at Office door.

3 EA Hinges - 3-1/2 inch x 3-1/2 inch
1 EA Locking Leverset
1 EA Closer

L. Group No 11: Incubator Space - Entry Door

3 EA 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 Closer

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. Acoustic insulation.
- C. Gypsum sheathing.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Textured finish system.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 07 84 00 - Firestopping: Penetrations at fire rated walls.
- C. Section 09 22 16 - Non-Structural Metal Framing.

1.03 REFERENCE STANDARDS

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- C. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- D. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- E. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- F. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- G. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2013a.
- H. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014a.
- I. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.
- J. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2013.
- K. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- L. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- M. GA-216 - Application and Finishing of Gypsum Board; 2013.
- N. 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 Walls: UL listed assembly No. U419; One hour rating.
 - 2. Fire Rated Roof/Ceiling Assemblies: UL listed assembly No. P556; One (1) hour fire rating.
 - 3. Fire-Rated Dwelling Unit Separation Walls: UL listed assembly No. U341 & U493; One (1) hour rating as indicated on drawings.
 - 4. Fire-Rated Floor/Ceiling Assemblies: UL listed assembly No. L550; One (1) hour rating.
 - 5. 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 shall be used in tub/shower alcoves.
 - 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. Thickness:
 - a. Vertical Surfaces: 5/8 inch, or as indicated.
 - b. Ceilings: 5/8 inch.
 - 5. Paper-Faced Products:
 - a. American Gypsum Company; ClassicRoc Gypsum Wallboard.
 - b. American Gypsum Company; FireBloc Type X Gypsum Wallboard.
 - c. American Gypsum Company; FireBloc Type C Gypsum Wallboard.
 - d. Georgia-Pacific Gypsum; ToughRock.
 - e. Georgia-Pacific Gypsum; ToughRock Fireguard X.
 - f. Georgia-Pacific Gypsum; ToughRock Fireguard C.
 - g. National Gypsum Company; Gold Bond Brand Gypsum Wallboard.
 - h. National Gypsum Company; Gold Bond Brand Fire-Shield Gypsum Board.
 - i. USG Corporation; Sheetrock Brand Gypsum Wallboard.
 - j. USG Corporation; Sheetrock Brand Firecode X.
 - 6. Mold Resistant Paper Faced Products:
 - a. American Gypsum Company; M-Bloc.
 - b. American Gypsum Company; M-Bloc Type X.
 - c. American Gypsum Company; M-Bloc Type C.
 - d. CertainTeed Corporation; M2Tech 1/2" Moisture & Mold Resistant Drywall.
 - e. CertainTeed Corporation; M2Tech 5/8" Type C Moisture & Mold Resistant Drywall.
 - f. CertainTeed Corporation; M2Tech 5/8" Type X Moisture & Mold Resistant Drywall.
 - g. Georgia-Pacific Gypsum; ToughRock Mold-Guard.
 - h. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard.
 - i. National Gypsum Company; Gold Bond XP Gypsum Board.

- j. USG Corporation; Sheetrock Brand Mold Tough (Firecode X).
- C. Abuse Resistant Wallboard:
- 1. Application: Fire upgrade to historic Dwelling Unit entry doors.
 - 2. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
 - 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 4. Glass Mat-Faced Type: Gypsum wallboard, as defined in ASTM C1658/C1658M.
 - 5. Type: Fire-resistance-rated Type X, UL or WH listed.
 - 6. Thickness: 3/8 and 5/8 inch as indicated on drawings.
 - 7. Edges: Square.
 - 8. Glass Mat Faced Products:
 - a. Georgia-Pacific Gypsum; DensArmor Plus Abuse-Resistant: www.gpgypsum.com.
 - b. National Gypsum Company; Gold Bond eXP Interior Extreme AR Gypsum Panel: www.nationalgypsum.com.
 - c. USG Corporation; USG Sheetrock Brand Glass-Mat Panels Mold Tough AR Firecode X: www.usg.com.
- D. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
- 1. Application: Exterior window opening infill, unless otherwise indicated.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Fungal Resistance: No fungal growth when tested in accordance with ASTM G21.
 - 4. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
 - 5. Core Type: Regular.
 - 6. Regular Board Thickness: 1/2 inch.
 - 7. Edges: Square.
 - 8. Glass Mat Faced Products:
 - a. American Gypsum Company; M-Glass 1/2" Exterior Sheathing: www.americangypsum.com.
 - b. Georgia-Pacific Gypsum; DensGlass Sheathing: www.gpgypsum.com.
 - c. National Gypsum Company; Gold Bond eXP Sheathing: www.nationalgypsum.com.
 - d. USG Corporation; USG Securock Brand Ultralight Glass-Mat Sheathing: www.usg.com.
- E. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.
- 1. Paper-Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Paper-Faced Products:
 - a. American Gypsum Company; M-Bloc Shaft Liner: www.americangypsum.com.
 - b. Georgia-Pacific Gypsum; ToughRock Shaftliner: www.gpgypsum.com.
 - c. National Gypsum Company; Gold Bond Fire-Shield Shaftliner XP: www.nationalgypsum.com.

2.03 GYPSUM WALLBOARD ACCESSORIES

- A. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, 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. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
 - b. Stockton Products; Metal: www.stocktonproducts.com/#sle.
 - c. Trim-tex, Inc: www.trim-tex.com/#sle.
- B. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
- 1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 2. Joint Compound: Drying type, vinyl-based, ready-mixed.

- C. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- D. 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 SHAFT WALL INSTALLATION

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
 - 1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches on center.
 - 2. Install studs at spacing required to meet performance requirements.
- B. Shaft Wall Liner: Cut panels to accurate dimensions and install sequentially between special friction studs.

3.03 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Studs: Space studs as indicated.
 - 1. Extend partition framing to structure in all locations.
 - 2. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
- C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- D. Standard Wall Furring: Install at masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
- E. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
- F. Furring for Fire-Resistance Ratings: Install as required for fire-resistance ratings indicated U.L. requirements.
- G. Blocking: Install wood blocking for support of:
 - 1. Framed openings.
 - 2. Wall-mounted cabinets.
 - 3. Toilet accessories.
 - 4. Wall-mounted door hardware.

3.04 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

3.05 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 Nonrated: 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-Resistance-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. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
- F. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.

3.06 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.

3.07 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- B. 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-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. 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 are not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.

3.08 TEXTURE FINISH

- A. Apply finish texture coating by means of trowel in accordance with manufacturer's instructions.
- B. Texture finish on walls and ceilings: "Light Texture"

3.09 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 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal partition, ceiling, and soffit framing.
- B. Framing accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking within stud framing.
- B. Section 07 21 00 - Thermal Insulation: Acoustic insulation.
- C. Section 07 84 00 - Firestopping: Sealing top-of-wall assemblies at fire-resistance-rated walls.
- D. Section 09 21 16 - Gypsum Board Assemblies: Metal studs for gypsum board partition 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. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- C. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- D. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.
- C. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing, Connectors, and Accessories:
 - 1. ClarkDietrich: www.clarkdietrich.com.
 - 2. Jaimes Industries: www.jaimesind.com.
 - 3. SCAFECO Corporation: www.scafco.com.
 - 4. Simpson Strong Tie: www.strongtie.com.
 - 5. The Steel Network, Inc: www.SteelNetwork.com.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FRAMING MATERIALS

- A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
 - 1. Studs: C shaped with knurled or embossed faces.
 - 2. Shaft-wall studs: C-H shaped with knurled or embossed faces; For Fire-rated walls tight to existing corridors.
 - 3. Runners: U shaped, sized to match studs.
 - 4. Ceiling Channels: C shaped.
 - 5. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
 - 6. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.
- B. Partition Head to Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and braced with continuous bridging on both sides.
- C. Non-Loadbearing Framing Accessories:

1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
2. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
3. Fasteners: ASTM C1002 self-piercing tapping screws.
4. Anchorage Devices: Drilled expansion bolts.
5. Acoustic Insulation: As specified in Section 07 21 00.

PART 3 EXECUTION

3.01 INSTALLATION OF STUD FRAMING

- A. Extend partition framing to structure where indicated and to ceiling in other locations.
- B. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
- C. Align and secure top and bottom runners at 24 inches on center.
- D. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
- E. Align stud web openings horizontally.
- F. Secure studs to tracks using crimping method. Do not weld.
- G. Fabricate corners using a minimum of three studs.
- H. Install double studs at wall openings, door and window jambs, not more than 2 inches from each side of openings.
- I. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.
- J. Furring: Install at spacing and locations shown on drawings. Lap splices a minimum of 6 inches.

END OF SECTION

SECTION 09 23 00
GYP SUM PLASTERING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Gypsum plastering.

1.02 REFERENCE STANDARDS

- A. ASTM C28/C28M - Standard Specification for Gypsum Plasters; 2010 (Reapproved 2015).
- B. ASTM C35 - Standard Specification for Inorganic Aggregates for Use in Gypsum Plaster; 2001 (Reapproved 2014).
- C. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring; 2003 (Reapproved 2013).
- D. ASTM C842 - Standard Specification for Application of Interior Gypsum Plaster; 2005 (Reapproved 2015).

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide data on plaster materials, characteristics, and limitations of products specified.

PART 2 PRODUCTS

2.01 PLASTER MATERIALS

- A. Ready-Mixed Gypsum Plaster: ASTM C28/C28M; mill-mixed type, requiring only the addition of water.
- B. Aggregate for Base Coats: ASTM C35; sand and lightweight aggregates.
- C. Ready-Mixed Finishing Plaster: Gypsum/Lime putty type, ASTM C28/C28M; mixture of gauging plaster and lime.

2.02 LATH AND ACCESSORIES

- A. Finishing Accessories: ASTM C841, extruded aluminum alloy (6063 T5), unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
- B. Beads, Screeds, Joint Accessories, and Other Trim: Depth governed by plaster thickness, maximum possible lengths.
 - 1. Material: Formed aluminum, solid flanges.
- C. Strip Mesh: Expanded metal lath, minimum 0.018 inch thick, 2 inch wide by 24 inch long; galvanized.
- D. Fasteners: Nails, staples, or other approved metal supports, of type and size to suit application, to rigidly secure accessories in place.

2.03 PLASTER MIXES

- A. Over Metal Lath: Three-coat application, ready-mixed plaster, mixed and proportioned in accordance with ASTM C842 and manufacturer's instructions.
- B. Ready-Mixed Plaster Materials: Mix in accordance with manufacturer's instructions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing conditions are satisfactory before starting work.
- B. Grounds and Blocking: Verify items within walls for other sections of work have been installed.
- C. Metal Lath and Accessories: Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are in place.

3.02 PREPARATION

- A. Remove loose or damaged plaster back to solid material. Remove existing paint and finishes surrounding areas to be repaired and bevel surface for feathering of new patch.

3.03 INSTALLATION - GYPSUM LATH AND ACCESSORIES

- A. Install gypsum lath in accordance with ASTM C841.
- B. Install gypsum lath perpendicular to framing members, with lath face exposed. Stagger end joint of alternate courses. Butt joints tight. Maximum gap allowed: 1/8 inch.
- C. Place corner reinforcement diagonally over gypsum lath and across corner immediately above and below openings. Secure to gypsum lath only.
- D. Continuously reinforce internal angles with corner mesh, return 3 inches from corner to form the angle reinforcement; fasten at perimeter edges only.
- E. Place corner bead at external wall corners; fasten at outer edges of lath only.
- F. Place strip mesh diagonally at corners of lathed openings. Secure rigidly in place.
- G. Place 4 inch wide strips of strip mesh centered over junctions of dissimilar backing materials. Secure rigidly in place.
- H. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.

3.04 PLASTERING

- A. Apply gypsum plaster in accordance with ASTM C842 and manufacturer's instructions.
- B. Thickness of Plaster including Finish Coat:
 - 1. Over metal lath: 5/8 inch.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.
- D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- F. CHPS (HPPD) - High Performance Products Database; Current Edition at www.chps.net/.
- G. UL (GGG) - GREENGUARD Gold Certified Products; current listings at <http://productguide.ulenvironment.com/QuickSearch.aspx>.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- D. Certification: Manufacturer's certification that products comply with specified requirements, including reports indicating compliance with specified tests and standards. For acoustical performance, each carton of acoustical units must carry an approved laboratory classification of NRC, CAC, and AC.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.05 QUALITY ASSURANCE

1.06 FIELD CONDITIONS

- A. Standard Ceilings: Do not install interior ceilings until space is enclosed, weatherproof, and all wet work in place is completed and nominally dry.
- B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.07 WARRANTY

- A. Refer to Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Provide manufacturer's standard written ten-year limited warranty to repair or replace components due to failure caused defects in material or factory workmanship.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION:

- A. Continuous/Wall to Wall, seismically reinforced.

2.02 MANUFACTURERS

- A. Manufacturers:
 - 1. Armstrong World Industries, Inc: www.armstrongceilings.com.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. USG Corporation: www.usg.com/ceilings.
 - 4. Or approved equal.
- B. Suspension Systems:
 - 1. Armstrong World Industries, Inc: www.armstrongceilings.com/#sle.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. Chicago Metallic/Rockfon, LLC: www.rockfon.com.
 - 4. USG Corporation: www.usg.com/ceilings/#sle.

2.03 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
 - 1. VOC Content: Certified as Low Emission by one of the following:
 - a. Product listing in UL (GGG).
 - b. Product listing in CHPS (HPPD).
 - 2. Fire Classification: Class A in accordance with ASTM E84:
 - a. Flame spread: 25 maximum.
 - b. Smoke generated: 50 maximum.
 - 3. Dimensional Stability: Panels shall remain unaffected by temperatures to 120 degrees F and relative humidity levels of 100 percent.
- B. Acoustical Panels, Type ____: Mineral fiber with membrane-faced overlay, with the following characteristics:
 - 1. Classification: ASTM E1264 Type IV.
 - a. Form: 2, water felted.
 - b. Pattern: "E" - lightly textured.
 - 2. Size: 24 by 24 inches.
 - 3. Thickness: 3/4 inch.
 - 4. Light Reflectance: 0.88 percent, determined in accordance with ASTM E1264.
 - 5. Panel Edge: Beveled Tegular.
 - 6. Color: White.
 - 7. Suspension System: Exposed grid.
 - 8. Products:
 - a. Armstrong World Industries, Inc; Ultima: www.armstrongceilings.com.
 - b. Or approved equal.

2.04 SUSPENSION SYSTEM(S)

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
- B. Exposed Suspension System: Hot-dipped galvanized steel grid with aluminum cap.
 - 1. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
 - 2. Profile: Tee; 9/16 inch face width.
 - 3. Finish: Baked enamel.
 - 4. Color: White.
 - 5. Products:
 - a. Armstrong World Industries, Inc; Suprafine: www.armstrongceilings.com.
 - b. Or approved equal.

2.05 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.
- C. Perimeter Moldings: Same material and finish as grid; size and type to suit application, and seismic requirements.
 - 1. Size: As required for installation conditions.
 - 2. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
- D. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify all work above ceilings is complete.
- C. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Overlap and rivet corners.
- E. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- E. Cutting Acoustical Units:
 - 1. Cut to fit irregular grid and perimeter edge trim.
 - 2. Make field cut edges of same profile as factory edges.
 - 3. Double cut and field paint exposed reveal edges.
- F. Where round obstructions occur, provide preformed closures to match perimeter molding.
- G. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

3.04 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. 03 35 11 - Concrete Floor Finishes: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.
- C. Section 03 54 00 - Cast Underlayment: Leveling uneven existing floors.

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 F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2014).
- D. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2013a.
- E. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.
- F. ASTM F2169 - Standard Specification for Resilient Stair Treads; 2015.
- G. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.
- H. 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 Architect's initial selection.
- D. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor 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. Extra Flooring Material:
 - a. Community Building: Amount equal to 5 percent of each type and color.
 - b. Dwelling Unit Buildings: Amount equal to 10 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. 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 TILE FLOORING

- A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness.
 - 1. Manufacturers:
 - a. Armstrong Flooring, Inc; Standard Execelon Imperial Texture: www.armstrongflooring.com.
 - b. Congoleum Corporation; Alternatives: www.congoleum.com.
 - c. Johnsonite, a Tarkett Company; AZROCK - VCT: www.johnsonite.com.
 - 2. Minimum Requirements: Comply with ASTM F1066, 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. Size: 12 by 12 inch.
 - 5. VOC Content Limits: As specified in Section 01 61 16.
 - 6. Thickness: 0.125 inch.
 - 7. Color: To be selected by Owner from manufacturer's full range.
- B. Luxury Vinyl Plank: Printed film type, with transparent or translucent wear layer, floating floor.
 - 1. Manufacturers:
 - a. Burke Flooring; Luxury Vinyl Planks: www.burkeflooring.com.
 - b. Shannon Specialty Floors, Inc; Technoflor - Icon: www.shannonspecialtyfloors.com.
 - c. 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: 4 by 36 inch minimum.
 - 6. Wear Layer Thickness: 0.020 inch.
 - 7. Total Thickness: 0.177 inch.
 - 8. Pattern and Color: To be selected by Owner from manufacturer's standard range.
 - a. Wood Grain patterns not allowed on the ground floor of the historic buildings per Historic Preservation requirements.

2.02 STAIR COVERING

- A. Stair Treads: Rubber; full width and depth of stair tread in one piece; tapered thickness.
 - 1. Manufacturers:
 - a. Burke Flooring; Endura Stair Treads: www.burkeflooring.com.
 - b. Johnsonite, a Tarkett Company; Angle Fit: www.johnsonite.com.
 - c. Or approved equal.
 - 2. Minimum Requirements: Comply with ASTM F2169, Type TP, rubber, thermoset.
 - 3. Nominal Thickness: 0.1875 inch.
 - 4. Nosing: Square.
 - 5. Striping: 2 inch wide contrasting color abrasive strips.
 - 6. Texture: Ribbed.
 - 7. Color: As selected by Owner.
- B. Stair Risers: Full height and width of tread in one piece, matching treads in material and color.
 - 1. Thickness: 0.080 inch.

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 Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
 - 1. Test as Follows:
 - a. Alkalinity (pH): ASTM F710.
 - b. Moisture Vapor Emission: ASTM F1869.
 - 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 subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor 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 subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
 - 1. Spread only enough adhesive to permit installation of materials before initial set.
 - 2. Fit joints and butt seams tightly.
 - 3. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- E. 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.
- F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- G. Install flooring in recessed floor access covers, maintaining floor pattern.

3.04 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.

3.05 INSTALLATION - STAIR COVERINGS

- A. Adhere over entire surface. Fit accurately and securely.

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 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- 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. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Exposed surfaces of steel lintels and ledge angles.
 - 3. Galvanized roof flashings and drip edges.
 - 4. 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 09 91 23 - Interior Painting.

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 D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2015.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- D. SSPC-SP 1 - Solvent Cleaning; 2015.
- E. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).
- F. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.04 SELECTION AND REVIEW OF MATERIALS

- A. Coordinate selection and approval of colors and sheens with Historic Preservation consultant.

1.05 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. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.

1.06 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.

1.07 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.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
- 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.

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/#sle.
 2. Benjamin Moore Paints: www.benjaminmoore.com.
 3. PPG Paints: www.ppgpaints.com/#sle.
 4. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

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 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.
- C. 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.
- D. 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. Interior/Exterior Latex Block Filler.
 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 1,500 psi at 6 to 12 inches. Allow to dry.
- G. Engineered Wood Siding: Remove dirt, dust and other foreign matter with a stiff fiber brush. Do not coat surfaces if moisture content 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. 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. 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.
- 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. 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 06 20 00 - Finish Carpentry.
- D. Section 09 21 16 - Gypsum Board Assemblies.
- E. Section 09 91 13 - Exterior Painting.

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 D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2012).
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2015.
- D. SSPC-SP 1 - Solvent Cleaning; 2015.
- E. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
- F. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015); 2003.

1.04 SELECTION AND REVIEW OF MATERIALS

- A. Coordinate selection and approval of colors and sheens with Historic Preservation consultant.

1.05 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. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.

1.06 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.

1.07 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.

1.08 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. 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/#sle.
 2. Benjamin Moore Paints: www.benjaminmoore.com.
 3. Diamond Vogel Paints: www.diamondvogel.com/#sle.
 4. PPG Paints: www.ppgpaints.com/#sle.
 5. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

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.

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 adequately 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 affect 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. Plaster and Stucco: 12 percent.
 3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 4. 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. Concrete:
 1. Clean concrete according to ASTM D4258. Allow to dry.
 2. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- H. Masonry:
 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content, 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.
- I. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- J. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- K. 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.
- L. 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.
- 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. 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. Interior directional and informational signs.
- C. Emergency evacuation maps.
- D. Building Identification signs.
- E. Dwelling Unit identification signs.
- F. Egress Door signage.

1.02 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.
- D. UFAS - Uniform Federal Accessibility Standards - HUD 24 CFR part 40; 1984.

1.03 SELECTION AND REVIEW OF MATERIALS

- A. Coordinate selection of materials with Historic Preservation consultant.

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 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, UFAS, 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. Room Doors: Identify with room names as scheduled.
 6. Public Toilet Room(s): Identify with pictograms, "MEN" and "WOMEN", International accessibility symbol, and braille.
- C. Interior Directional and Informational Signs:
 1. Sign Type: Same as room and door signs.
 2. Sizes: As required to accommodate text.
 3. Allow for one sign per elevator lobby.
 4. Wording of signs to be determined by Owner.
- D. Egress Door Signs:
 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".
- E. Occupant Load Sign, Community Building: Shall be as required by the Local Fire Marshal, or Local Authority having Jurisdiction.
- F. Storm Shelter and Emergency Evacuation Signs:
 1. Refer to Scope of Work notes: "Attachment 12".
 2. Allow for one evacuation sign per elevator lobby, and as required at shelter.
 3. Map content to be provided by Owner.
- G. Building Identification Signs:
 1. Sign Type: Dimensional Letters and Numbers, 4 inch high minimum; wall-mounted.
 2. Material: plastic letters & numbers.
 3. Install at building exteriors as directed by Owner
- H. Dwelling Unit Identification Signs:
 1. Sign Type: Flat signs with raised panel media as specified.
 2. Material: Fiberglass or Photopolymer signs.
 3. Mounting: Concealed Fasteners.
 4. Install on outside wall at apartment entries as directed or 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 DIMENSIONAL LETTERS

- A. Plastic Letters:
1. Mounting: Tape adhesive.

2.07 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 Date of Substantial Completion; repair or replace damaged items.

PART 4 SCHEDULES - SEE NEXT PAGE

4.01 FLAT AND TACTILE SIGNAGE SCHEDULE

- A. In addition to signs listed below, coordinate with Owner for text and total required number of Tenant / Office / Directional signs.
- B. Refer to Drawings for FEMA / Storm Shelter signage requirements.

DESCRIPTION/TEXT	LOCATION	QUANTITY
DIMENSIONAL NUMBERS / LETTERS		
Building Unit Numbers	Exterior	1 per Bldg
FLAT SIGNS		
Dwelling Unit Number	Interior	1 per Unit
Directional Signs (text coordinated with Owner)	Interior	2 per Floor
TACTILE SIGNS		
Community Room	Interior	1
Fitness Center	Interior	1
Kitchen	Interior	1
Women (with international accessibility symbol) (CB)	Interior	1
Men (with international accessibility symbol) (CB)	Interior	1
Toilet (w/ international unisex and accessibility symbols)	Interior	1
Stairs (outside CB stairway adjacent to door)	Interior	1 per Floor
Stairs (outside CB stairway adjacent to door)	Exterior	1
Ground Floor (inside CB stairway at ground floor landing)	Interior	1
2nd Floor (inside CB stairway at 2nd floor landing)	Interior	1
Community Building	Exterior	2
Salon	Exterior	1
Office	Interior	1
Podcast Sound Room	Interior	1
Conference Room	Interior	1
Mechanical Closet	Interior	2
Maintenance	Exterior	1

END OF SECTION

SECTION 10 28 00
TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Accessories for Dwelling Unit Bathrooms and Public Toilet Rooms.
- 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. Provide products of each category type by single 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.
- 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: Folded paper type, stainless steel, surface-mounted, with viewing slots on sides as refill indicator and tumbler lock.
 - 1. Capacity: 400 multifold minimum.
 - 2. Product: Model # B262 manufactured by Bobrick, 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: As indicated on 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, textured surface.
 - 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. Towel Bar: Solid brass, nickel-plated.
 - 1. Finish: Satin.
 - 2. Length: 24 inches.
 - 3. Product: Candlestick Park #2224 manufactured by Better Homes Products, or equal.
- G. 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.
- H. 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.

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 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, measured from floor 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.

PART 4 ACCESSORY SCHEDULES

4.01 PUBLIC TOILET ROOMS

Qty	Description	Model #	Mfr
1	Toilet Paper Holder; surface-mounted	#2209	BHP
1	Paper Towel Dispenser; surface-mounted	#B262	Bobrick
1	Mirror; size as indicated	----	----
1	Grab Bar; 42 inch	BR832-00142	Bradley
1	Grab Bar; 36 inch	BR832-00136	Bradley
1	Grab Bar; 18 inch	BR832-00118	Bradley
1	Coat Hook; door-mounted, typical height	#2202	BHP

4.02 TYPICAL DWELLING UNIT BATHROOMS

Qty	Description	Model #	Mfr
1	Toilet Paper Holder; surface-mounted	#2209	BHP
1	Mirror; size as indicated	---	---
1	Shower Curtain Rod	B-207	Bobrick
1	Towel Bar; 24 inch	#2224	BHP
1	Towel Ring	#2204	BHP
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:

Qty	Description	Model #	Mfr
1	Grab Bar; 42 inch (toilet)	BR832-00142	Bradley
1	Grab Bar; 36 inch (toilet)	BR832-00136	Bradley
Grab bars in prefabricated tub/shower enclosures to be factory-installed			
1	Robe Hook; accessible height	#2202	BHP

END OF SECTION

SECTION 10 55 00
POSTAL SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Central mail delivery boxes.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Blocking for recessed mailbox units.
- B. Section 09 21 16 - Gypsum Board Assemblies.

1.03 REFERENCE STANDARDS

- A. 39 CFR 111 - U.S. Postal Service Standard 4C; effective date September 3, 2006.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

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. 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 master door, single-column design, 7 customer compartments, 1 outgoing mail compartment, and 1 parcel compartment.
 - a. Florence Manufacturing Company; Model # 4C14S-07.
 - 2. Unit B - School House: Front-loading with pair of master doors, double-column design, 15 customer compartments, 1 outgoing mail compartment, and 2 parcel compartments.
 - a. Florence Manufacturing Company; Model # 4C14D-15.
 - b. Quantity: 1 Unit
 - 3. Unit C - School House: 2 parcel compartments, front-loading, single-column design.
 - a. Florence Manufacturing Company; Model # 4C14S-2P.
 - b. Quantity: 1 Unit
- D. Enclosure-mounted Mailboxes: Complying with 39 CFR 111 (USPS-STD-4C); with matching exterior, free-standing, weatherproof enclosure.
 - 1. Unit D: Front-loading with pair of master doors, double-column design, 9 customer compartments, 1 outgoing mail compartment, and 2 parcel compartments.

- a. Florence Manufacturing Company; Model # 4CADD-09-D.
- b. Quantity: 4 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.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Coordinate location of postal specialties with local USPS District authority.
- 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 or storage system.

1.03 SUBMITTALS

- A. 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, Inc; Wire Closets: www.rubbermaidpro.com.

2.02 WIRE STORAGE SHELVING SYSTEMS

- A. Applications:
 - 1. Shelf Depth: 12 inches, unless otherwise indicated.
 - 2. Bedroom Closets:
 - a. Wall-to-wall shelf with free sliding hanger rod.
 - b. Provide intermediate bracing for shelves longer than 36 inches.
 - 3. Coat Closets:
 - a. Wall-to-wall shelf with integral hanger rod.
 - b. Provide intermediate bracing for shelves longer than 36 inches.
 - 4. Linen and Pantry Shelving:
 - a. Wall-to-wall shelves spaced as shown on the drawings, not less than 16 inch deep.
- B. Wire Shelving: Factory-assembled coated wire mesh shelf assemblies for wall-mounting, with 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 surfaces.
 - 3. PVC Coating: 9 to 11 mils thick.
 - 4. Epoxy Coating: Nontoxic epoxy-polyester powder coating baked-on finish, 3 to 5 mils thick.
 - 5. Standard Mesh Shelves: Cross deck wires spaced at 1 inch.
 - 6. Close-Mesh Shelves: Cross deck wires spaced at 1/2 inch.
 - 7. Shelf and Rod Units: Integral hanging rod at front edge of shelf.
 - 8. Free-Sliding Hanging Rod: Integral hanging rod that permits uninterrupted sliding of hangers the full width of the shelf.

- C. Hanging Rod: Tubular steel, 1 inch diameter, with end caps on open ends.
 - 1. Finish: Epoxy powder coat.
 - 2. Wall Thickness: 20 gauge, 0.035 inch.
- D. Wall-Mounted Standards for Wire Shelving: Vertically slotted channel standards with double-tab cantilever brackets to suit shelving; factory finished to match shelving.
- E. Mounting Hardware for Wire Shelving: 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.
- F. Fasteners: As recommended by manufacturer for mounting substrates.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect areas to receive shelving or storage system, 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 wire shelving 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:
 - a. Typical Dwelling Units Install shelf at 68 inches above floor.
 - b. Accessible Dwelling Unit(s) install shelf at 48 inches maximum 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. Residential and Commercial Laundry appliances.

1.02 RELATED REQUIREMENTS

- A. Section 12 35 30 - Residential Cabinets and Countertops: Installation of appliances in casework.

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 Unit: Free-standing, top-mounted freezer, and frost-free.
 - 1. Capacity: Total minimum storage of 15.0 cubic ft; minimum 25 percent freezer capacity.
 - 2. Energy Usage: Energy Star Rated.
 - 3. Features: Include glass shelves, automatic icemaker, 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 15.0 cubic ft; minimum 29 percent freezer capacity.
 - 2. Energy Usage: Energy Star Rated.
 - 3. Features: Include glass shelves, automatic icemaker, 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 Unit: Electric, free-standing, with plug-in heating elements 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 plug-in heating elements 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, and anti-tip restraint.
 6. Exterior Finish: Porcelain enameled steel, color as selected by Owner.
 7. Manufacturers:
 - a. To be selected by Owner.
- F. Cooking Exhaust, Accessible Dwelling Unit: Range hood; fan and light wired to wall switches. Refer to drawings for switch heights.
1. Size: 30 inches wide.
 2. Fan: Two-speed, 220 cfm
 3. Exhaust: Ducted, match existing connections.
 4. Features: Include cooktop light and removable grease filter.
 5. Exterior Finish: Painted steel, color as selected by Owner.
 6. Manufacturers:
 - a. To be selected by Owner.
- G. Microwave/Hood, Typical Dwelling Units: Over-the-range, microwave/hood combination.
1. Capacity: 1.7 cubic ft.
 2. Power: 850 watts.
 3. Exhaust: Ducted, match existing connections.
 4. Features: Include turntable, cooktop light, night light, 2-speed exhaust fan, built-in trim kit, and undercabinet mounting kit.
 5. Exterior Finish: Painted steel, color as selected by Owner.
 6. Manufacturers:
 - a. To be selected by Owner.
- H. Microwave, Accessible Dwelling Units: Countertop.
1. Capacity: 0.7 cubic ft.
 2. Power: 1000 watts.
 3. Height: 12 inches maximum.
 4. Features: Include turntable.
 5. Exterior Finish: Painted steel, color as selected by Owner.
 6. Manufacturers:
 - a. To be selected by Owner.
- I. Dishwasher, Accessible Dwelling Unit: 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.
- K. Grease Shield: Wall-mounted backsplash type; countersunk screw attachment.
1. Material: Aluminum.
 2. Width: To match width of range.
 3. Finish: Brushed.

2.02 RESIDENTIAL LAUNDRY APPLIANCES

- A. Provide Equipment Eligible for Energy Star Rating.
- B. Clothes Washer, Accessible Dwelling Unit: Front-loading.
1. Size: Large capacity.
 2. Controls: Solid state electronic.
 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, end of cycle signal, and accessible front-mounted controls.
 6. Finish: Painted steel, color white.
 7. Provide one (1) Accessible washer, minimum; Front-loading with front-mounted controls.
 8. Manufacturers:
 - a. To be selected by Owner.
- C. Clothes Dryer, Accessible Dwelling Unit: Electric.
1. Size: Large capacity.
 2. Controls: Solid state electronic, 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, end of cycle signal, and accessible front-mounted controls.
 6. Finish: Painted steel, color white.
 7. Provide one (1) Accessible dryer, minimum; with front-mounted controls.
 8. Manufacturers:
 - a. To be selected by Owner.
- D. Combination Clothes Washer/Dryer, Typical Dwelling Units, Electric, Stacked.
1. Size: Compact.
 2. Controls: Solid state electronic.
 3. Cycles: Include normal, permanent press, delicate, and soak.
 4. Temperature Selections: Four.
 5. Finish: Painted steel, color as selected by Owner.
 6. 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. Concrete footings for playground equipment.
- C. Playground equipment.
- D. Protective Ground cover.

1.02 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 B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- G. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2016a.
- H. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test; 2005 (Reapproved 2011).
- I. ASTM D6662 - Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards; 2013.
- J. ASTM F1487 - Standard Consumer Safety Performance Specification for Playground Equipment for Public Use; 2011.
- K. ASTM F2075 - Standard Specification for Engineered Wood Fiber for Use as a Playground Safety Surface Under and Around Playground Equipment; 2015.
- L. CPSC Pub. No. 325 - Public Playground Safety Handbook; 2010.

1.03 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.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: For 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.
- C. 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.
- D. Samples: For each item that a color must be selected, provide color chart showing full range of colors and finishes.
- E. 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.
- F. 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 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.

1.06 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.

1.07 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 compliance with design criteria, this information is provided for Contractor's information.
 - 1. Provide four (4) pieces, plus multiple-play structure.
 - 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 equipment on concrete footings, unless otherwise indicated.
 - 1. Playground protective surfacing constitutes a resilient layer installed over subgrade; locate top of footings and anchorage devices below surface of 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 PLAYGROUND EQUIPMENT

- A. Comply with ASTM F1487 and CPSC Pub. No. 325; provide equipment complying with specified requirements for relevant age group(s).
 - 1. Provide components having factory-drilled holes; do not use components with extra holes that will not be filled by hardware or covered by other components.
- B. Single-Axis (To-and-Fro) Swings: Single-user swings seats suspended from steel chains.
 - 1. Location: As indicated on drawings.
 - 2. Seats - Ages Five to Twelve: Standard swing seat molded of rubber or polyurethane with encapsulated steel reinforcement. Provide two swings for each swing bay.

3. Height to Pivot Point - Ages Five to Twelve: 84 inches.
- C. Spring Rockers: Designed for seated riders, maximum weight limit 120 pounds, seats designed to accommodate intended number of users only.
 1. Fall Height: 24 inches.
 2. Material: steel with fiberglass shell.
 3. Color: Select from manufacturer's standard color palette.
- D. Slides: Slide bed, stair with handrails, and platform.
 1. Slide Bed: Rigid, molded ultraviolet stabilized polyethylene.
 2. Treads and Handrails: Galvanized steel with stringers of galvanized steel.
 3. Fall Height - Ages Five to Twelve: 60 inches, maximum.
 4. Width: 14 inches.
 5. Maximum Slope: 1:3.4.
 6. Supports and Platform: Galvanized steel with PVC coating.
 7. Color: As selected from manufacturer's standard color palette.

2.04 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.

2.05 MATERIALS

- A. Steel Pipe and Tube: Comply with 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. Chain: Corrosion resistant zinc plated steel; minimum size 4/0; polyvinyl chloride (PVC) coating.
- D. Rope Cable: Strands of steel cable with UV-stabilized polypropylene synthetic covering; ends capped to prevent fraying.
- E. Hardware: Provide without hazardous protrusions, corners, or finishes, and that require 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 galvanized steel; with polyvinyl chloride coating.
 6. Anchors: In accordance with manufacturer's recommendations.

- F. Transparent Plastic: Clear polycarbonate plastic sheets, flat; shatterproof; resistant to crazing, cracking, and fogging.
 - 1. Sheet Thickness: 3/16 inch, minimum.
- G. 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 (UV) and color stabilized polyethylene without applied surface coating; color through entire thickness.
 - 2. Wood-Polymer Composite Lumber: Comply with ASTM D6662; factory finished.
 - 3. Panel Thickness: 3/16 inch, minimum.
 - 4. Panel Edges: 3/16 inch radius, minimum.
- H. Polyvinyl Chloride (PVC) Coating: Ultraviolet (UV) 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.
- I. Concrete: ASTM C94/C94M ready mix concrete; 28 days strength of 3,000 psi.

2.06 PROTECTIVE GROUND COVER

- A. Engineered Wood Fiber Fill: Manufactured for the purpose of protective surfacing; complying with ASTM F2075; do not use mulch manufactured from recycled pallets, or lumber containing nails or metal fasteners.
 - 1. Depth - Other Than High Play Activity Area: 9 inches, maximum.
 - 2. Depth - High Play Activity Area: 12 inches.
 - 3. Manufacturers:
 - a. Fibar Systems: www.fibar.com.
 - b. GameTime, Inc: www.gametime.com.
 - c. Sof' Fall: www.sof-fall.com.
- B. Geotextile Fabric: Nonwoven polypropylene sheet.
- C. 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 VERIFICATION OF CONDITIONS

- A. Verify that playground area has been graded to subgrade elevations required and that excess soil, rocks, and debris have been removed.
- B. Verify that playground equipment footings have been installed in proper locations and at proper elevations.
- C. Verify location of underground utilities and facilities in playground area; damage to underground utilities and facilities will be repaired at Contractor's expense.

3.02 PREPARATION

- A. Stake 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.

3.03 INSTALLATION

- A. Install concrete footings with top surface a minimum of 1/2 inch below required subgrade elevation.
- B. Install in accordance with CPSC Pub. No. 325, ASTM F1487, manufacturer's instructions, and requirements of authorities having jurisdiction (AHJ).
- C. Anchor equipment securely below bottom elevation of resilient surfacing layer.
- D. Install without sharp points, edges or protrusions, entanglement hazards, 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 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 (AHJ).

3.05 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 REFERENCE STANDARDS

1.03 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. Manufacturer's Installation Instructions: Indicate special procedures.

1.04 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. Hunter Douglas Architectural; EVERWOOD Faux Wood Blinds: www.hunterdouglasarchitectural.com/#sle.
 - 2. Levolor; Faux Wood Blinds: www.levolor.com/commercial/#sle.
 - 3. SWFcontract, a division of Spring Window Fashions, LLC.; 'Visions' 2 inch Faux-Wood Blinds: www.swfcontract.com.
 - a. Bali Blinds.

2.02 BLINDS

- A. Description: Horizontal slat louvers hung from full-width headrail with full-width bottom rail.
 - 1. Provide 2 inch 'Faux-Wood' horizontal louver blinds at all Dwelling Unit windows.
- 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. Headrail Attachment: Wall brackets.
- H. 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 CABINETS AND COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Kitchen cabinets.
- B. Kitchen countertops.
- C. Vanity cabinets.
- D. Vanity countertops.
- E. Epoxy resin window sills.
- F. Miscellaneous Work Surfaces.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between casework and countertops and adjacent walls, floors, and ceilings.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- E. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2009.
- F. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- G. IAPMO Z124 - Plastic Plumbing Fixtures; 2012.
- H. KCMA A161.1 - Performance and Construction Standard for Kitchen and Vanity Cabinets; 2012.
- I. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- J. UFAS - Uniform Federal Accessibility Standards - HUD 24 CFR part 40; 1984.

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. Certificate: Submit Kitchen Cabinet Manufacturers Association (KCMA) certificate showing conformance with KCMA A161.1.
- D. 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.
- E. Manufacturer's Qualification Statement.
- F. 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. 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 CABINETS

- A. Manufacturers:
 - 1. All Wood Cabinetry Inc.; "All Wood": www.allwoodfast.com
 - 2. American Traditions/S&W Cabinets, Inc; Shaker Poplar: www.swcabinets.com
 - 3. Mid-America Cabinets Inc; "Sierra/Mesa" : www.midamericacabinets.com.
 - 4. Wellborn Cabinet, Inc; Home Concepts - All Plywod: www.wellborn.com/#sle.
 - 5. Wolf Home Products; Wolf Classic Cabinets: www.wolfhomeproducts.com/#sle.
 - 6. Or approved equal.
- B. Kitchen and Vanity Cabinets: Premanufactured and factory-finished, complying with construction and testing requirements in KCMA A161.1.
- C. Cabinet Box: Framed construction.
 - 1. Side Panels: 5/8 inch Plywood.
 - a. Exposed Side Panel Finish: Hardwood veneer, coordinate with cabinet door and drawer color/finish.
 - 2. Back Panel: 1/4 inch Plywood.
 - 3. Bottom (and Top) Panel: 1/2 inch Plywood, dadoed into side panels and interlocked with hanging rail.
 - 4. Face Frame: 3/4 inch kiln-dried hardwood, screwed and glued.
 - 5. Interior Cabinet Finish: Thermally fused laminate.
 - 6. Exposed Panel Edges: Finish with manufacturer's standard edge banding, color coordinated with other exposed finishes.
 - 7. Extend base and upper cabinets, and shelves into corners, typical.
- D. Cabinet Door/Drawer Configuration: Full overlay.
- E. Cabinet Doors:
 - 1. Solid wood, stained finish.
 - 2. 3/4 inch kiln-dried hardwood frame; mortice and tenon construction, 1/4 inch plywood center panel with hardwood veneer finish.
 - 3. Stain Color: As selected by Owner.
- F. Drawers:
 - 1. 1/2 inch Birch plywood full box with butted joints, 1/4 inch Birch plywood bottom.
 - 2. Drawer Front: To match cabinet doors in style, material, and finish.
 - 3. Interior Finish: Manufacturer's standard.
- G. Shelves: 5/8 inch plywood.
 - 1. Exposed shelf edges: Finish with manufacturer's standard edge banding, color coordinated with other exposed finishes.
- H. Cabinet Hardware: As selected from manufacturer's standard types, styles and finishes.
 - 1. Drawer and Cabinet Pulls: Satin nickel, wire pulls 4 inches wide
 - a. Hardware to comply with accessibility requirements of UFAS, and ADA Standards where applicable.
 - 2. Hinges: Manufacturer's standard self-closing concealed hinges.
 - 3. Drawer Slides: Manufacturer's standard drawer slides.
- I. Exterior Finish: Factory-applied urethane; 2 color coats with top coat min.
 - 1. Color: To be selected by Owner from manufacturer's standard line.

2.02 COUNTERTOPS

- A. Kitchen Countertops and Countertops in common areas: 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.
- B. Vanity Countertops: Post formed plastic laminate over particle board, covered 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.
 - 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. Salon and Coffee Bar Countertops: Solid surfacing sheet or plastic resin casting self-supporting over structural members.
 - 1. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; Acrylic or Acrylic/Polyester blend resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Manufacturers:
 - 1) Aristech Surfaces LLC; Avonite: www.avonitesurfaces.com.
 - 2) Dupont Inc; Corian: www.corian.com.
 - 3) Staron Solid Surface; Staron: www.staron.com.
 - 4) Swan Surfaces LLC; Swanstone: www.swanstone.com.
 - b. Surface Burning Characteristics: Flame spread index of 15, maximum; smoke developed index of 255, maximum; when tested in accordance with ASTM E84.
 - c. NSF approved for food contact.
 - d. Sinks and Bowls: Integral castings; minimum 3/4 inch wall thickness; comply with IAPMO Z124.
 - e. Finish on Exposed Surfaces: Semi-gloss, gloss rating of 25 to 50.
 - f. Color and Pattern: As selected by Owner from manufacturer's full line.
 - 2. Other Components Thickness: 1/2 inch, minimum.
 - 3. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge.
 - 4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
 - 5. Fabricate in accordance with manufacturer's standard requirements.
 - 6. Supply materials for installation of products as specified in manufacturer's printed installation instructions including color matched silicon sealant and adhesives where applicable.

2.03 WINDOW SILLS

- A. Natural Quartz and Resin Composite Window Sills (Cultured Marble): Sheet or slab of natural quartz and plastic resin.
 - 1. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISFA 3-01 and NEMA LD 3; orthophthalic polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - 2. Flat Sheet Thickness: 3/4 inch, minimum.
 - 3. Finish on Exposed Surfaces: Polished.
 - 4. Color and Pattern: As selected by Owner.

2.04 MATERIALS

- A. Adhesives Used for Assembly: Comply with VOC requirements for adhesives and sealants as specified in Section 01 61 16.
- B. Wood-Based Materials:
 - 1. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.
- C. Solid Wood: Clear, dry, sound, plain sawn, selected for species grain and color, no defects.
- D. Hardwood Plywood: Veneer core; HPVA HP-1 Grade as indicated; same species as exposed solid wood, clear, compatible grain and color, no defects. Band exposed edges with solid wood of same species as veneer.
- E. Concealed Solid Wood or Plywood: Any species and without defects affecting strength or utility.

- F. Particleboard: Composed of wood chips, medium density, with waterproof resin binders; of grade to suit application; sanded faces; complying with ANSI A208.1.
- G. Medium Density Fiberboard (MDF): Composed of cellulosic fibers and resin cured under heat and pressure; grade to suite application; complying with ANSI A208.2.
- H. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.

2.05 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.
- C. Fabricate each unit to be rigid and not dependent on adjacent units for rigidity.
- D. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using best method recommended by manufacturer.
 - 2. Fabricate to overhang fronts and ends of cabinets 1/2 inch except where top butts against cabinet or wall.
 - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
 - 4. Finish all exposed ends of countertops, including ends abutting appliances.
- E. When necessary to cut and fit countertops on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- F. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 - 2. Height: 4 inches, unless otherwise indicated.
- G. Wall-Mounted Counters: Provide aprons, brackets, and braces as indicated on drawings.

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.

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. Pipe hangers and supports.
 - 4. Valves.
 - 5. Check valves/Backflow preventers.
 - 6. Water pressure reducing valves.
- B. Piping Specialties
 - 1. Drains.
 - 2. Cleanouts.
 - 3. Washing machine boxes and valves.
 - 4. Water hammer arrestors.
 - 5. Mixing valves.
 - 6. Under-counter pipe and drain covers.

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 State and City codes and the currently adopted edition of the International Plumbing Code.
- 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.
- B. PVC - DWV Pipe: ASTM D2949 SCH 30.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.05 DOMESTIC WATER PIPING, BURIED BEYOND 5 FEET OF BUILDING

- A. Copper Pipe: Type K complying with ASTM B42, annealed.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.

2.06 DOMESTIC WATER PIPING, BURIED UNDER FLOOR SLAB

- A. Copper Pipe: Type K complying with ASTM B42; annealed 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.
 - 3. Joints: Mechanical compression fittings.

2.07 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Pipe: Type K or L complying with 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.
 - 3. Joints: Mechanical compression fittings.

2.08 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with manufacturer's recommendations for material type and application.

- B. Plumbing Piping - Drain, Waste, and Vent:
 - 1. Wall Support for Pipe Sizes to 3 Inches: molded plastic hook.
 - 2. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.

2.09 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.

2.10 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.

2.11 WATER PRESSURE REDUCING VALVES

- A. Up to 2 Inches:
 - 1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.
- B. Over 2 Inches:
 - 1. ASSE 1003, cast iron body with interior lining complying with AWWA C550, bronze fitted, elastomeric diaphragm and seat disc, flanged.

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 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.

2.17 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.

2.18 UNDER-COUNTER DRAIN AND SUPPLY COVERS

- A. Under-Counter Pipe and Supply Covers:
 - 1. Insulate exposed drainage piping including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
 - 2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
 - 3. Construction: 1/8 inch flexible PVC.
 - a. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 - b. Comply with ASTM C1822, type indicated.
 - c. Comply with ASME A112.18.9.
 - d. Comply with ICC A117.1.
 - e. Microbial and Fungal Resistance: Comply with ASTM G21.
- B. Color: White.
- C. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces.
- D. Products:
 - 1. Plumberex Specialty Products, Inc; Plumberex Trap Gear: www.plumberex.com/#sle.
 - 2. Or approved equal.

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. Install, at each building water device, a pressure reducing valve as required to maintain proper water pressure.
- F. Perform Hydrostatic testing of all piping systems, as per prevailing codes, prior to placing concrete slabs or enclosing interior walls with gypsum board. System shall maintain 50 psi for 15 minutes min.
- G. Install required vents at all new fixtures per prevailing codes. Locate vents through roof to rear facing roof slope or least visible area.
- H. Install vent piping penetrating roofed areas to maintain integrity of roof assembly; refer to Section 07 31 13 - Asphalt Shingles.
- I. 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.
- J. Install water piping to ASME B31.9.
- K. Install approved portable water protection devices on plumbing lines where contamination of domestic water may occur or as required by prevailing codes.
- L. 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.
- M. 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.
- N. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- O. Cross-Linked Polyethylene (PEX) Pipe shall not be installed within the first 18 inches of piping connected to a water heater.
- P. Install valves on hot and cold supply piping at water heater, at fixtures as indicated, or where required to allow future maintenance.
- Q. Provide access where valves and fittings are not exposed.
- R. Install valves with stems upright or horizontal, not inverted.
- S. 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 01 00 00 - General Requirements; IECC Energy Efficiency testing.
- 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. ANSI/ACCA 2 - Manual J Residential Load Calculation; 2016.
- D. 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.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- F. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2012.
- G. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- H. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2015.
- I. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2014.
- J. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- L. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- M. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- N. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- O. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.
- P. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).
- Q. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.

- R. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
- S. 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.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- C. Load Calculations: Contractor shall verify capacity of specified heating and cooling components by submitting to the Architect load calculations as set forth in the current edition of the Air Conditioning Contractors of America (ACCA) Manual J - Residential Load Calculation.

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.
- E. Or Approved Equal.

2.02 SYSTEM DESIGN

- A. 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.
- B. Performance Requirements: See Drawings for additional requirements.
 - 1. Efficiency:
 - a. Seasonal Energy Efficiency Ratio: 14, minimum.
 - b. Heating Seasonal Performance Factor: 9.0, minimum.
 - 2. Heating Performance Requirements:
 - a. Heating Output: 9000 Btuh.
 - 3. Cooling Performance Requirements:

- a. Outdoor Unit Rated Cooling Output: 30000 Btuh.
- C. Electrical Characteristics: See Drawings for additional requirements.
 - 1. 120/240 volts, single phase, 60 Hz.
 - 2. Disconnect Switch: Factory mount disconnect switch on equipment under provisions of Section 26 20 00.

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. 120 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: Cast in place concrete pad as specified in Section 03 30 00.

2.05 ELECTRIC FURNACE COMPONENTS

- A. Electric Heater: Helix wound bare nichrome wire heating elements arranged in incremental stages, 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.
 - 3. Supply fan started before electric elements are energized and continues operating after thermostat is satisfied until bonnet temperature reaches minimum setting. Include manual switch for continuous fan operation.

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.
- E. Transfer Air and Sound Boots: 1/2 inch w.g. pressure class, fibrous glass.

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, unless noted otherwise.
 - 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, unless noted otherwise.
- 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 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. At fans and motorized equipment, except inline dryer booster fans, associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

3.03 ENERGY AUDIT TESTING

- A. See Section 01 00 00 - General Requirements, for additional requirements.

3.04 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.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2015.
- B. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.
- C. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- D. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- E. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Revision E with Supplement 1, 2013.
- F. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Revision G, 2014.
- G. FS W-C-596 - Connector, Electrical, Power, General Specification for; Revision H, 2014.
- H. IEEE C37.20.1 - IEEE Standard for Metal-Enclosed Low-Voltage (1000 Vac and below, 3200 Vdc and below) Power Circuit Breaker Switchgear; 2015.
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- J. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- K. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.
- L. NECA 407 - Standard for Installing and Maintaining Panelboards; 2009.
- M. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- N. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- O. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.
- P. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; 2005 (R2013).
- Q. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.
- R. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.
- S. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R2015).
- T. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- U. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- V. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- W. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

- X. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.
- Y. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- Z. UL 4 - Armored Cable; Current Edition, Including All Revisions.
- AA. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- AB. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- AC. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- AD. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- AE. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- AF. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- AG. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- AH. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- AI. UL 719 - Nonmetallic-Sheathed Cables; Current Edition, Including All Revisions.
- AJ. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- AK. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- AL. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- AM. UL 1699 - Arc-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 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.

1.05 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 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.

1.06 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.

1.07 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.

1.08 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 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.

4. Lockable Doors: All locks keyed alike unless otherwise indicated.

2.02 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. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
 5. 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.
 6. Do not use handle ties in lieu of multi-pole circuit breakers.
 7. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.

2.03 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 (NM) 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 Entrance (SE) drop; installed in raceway to service head.
 - b. For Underground Service Entrance (USE); direct buried.
- D. Amored cable (AC) is permitted only as follows:
 1. Where not otherwise restricted, may be used:
 - a. Where concealed in hollow stud walls and 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.
- E. Metal-clad (MC) cable is permitted only as follows:
 1. Where not otherwise restricted, may be used:
 - a. Where concealed in hollow stud walls and ceilings for branch circuits.
 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.

2.04 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.

2.05 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.

2.06 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.

2.07 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.

2.08 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.

2.09 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 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.
- C. 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.
- D. Exposed, Exterior: Use galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit.

2.10 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.

2.11 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.

2.12 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.

2.13 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.

2.14 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 Division 02 - Earthmoving: (by Gonzales-Strength & Assoc; Refer to drawings)
 - 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.

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.

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 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.
 - 1. Attendance Required:
 - a. Contractor.
 - b. Architect.
 - c. Special consultants.
 - d. Contractor's superintendent.
 - e. Associated subcontractors.
- 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 civil drawings.
- 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 03 30 00 - Cast-in-Place Concrete: Installation of monument sign lighting.
- C. Section 04 20 01 - Masonry Veneer
- D. Section 06 10 00 - Rough Carpentry: Coordination of blocking for fixtures.
- E. Section 07 46 46 - Fiber-Cement Siding: Installation of exterior fixtures.
- F. 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.
- C. 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.

- D. 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, common areas, and monument sign.
- 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 Dwelling Units, Community Building, 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. Emergency Lighting Units:
 - 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. 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.
- L. Install lamps in each lighting fixture.

END OF SECTION

SECTION 27 50 10

TELEPHONE, CABLE TELEVISION, AND NETWORK WIRING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Telephone Wiring.
- B. Cable Television Wiring.
- C. Computer Network Cabling.
- D. 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/ internet, 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. Product Data: Provide showing electrical characteristics and connection requirements for each component.
- C. 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.
- D. Operation Data: Instructions for setting and tuning channels.
- E. 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 ACCESSORIES

- A. Coax Demarcation Enclosure: Secure compartment for terminating coax and mounting of splitters and groundblocks for distribution to individual units.
 - 1. Provide one demarcation enclosure for every Dwelling Unit.
 - 2. Keptel OPE-92000 or equal.
- B. Telephone Tap (Jack)
 - 1. Recessed, suitable for mounting in standard electrical wall box, type and model suitable to local telephone company.
- C. 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.
- D. Ethernet/Internet Tap (Cat-6 jack)
 - 1. Recessed, suitable for mounting in standard electrical wall box, conforming to TIA/EIA-568.
 - 2. Frequency Range: 250MHz
 - 3. Connector: 'Keystone' type connector.
- E. 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.
- F. Main Distribution Cable:
 - 1. Description: RG11/F or RG6/F as required.
- G. Branch Distribution Cable:
 - 1. Description: RG 6/F.
- H. Network Cable:
 - 1. Description: CAT6 multistrand cable.

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 10 00
ACCESS CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Access control system requirements.
- B. Access control units and software.
- C. Access control point peripherals, including readers and keypads.
- D. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 08 71 00 - Door Hardware: Electrically operated door hardware, for interface with access control system.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 294 - Access Control System Units; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other installers to provide suitable door hardware as required for both access control functionality and code compliance.
 - 2. Coordinate the placement of readers with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 3. Coordinate the work with other installers to provide power for equipment at required locations.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Preinstallation Meetings:
 - 1. Conduct meeting with facility representative to review reader and equipment locations.
 - 2. Conduct meeting with facility representative and other related equipment manufacturers to discuss access control system interface requirements.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Include plan views indicating locations of system components and proposed size, type, and routing of conduits and/or cables. Include elevations and details of proposed equipment arrangements. Include system interconnection schematic diagrams. Include requirements for interface with other systems.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets for each system component. Include ratings, configurations, standard wiring diagrams, dimensions, finishes, service condition requirements, and installed features.
- 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 operation of product.
- E. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
- F. Software: One copy of software not resident in read-only memory.

1.06 QUALITY ASSURANCE

- A. Comply with the following:

1. NFPA 70.
 2. The requirements of the local authorities having jurisdiction.
 3. Applicable TIA/EIA standards.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.08 WARRANTY

- A. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Access Control Units - Basis of Design: DKS Door King; Series 1830.

2.02 ACCESS CONTROL SYSTEM REQUIREMENTS

- A. Provide new access control system consisting of required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Surge Protection:
1. Provide surge protection for readers and door strikes/locks.
- C. Access Control Points:
1. Exterior Doors:
 - a. Function: Operational and emergency.
 - b. Access: Controlled entry, free exit.
 - c. Peripherals on Secure Side:
 - 1) Reader/Keypad: Contactless key fob reader.
 - d. Locking Device: Electric strike.
 - 1) Configuration: Fail-secure.
- D. Computers Required:
1. Workstation Computer(s):
 - a. Quantity: One.
 - b. Location(s): Leasing Office.
 - c. Peripherals required for each workstation computer:
 - 1) Mouse and keyboard.
 - 2) Monitor(s): One.
 - 3) Alarm/report printer.
- E. Interface with Other Systems:
1. Provide products compatible with other systems requiring interface with access control system.
 2. Interface with electrically operated door hardware as specified in Section 08 71 00.
- F. Provide products listed, classified, and labeled as suitable for the purpose intended.
1. Access Control Units and Readers: Listed and labeled as complying with UL 294.

2.03 ACCESS CONTROL UNITS AND SOFTWARE

- A. Provide access control units and software compatible with readers to be connected.
- B. Unless otherwise indicated, provide software and licenses required for fully operational system.
- C. Access Control Unit:
1. Basis of Design: DKS Door King; Model 1838 .
 2. Control Capability: 15 doors/ 15 readers.
 3. Database:
 - a. Quantity of Access Codes Supported: 8000.
 4. Operating Modes Supported:

- a. Proximity key fob.
- 5. Features:
 - a. Dedicated power loss alarm input.
 - b. Supports database and event exporting.
 - c. Supports database backup.
- D. Computers:
 - 1. Workstation Computers: Unless otherwise indicated, workstation computer hardware and associated peripherals not furnished by access control system manufacturer to be provided by Contractor as part of work of this section, meeting access control system equipment manufacturer's recommended requirements.
 - 2. Servers: Unless otherwise indicated, server hardware and associated peripherals not furnished by access control system manufacturer to be provided by Contractor as part of work of this section, meeting access control system equipment manufacturer's recommended requirements.
- E. Products:
 - 1. Access Control Software:
 - a. Basis of Design: DKS Door King.

2.04 ACCESS CONTROL POINT PERIPHERALS

- A. Provide devices compatible with control units and software.
- B. Provide devices suitable for operation under the service conditions at the installed location.
- C. Readers and Keypads:
 - 1. General Requirements:
 - a. Provide readers compatible with credentials to be used.
 - b. Proximity Readers:
 - 1) Utilize 125 kHz RF communication with compatible credentials.
 - 2. Proximity Reader:
 - a. Basis of Design: DKS Door King; Model 1815-305.
 - b. Read Range: Up to 12 inches.
 - c. Features:
- D. Door Locking Devices (Electric Strikes and Magnetic Locks): Comply with Section 08 71 00.

2.05 ACCESSORIES

- A. Provide components as indicated or as required for connection of access control system to devices and other systems indicated.
- B. Unless otherwise indicated, credentials to be provided by Contractor.
 - 1. Provide credentials compatible with readers and control units/software to be used.
 - 2. Credential Type: Key fob.
- C. Provide cables as indicated or as required for connections between system components.
 - 1. Data Cables for IP Network Connections: Unshielded twisted pair (UTP), minimum Category 5e, complying with Section 27 10 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that ratings and configurations of system components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive system components.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to system.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install access control system in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.

- C. Wiring Method: Unless otherwise indicated, use wiring in conduit.
 - 1. Use suitable listed cables in wet locations, including underground raceways.
 - 2. Use suitable listed cables for vertical riser applications.
 - 3. Conduit: Comply with Section 26 20 00.
 - 4. Use power transfer hinges complying with Section 08 71 00 for concealed connections to door hardware.
 - 5. Do not exceed manufacturer's recommended maximum cable length between components.
- D. Provide grounding and bonding in accordance with Section 26 20 00.
- E. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- F. Identify system wiring and components in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

- A. Prepare and start system in accordance with manufacturer's instructions.
- B. Program system parameters according to requirements of Owner.
- C. Test for proper interface with other systems.
- D. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.04 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 28 20 00
VIDEO SURVEILLANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Video surveillance system requirements.
- B. Video recording and viewing equipment.
- C. Cameras.
- D. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 27 50 10 - Telephone, Cable Television, and Network Wiring Data cables for IP video surveillance system network connections.

1.03 REFERENCE STANDARDS

- A. 47 CFR 15 - Radio Frequency Devices; current edition.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 303 - Standard for Installing Closed-Circuit Television (CCTV) Systems; 2005.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of cameras with structural members, ductwork, piping, equipment, luminaires, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 2. Coordinate the work with other installers to provide power for cameras and equipment at required locations.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Preinstallation Meetings:
 - 1. Conduct meeting with Owner to review camera and equipment locations and camera field of view objectives.

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 system component. Include ratings, configurations, standard wiring diagrams, dimensions, finishes, service condition requirements, and installed features.
- C. 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 operation of product.
- D. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
- E. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. NFPA 70.
 - 2. Applicable TIA/EIA standards.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions and NECA 303.
- B. Store products in manufacturer's unopened packaging, keep dry and protect from damage until ready for installation.

1.08 WARRANTY

- A. Provide minimum Five year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Video Recording and Viewing Equipment - Basis of Design: HD8SYSL-10T16H4 16-Channel Hybrid recorder and Cameras.
- B. Cameras - Basis of Design: TC80TA Starlight Cameras manufactured by SuperCircuits Inc.

2.02 VIDEO SURVEILLANCE SYSTEM

- A. Provide new video surveillance system consisting of all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. System Description: IP system with connection to network (IP) cameras.
 - 1. Video Storage Capacity: Suitable for storing video from all cameras for 7 days.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B, consumer application.

2.03 VIDEO RECORDING AND VIEWING EQUIPMENT

- A. Provide video recording and viewing equipment compatible with cameras to be connected.
- B. Hybrid Digital Video Recorders (DVRs):
 - 1. Supports connection of both network (IP) and analog cameras.
 - 2. Supports continuous and event-based recording.
 - 3. Hybrid Digital Video Recorder:
 - a. Basis of Design: HVRH1602-0 16-Channel DVR.
 - b. Storage Capacity: 4 TB.
 - c. Network: 10/100 base T Ethernet.
- C. Computers:
 - 1. Workstation Computers: Unless otherwise indicated, workstation computer hardware not furnished by video surveillance system manufacturer to be provided by Contractor as part of work of this section, meeting video surveillance system equipment manufacturer's minimum requirements.
- D. Software:
 - 1. Unless otherwise indicated, provide all software and licenses required for fully operational system.
- E. Monitors:
 - 1. Unless otherwise indicated, monitors to be provided by Contractor as part of work of this section.

2.04 CAMERAS

- A. Provide cameras and associated accessories suitable for operation under the service conditions at the installed location. Provide additional components (e.g. enclosures, heaters, blowers, etc.) as required.
- B. Where not factory-installed, provide additional components (e.g. lenses, mounting accessories, etc.) as necessary for complete installation.
- C. Network (IP) Cameras:
 - 1. Signal-to-Noise Ratio: Not less than 50 dB.

2. Provide the following standard features:
 - a. Automatic electronic shutter.
 - b. Automatic gain control.
 - c. Automatic white balance.
 - d. Web-based interface for remote viewing and setup.
 - e. Password protected security access.
3. Network (IP) Fixed Dome 3-Axis IR Camera - Basis of Design: SuperCircuits Inc; Model TC80TA; www.supercircuits.com.
 - a. Maximum Video Resolution: 8MP.
 - b. Image Sensor Size: 1/2.8 inch.
 - c. Minimum Illumination/Light Sensitivity (Color): 0.01 lux.
 - d. IR Wavelength: 850 nm.
 - e. IR Array Range: 65 feet.
 - f. Lens: 2.8-12 mm, F1.4; horizontal field of view of 106 degrees; varifocal, P-Iris, remote focus and zoom.

2.05 ACCESSORIES

- A. Provide components as indicated or as required for connection of video surveillance system to devices and other systems indicated.
- B. Provide components as indicated or as required for system power and network connections.
- C. Provide cables as indicated or as required for connections between system components.
 1. Data Cables for IP Network Connections: Unshielded twisted pair (UTP), minimum Category 5e, complying with Section 27 50 10.
- D. Provide accessory racks/cabinets as indicated or as required for equipment mounting.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that mounting surfaces are ready to receive system components.
- B. Verify that branch circuit wiring installation is completed, tested, and ready for connection to system where applicable.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install video surveillance system in accordance with NECA 1 (general workmanship) and NECA 303.
- B. Install products in accordance with manufacturer's instructions.
- C. Wiring Method: Unless otherwise indicated, use cables (not in conduit).
 1. Use suitable listed cables in wet locations, including underground raceways.
 2. Use suitable listed cables for vertical riser applications.
 3. Install wiring in conduit for the following:
 - a. Where required for rough-in.
 - b. Where required by authorities having jurisdiction.
 - c. Where exposed to damage.
 - d. Where installed outside the building.
 - e. For exposed connections from outlet boxes to cameras.
 4. Conduit: Comply with Section 26 20 00.
 5. Conceal all cables unless specifically indicated to be exposed.
 6. Route exposed cables parallel or perpendicular to building structural members and surfaces.
 7. Include service loop cable lengths to allow relocation of cameras within 30 ft of installed location.

3.03 FIELD QUALITY CONTROL

- A. Prepare and start system in accordance with manufacturer's instructions.
- B. Adjust cameras to provide desired field of view and produce suitable images under all service lighting conditions.

- C. Program system parameters according to requirements of Owner.
- D. Test for proper interface with other systems.
- E. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.04 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

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. Carbon Monoxide Detectors.
- C. Audible/Visual Doorbell Signaler for A/V designated 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. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NFPA 72 - National Fire Alarm and Signaling Code; 2016.
- C. UL 2034 - Standard for Single and Multiple Station Carbon Monoxide Alarms; 2017.
- D. 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, and A/V door signalers of same manufacturer and model as those installed; deliver in original packaging, labeled in same manner as in operating and maintenance data.
 - 1. 1 of each type of 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
- B. Visual Strobe Alarms:
 - 1. Kidde/FireX; Model SLED 177i: www.kidde.com.
 - 2. FirstAlert/BRK; Model SL177: www.brkelectronics.com
- C. Carbon Monoxide Detectors:
 - 1. Kidde; Model KN-COB-IC: www.kidde.com.
 - 2. FirstAlert/BRK; Model CO5120BN: www.brkelectronics.com.
- D. 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.

2.02 GENERAL

- A. Provide all components necessary, regardless of whether shown in the contract documents or not.
- B. Extent of Protection: Individual Dwelling Units, new construction.
- C. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
 1. The requirements of the State Fire Marshal.
 2. The requirements of the local authority having jurisdiction.
 3. Applicable local codes.
 4. The contract documents (drawings and specifications).
 5. 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. Carbon Monoxide Detectors: UL 2034, NFPA 72 certified, single station, 120v AC/ 60hz, monitored battery backup, electrochemical sensing chamber.
 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. Unit shall alarm for time ranges and exposure levels in accordance with UL 2034.
 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.

PART 3 EXECUTION

3.01 APPLICATION

- A. Typical 2 and 3 - Bedroom Dwelling Units
 1. Install one smoke detector in each bedroom, and in the hallway leading to the bedrooms.
 2. Install one carbon monoxide detector outside each bedroom, near bedroom door.
 - a. Where bedroom doors are in close proximity of each other, one detector may cover both bedrooms.
 3. Interconnect all units within each dwelling unit, such that in an alarm event, all detector 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 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Removing existing vegetation.
 - 2. Clearing and grubbing.
 - 3. Stripping and stockpiling topsoil.
 - 4. Disconnecting and removing site utilities.
 - 5. Temporary erosion- and sedimentation-control measures.
- B. Related Sections:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities.

1.3 DEFINITIONS

- A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.
- D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
- B. Utility Locator Service: Call Okie (800) 522-6543 before site clearing or excavation.
- C. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 EXISTING UTILITIES

- A. The Contractor shall arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- C. Excavate for and remove underground utilities indicated to be removed.

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches (6 inches minimum - refer to geotechnical engineering bore logs) in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
 - 1. Limit height of topsoil stockpiles to 48 inches.
 - 2. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.

3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.
 - 3. Existing parking lot shall have full asphalt pavement removal. Contractor shall maintain and utilize the existing aggregate base materials under the existing asphalt.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Preparing subgrades for walks, pavements, turf and grasses.
 - 2. Subbase course for concrete walks and pavements.
- B. Related Sections:
 - 1. Division 03 Section "Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.
 - 2. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping, stockpiling topsoil, and removal of above- and below-grade improvements and utilities.

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
- F. Fill: Soil materials used to raise existing grades.

- G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- H. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
- B. Utility Locator Service: Call Okie (800) 522-6543 before site clearing or excavation.
- C. Do not commence earth moving operations until temporary erosion and sedimentation control measures are in place and an earth change permit is obtained.

1.5 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups A-1, A-2-4, A-2-5, and A-3 according to AASHTO M 145, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
 - 1. Liquid Limit: <40 (all locations and elevations) or as noted in geotechnical engineering report.
 - 2. Plasticity Index: $5 < PI < 15$ (all locations and elevations) or as noted in geotechnical engineering report.
- C. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- D. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Sand: ASTM C 33; fine aggregate.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 - a. 12 inches outside of concrete forms other than at footings.
 - b. 6 inches beneath pipe in trenches

3.3 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.4 EXCAVATION FOR WALKS

- A. Excavate surfaces under walks to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 - 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.

3.6 SUBGRADE INSPECTION

- A. Notify Architect when excavations have reached required subgrade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the slabs and sidewalk with a pneumatic-tired, tandem-axle dump truck weighing not less than 25 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction
 - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.8 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 1. Testing and inspecting underground utilities.
 2. Removing concrete formwork.
 3. Removing trash and debris.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.9 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Place and compact final backfill of satisfactory soil to final subgrade elevation.

3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 1. Under grass and planted areas, use satisfactory soil material.
 2. Under walks and pavements, use satisfactory soil material.
 3. Under steps and ramps, use engineered fill.
 4. Under building slabs, use engineered fill.
 5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.11 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 3 percent of optimum moisture content.
 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 9 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
 - 1. Under structures, building slabs, steps, sidewalks and pavements, scarify and recompact top 8 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent (of maximum dry density)
 - 2. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent (of maximum dry density).

3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1/2 inch.
 - 3. Walkways shall comply with ADA slope requirements.

3.14 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

3.15 FIELD QUALITY CONTROL

- A. Special Inspections: The Contractor shall engage a qualified special inspector to perform the following special inspections:
 - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
 - 2. Determine that fill material and maximum lift thickness comply with requirements.
 - 3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.

- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length, but no fewer than two tests.
 - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length, but no fewer than two tests.
- F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.16 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
 - 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 32 13 13
CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete walkways, retaining walls and pavement.
- B. Related Sections:
 - 1. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Curing compounds.
 - 3. Applied finish materials.
 - 4. Joint fillers.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- C. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
- D. ACI Publications: Comply with ACI 301 unless otherwise indicated.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet (30.5 m) or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, portland cement Type I/II.
 - a. Fly Ash: ASTM C 618, Class C
- B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source[with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials].

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Exposed Aggregate: Selected, hard, and durable; washed; free of materials with deleterious reactivity to cement or that cause staining; from a single source, with gap-graded coarse aggregate as follows:
1. Aggregate Sizes: 3/4 to 1 inch (19 to 25 mm) nominal.
- D. Water: Potable and complying with ASTM C 94/C 94M.
- E. Air-Entraining Admixture: ASTM C 260.
- F. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.3 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1752, cork or self-expanding cork] in preformed strips.
- B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements.

2.4 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.

2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
1. Compressive Strength (28 Days): 3,500 psi.
 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
 3. Slump Limit: 4 inches, plus or minus 1 inch (25 mm).
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
- E. Cementitious Materials: Limit percentage by weight of cementitious materials other than portland cement according to ACI 301 (ACI 301M) requirements.
1. Fly Ash or Pozzolan: 25 percent.
 2. Ground Granulated Blast-Furnace Slag: 50 percent.
 3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

2.5 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Furnish batch certificates for each batch discharged and used in the Work.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below paving to identify soft pockets and areas of excess yielding.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - 2. Provide tie bars at sides of paving strips where indicated.
 - 3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
1. Locate expansion joints at intervals As Shown on Drawings (maximum of 50-feet).
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a [1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes.
 - a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 - a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.
 3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes.

3.5 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

- B. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- K. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total

amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by a combination of these:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.7 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.
2. Thickness: Plus 3/8 inch minus 1/4 inch.
3. Surface: Gap below 10-foot long, unlevelled straightedge not to exceed 1/2 inch.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 1. Testing Frequency: Obtain at least one composite sample for each 50 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

- D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.9 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 32 13 73

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 Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Cold-applied joint sealants.
 - 2. Hot-applied joint sealants.
- B. Related Sections:
 - 1. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, Samples of materials that will contact or affect joint sealants.
 - 1. Use manufacturer's standard test method to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 3. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - 4. Testing will not be required if joint-sealant manufacturers submit joint-preparation data that are based on previous testing, not older than 24 months, of sealant products for compatibility with and adhesion to joint substrates and other materials matching those submitted.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.

- B. Pavement-Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
- C. Product Certificates: For each type of joint sealant and accessory, from manufacturer.
- D. Preconstruction Compatibility and Adhesion Test Reports: From joint-sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility with and adhesion to joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

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.
 - 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 MATERIALS

- 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.
- B. Colors of Exposed Joint Sealants: As indicated by manufacturer's designations.

2.2 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Nonsag, Silicone Joint Sealant for Concrete: ASTM D 5893, Type NS.
 - 1. Products: Subject to compliance with requirements:
 - a. Crafcoc Inc., an ERGON company; RoadSaver Silicone.
 - b. Dow Corning Corporation; 888.
 - c. Or approved equal.

2.3 HOT-APPLIED JOINT SEALANTS

- A. Hot-Applied, Single-Component Joint Sealant for Concrete: ASTM D 3406.
 - 1. Products: Subject to compliance with requirements:
 - a. Crafcoc Inc., an ERGON company; Superseal 444/777.
 - b. Or approved equal.

2.4 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- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.5 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

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. Joint-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 joint-sealant backings of kind indicated to support joint 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 joint-sealant backings.
 - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
 - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place joint sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in 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 Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements 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 joint sealant from surfaces adjacent to joints.
 - 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.

3.4 CLEANING

- A. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

END OF SECTION

SECTION 32 31 13
CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Posts, rails, and frames.
- B. Wire fabric.
- C. Concrete.
- D. Manual gates with related hardware.
- E. Accessories.

1.02 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- 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 C94/C94M - Standard Specification for Ready-Mixed Concrete; 2016a.
- D. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2014a.
- E. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric; 2011.
- F. CLFMI CLF-SFR0111 - Security Fencing Recommendations; 2014.
- G. FS RR-F-191/1D - Fencing, Wire and Post Metal (Chain-Link Fence Fabric); 1990.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.
- C. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.
- D. Manufacturer's Installation Instructions: Indicate installation requirements and post foundation anchor bolt templates.

1.04 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Chain Link Fences and Gates:
 - 1. Master-Halco, Inc: www.masterhalco.com/#sle.
 - 2. Merchants Metals: www.merchantsmetals.com/#sle.
 - 3. Or approved equal.

2.02 COMPONENTS

- A. Line Posts: 2.38 inch diameter.
- B. Corner and Terminal Posts: 2.38 inch diameter.
- C. Gate Posts: 2.38 inch diameter.
- D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.
- E. Gate Frame: 1.66 inch diameter for welded fabrication.
- F. Fabric: 2 inch diamond mesh interwoven wire, 11 gauge, 0.1205 inch thick, top selvage knuckle end closed, bottom selvage twisted tight.
- G. Tie Wire: Aluminum alloy steel wire.

2.03 MATERIALS

- A. Posts, Rails, and Frames: Formed from hot-dipped galvanized steel sheet, ASTM A653/A653M, HSLAS, Grade 50, with G90 (Z275) zinc coating.
- B. Line Posts: Type I round in accordance with FS RR-F-191/1D.
- C. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round in accordance with FS RR-F-191/1D.
- D. Wire Fabric: ASTM F668 polymer-coated steel chain link fabric.
- E. Ready-mixed, complying with ASTM C94/C94M; normal Portland cement; 2,500 psi strength at 28 days, 3 inch slump; 1/2 inch nominal size aggregate.

2.04 MANUAL GATES AND RELATED HARDWARE

- A. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; fork latch with gravity drop and padlock hasp.
- B. Hardware for Double Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; drop bolt on inactive leaf engaging socket stop set in concrete, active leaf latched to inactive leaf preventing raising of drop bolt, padlock hasp.

2.05 ACCESSORIES

- A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

2.06 FINISHES

- A. Components and Fabric: Vinyl coated over coating of 1.8 ounces per square foot galvanizing.
- B. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.
- C. Accessories: Same finish as framing.
- D. Color(s): To be selected by Owner from manufacturer's standard range.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567.
- B. Place fabric on outside of posts and rails.
- C. Set intermediate, terminal, and gate posts plumb, in concrete footings with top of footing flush with finish grade. Slope top of concrete for water runoff.
- D. Provide top rail through line post tops and splice with 6 inch long rail sleeves.
- E. Do not stretch fabric until concrete foundation has cured 28 days.
- F. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- G. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
- H. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- I. Install bottom tension wire stretched taut between terminal posts.
- J. Install hardware and gate with fabric to match fence.

END OF SECTION

SECTION 32 92 23

SODDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Fertilizing.
- B. Sod shall be installed in all areas as defined on the Plans.
- C. Maintenance.

1.2 RELATED SECTIONS

- A. None

1.3 REFERENCES

- A. ASPA (American Sod Producers Association) - Guideline Specifications to Sodding.
- B. OSANA (Official Seed Analysts of North America)

1.4 SUBMITTALS

- A. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height, types, application frequency, and recommended coverage of fertilizer.

1.5 DEFINITIONS

- A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Bermuda Grass Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.6 QUALITY ASSURANCE

- A. Sod: 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.
- B. Sod Producer: Company specializing in sod production and harvesting with minimum five-(5) years experience, and certified by the State of Oklahoma.

1.7 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 mixture and herbicide mixture.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sod on pallets. Protect exposed roots from dehydration.
- B. Do not deliver more sod than can be laid within 24 hours or sod will be rejected.

1.9 COORDINATION

- A. Coordinate with the following construction tasks:
 - 1. Site Grading: Site grades shall be uniform in appearance with no low areas and positive drainage away from the building. On-site topsoil placement and finish grading shall be approved prior to placement of sod. Grades along the pavement or curb line shall be recessed 1" below the edge.
 - 2. Temporary Irrigation System: Coordinate how the sod shall be watered and established prior to installation of sod.

1.10 JOB CONDITIONS

- A. Work within seasonal limitations of the grass specie.
- B. Remove deleterious substance or waste from the area prior to proceeding.
- C. When detrimental conditions are encountered, notify the Owner's Representative.

1.11 MAINTENANCE SERVICE

- A. Maintain sodded areas immediately after placement until Final Acceptance of the project. The lawn shall be well established and exhibit a vigorous growing condition, free of weeds and uneven/unlevel areas. Sodded areas that has settled or shifted, shall be repaired to original grade.

PART 2 - PRODUCT

2.1 MATERIALS

- A. Sod: ASPA Certified grade; a cultivated grass sod; Bermuda grass (Cynodon dactylon 'U3') with a strong fibrous root system, free of stones, burned or bare spots; containing no more than 10 weeds per 1,000 square feet. 'U3 Bermuda grass sod designated for detention pond areas as shown on landscape plan.
- B. Stockpiled Topsoil: Refer to Site Grading Package and SECTION 32 91 19
- C. Fertilizer: Recommended for grass, with 50 percent of the elements derived from

organic sources; controlled-release, granular or pellet form, uniform in composition, slow releasing, delivered in fully labeled sealed packages, and shall conform to applicable state or federal regulations, and a composition of the following: nitrogen 10 percent, phosphoric acid 20 percent, and soluble potash 10 percent.

- D. Water: Water shall be obtained on site at the expense of the Contractor.
- E. Postemergent Herbicide: As manufactured by LESCO or GORDON'S or an approved equal. All pesticides application will be reported to OKDE-ENV Pest Management Coordinator prior to application and within 72 hours of completion of application. All pesticide usage will be documented.
- F. Sod Stakes: Sod stakes shall consist of cedar shake shingles, split lengthwise into narrow strips.

2.2 HARVESTING SOD

- A. Machine cut sod and load on pallets in accordance with ASPA Guidelines.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine installation areas. Report unsatisfactory conditions in writing to the Owner's Representative. Do not proceed until unsatisfactory conditions have been corrected.
- B. Verify that prepared topsoil is ready to receive the work of this section.
- C. Starting installation constitutes acceptance of condition or satisfactory for installation of sod by Contractor, who shall correct damage and defects or unsatisfactory work at no additional cost.

3.2 FERTILIZER AND AMENDMENTS

- A. Apply fertilizer (10-20-10) at a rate of 2.5 lbs. per 1,000 square feet. Apply amendments as determined by the soils test.
- B. Apply after hand raking smooth of topsoil and prior to installation of sod.
- C. Apply fertilizer and amendments no more than 48 hours before laying sod.
- D. Mix thoroughly into upper 2-inches of imported topsoil.
- E. Lightly water to aid the dissipation of fertilizer and amendments.

3.3 LAYING SOD

- A. Hand rake all areas to be sodded, removing stones and debris larger than 1" in diameter.

- B. Moisten prepared surface immediately prior to laying sod.
- C. Lay sod immediately (within 24 hours of harvesting) after delivery to site to prevent deterioration. Sod will be rejected if not installed within this time period. Sodded areas not hand raked shall be rejected.
- D. Place sod parallel with the adjacent street and building.
- E. Lay sod tight with no open joints visible, and no overlapping; stagger end joints 12-inches minimum. Do not stretch or overlap sod pieces.
- F. Lay smooth. Align with adjoining grass areas.
- G. Place top elevation of sod 1/2-inch below adjoining paving and curbs.
- H. Water sodded areas immediately after installation. Saturate sod to 4-inches of soil. Water by hand or by the irrigation system daily to prevent the root system from drying. Sod shall be kept moist. Dry sod will be rejected and replanted according to this specification.
- I. Once conditions are favorable, roll sodded areas to ensure a good bond between sod and soil and to remove minor depressions and irregularities. Roll sodded areas with a roller not exceeding 250 lbs. Do not roll sodded areas when soil conditions are dry.
- J. Stake sodding in place on slopes exceeding 3:1, minimum two stakes per roll of sod. Install stakes flush with soil level of sod.

3.4 MAINTENANCE

- A. Provide (1) year maintenance, beginning on date of Final Acceptance. This shall include:
 - 1. Semi –weekly mowing (every other week) of sodded areas only (using a “mulching” type blade/mower).
 - 2. Supplemental hand watering of all sodded areas to maintain optimum establishment of sodded areas.
 - 3. Trash/debris removal of all areas before each mowing.
- B. Neatly trim edges and hand clip where necessary.
- C. Water to prevent grass and soil from drying out.
- D. Roll surface and topdress with imported topsoil to remove irregularities and settling.
- E. Control growth of weeds. Notify the Owner’s Representative prior to herbicide application. Apply herbicides in accordance with manufacturer’s instructions. Remedy damage resulting from improper use of herbicides.
- F. Immediately sod areas that show deterioration or bare spots.
- G. Protect sodded areas with warning signs during maintenance period.

3.5 ACCEPTANCE OF SODDED AREAS

- A. When sodding is substantially completed, including maintenance, the Owner's Representative shall, upon request, make an inspection to determine acceptability.
- B. Sodded lawns will be acceptable, provided requirements, including maintenance, have been complied with, and healthy, uniform, close stand of specified grass is established, free of weeds, bare spots, open joints and surface irregularities.
- C. Where inspected work does not comply with requirements, replace defected work, and continue specified maintenance until inspected by the Owner's Representative and found to be acceptable.
- D. Once the installation/work is accepted as complete, the Contractor will maintain the seeded areas through the one year maintenance period and final acceptance of sodded areas.

END OF SECTION

SECTION 33 05 00

COMMON WORK RESULTS FOR 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 the following:
 - 1. Piping joining materials.
 - 2. Sleeves.
 - 3. Identification devices.
 - 4. Grout.
 - 5. Piping system common requirements.
 - 6. Equipment installation common requirements.

1.3 DEFINITIONS

- A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
- B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- C. CPVC: Chlorinated polyvinyl chloride plastic.
- D. PE: Polyethylene plastic.
- E. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Dielectric fittings.
 - 2. Identification devices.

3. Sanitary sewer package pump system.

1.5 QUALITY ASSURANCE

- A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

- A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 PIPING JOINING MATERIALS

- A. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- B. Solvent Cements for Joining Plastic Piping:
 1. ABS Piping: ASTM D 2235.
 2. CPVC Piping: ASTM F 493.
 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 4. PVC to ABS Piping Transition: ASTM D 3138.
- C. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.2 TRANSITION FITTINGS

- A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
- B. Transition Couplings NPS 1-1/2 (DN 40) and Smaller:
 1. Underground Piping: Manufactured piping coupling or specified piping system fitting.

2. Aboveground Piping: Specified piping system fitting.
- C. AWWA Transition Couplings NPS 2 (DN 50) and Larger:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cascade Waterworks Mfg. Co.
 - b. Dresser, Inc.; DMD Div.
 - c. Ford Meter Box Company, Inc. (The); Pipe Products Div.
 - d. Or approved equal
 3. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.

2.3 SLEEVES

- A. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
- B. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.
- C. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.4 IDENTIFICATION DEVICES

- A. General: Products specified are for applications referenced in other Division 33 Sections. If more than single type is specified for listed applications, selection is Installer's option.
- B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.
 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
 2. Location: Accessible and visible.
- C. Stencils: Standard stencils prepared with letter sizes complying with recommendations in ASME A13.1. Minimum letter height is 1-1/4 inches (30 mm) for ducts, and 3/4 inch (20 mm) for access door signs and similar operational instructions.
 1. Material: Fiberboard.
 2. Stencil Paint: Exterior, oil-based, alkyd-gloss black enamel, unless otherwise indicated. Paint may be in pressurized spray-can form.
 3. Identification Paint: Exterior, oil-based, alkyd enamel in colors according to ASME A13.1, unless otherwise indicated.

- D. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.
- E. Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): Full-band pipe markers, extending 360 degrees around pipe at each location.
- F. Pipes with OD, Including Insulation, 6 Inches (150 mm) and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.
- G. Lettering: Manufacturer's standard preprinted captions as selected by Architect.
- H. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
 - 1. Arrows: Either integrally with piping system service lettering to accommodate both directions of flow, or as separate unit on each pipe marker to indicate direction of flow.
- I. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils (0.08 mm) thick.
 - 1. Width: 1-1/2 inches (40 mm) on pipes with OD, including insulation, less than 6 inches (150 mm); 2-1/2 inches (65 mm) for larger pipes.
 - 2. Color: Comply with ASME A13.1, unless otherwise indicated.
 - 3. Size: 2-1/2 by 4 inches (65 by 100 mm) for control devices, dampers, and valves; 4-1/2 by 6 inches (115 by 150 mm) for equipment.
- J. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in piped utility identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of piped utility systems and equipment.
 - 1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

2.5 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPED UTILITY DEMOLITION

- A. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.
 - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - 2. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.
 - 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - 4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make operational.
 - 5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

- B. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING INSTALLATION

- A. Install piping according to the following requirements and Division 33 Sections specifying piping systems.

- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.

- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

- D. Install piping at indicated slopes.

- E. Install piping free of sags and bends.

- F. Install fittings for changes in direction and branch connections.

- G. Select system components with pressure rating equal to or greater than system operating pressure.

- H. Sleeves are not required for core-drilled holes.

- I. Permanent sleeves are not required for holes formed by removable PE sleeves.

- J. Verify final equipment locations for roughing-in.
- K. Refer to equipment specifications in other Sections for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 33 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
 - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
 - 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- E. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- F. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- G. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - 1. Plain-End PE Pipe and Fittings: Use butt fusion.
 - 2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.
- H. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.

2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Install dielectric fittings at connections of dissimilar metal pipes.

3.5 EQUIPMENT INSTALLATION

- A. Install equipment level and plumb, unless otherwise indicated.
- B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
- C. Install equipment to allow right of way to piping systems installed at required slope.

3.6 IDENTIFICATION

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
 1. Stenciled Markers: According to ASME A13.1.
 2. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.
 3. Locate pipe markers on exposed piping according to the following:
 - a. Near each valve and control device.
 - b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
 - c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
 - d. At manholes and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.

3.7 GROUTING

- A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.

- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION