GRIMM AND PARKER

SPECIFICATIONS

FOR

GARRETT STEM BUILDING
GARRETT COLLEGE

McHENRY, MARYLAND

VOLUME 1 OF 2
DIVISIONS 1 THROUGH 12

BID SET
February 1, 2017

11720 Beltsville Drive | Suite 600 | Calverton MD 20705 | ph 301-595-1000
www.grimmandparker.com

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PROPOSAL INVITATION

GARRETT COLLEGE will receive sealed proposals from pre-qualified general contractors for the renovation and construction of the new STEM Facility on the college campus at McHenry, Maryland. Proposal documents, drawings and specifications for this project will be available at noon February 1, 2017 and may be downloaded on-line at no charge by logging onto the following website:

http://www.garrettcollege.edu/stem/prequalified-contractors

Addenda will be available via the same website periodically throughout the duration of the proposal period. Proposing Contractor are responsible for checking the site to ensure that they have the required information to make an informed proposal. A pre-proposal meeting well be held on February 7 at 11:00 a.m. in the college Continuing Education Building. Questions related to this proposal process or to the contract document may be directed by e-mail to both Ms. Kathy Meagher, Garrett College at gcstem@garrettcollege.edu and Mr. Rick Morrison, Grimm + Parker Architects at rmorrison@gparch.com. Questions will be received until noon on February 14, 2017. Sealed proposal packages must be labeled "STEM Project" and will be received until 2:00 p.m. February 23, 2017 at the Office of the Vice President of Administration & Finance, Garrett College, 687 Mosser Road, McHenry, MD 21541.

Garrett College reserves the right to reject any and all proposals and to waive irregularities and informalities in the submittal and evaluation process. The RFP does not obligate the college to pay any costs incurred by respondents in the preparation and submission of their statement of qualifications. Furthermore, the RFP does not obligate the college to accept or contract for any expressed or implied services. It is Garrett College's policy to assure that no person shall, on the grounds of race, color, national origin or sex, as provided by Title VI of the Civil Rights Act of 1964, be excluded from participation in, be denied the benefits of, or be otherwise discriminated against regarding this RFP process. The college is committed to a program of equal employment opportunity regardless of race, color, creed, sex, age, nationality, disability, or sexual orientation. The successful contractor must agree to comply with Garrett College's equal opportunity requirements.

Response to the RFP must address the following criteria:

- Completion of Proposal Form and other forms specified in the project specifications.
- A narrative describing the firm's proposed approach to the construction. Firm should discuss any major pitfalls or potential problems noted in the drawings or specs. Explain why your firm is the best contractor for this project. Identify and discuss proposed timeline for project including proposed start/finish dates, how you intend to handle inclement weather, your expectation for potential delays, etc.
- Resumes of proposed site construction team.
- A preliminary list of proposed principal subcontractors.

Proposals will be evaluated according to the following criteria

- 60% - Proposed lump sum price
- 30% - Proposed approach narrative
- 10% - Strength of proposed project management and use of local subcontractors.

In accordance with Maryland Law, the college reserves the right to ask the top firms with the best overall proposals to conduct on campus interviews to expound/justify their proposals. In addition, the college may ask that the top firms revise their initial proposals by submitting best and final offers. As a result, information contained in the proposals will be treated as confidential and will not be disclosed publically or to other offerors until after a contract has been negotiated and signed by both parties.

AIA® Document A701™ – 1997

Instructions to Bidders

for the following PROJECT:
(Name and location or address)
Garrett College STEM Building
687 Moser Road
McHenry, Maryland 21541

THE OWNER:
(Name, legal status and address)
Garrett College Board of Trustees
687 Mosser Road
McHenry, Maryland 21541

THE ARCHITECT:
(Name, legal status and address)
Grimm + Parker Architecture, Inc.
11720 Beltsville Drive, Suite #600
Calverton, Maryland 20705
Project #21620

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.

TABLE OF ARTICLES

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement or Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders, the bid form, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 The Bidder by making a Bid represents that:

§ 2.1.1 The Bidder has read and understands the Bidding Documents or Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction.

§ 2.1.2 The Bid is made in compliance with the Bidding Documents.

§ 2.1.3 The Bidder has visited the site, become familiar with local conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents.

§ 2.1.4 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 COPIES

(Paragraph deleted)

§ 3.1.2 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the Advertisement or Invitation to Bid, or in supplementary instructions to bidders.

§ 3.1.3 Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

§ 3.1.4 The Owner and Architect may make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

§ 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

§ 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall at once report to the Architect errors, inconsistencies or ambiguities discovered.

§ 3.2.2 Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the Architect at least seven days prior to the date for receipt of Bids.

§ 3.2.3 Interpretations, corrections and changes of the Bidding Documents will be made by Addendum. Interpretations, corrections and changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them.

§ 3.3 SUBSTITUTIONS

(Paragraph deleted)

§ 3.3.2 No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.3 If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

§ 3.3.4 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 ADDENDA

§ 3.4.1 Addenda will be transmitted to all who are known by the issuing office to have received a complete set of Bidding Documents.

§ 3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 PREPARATION OF BIDS

§ 4.1.1 Bids shall be submitted on the forms included with the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and figures. In case of discrepancy, the amount written in words shall govern.

§ 4.1.4 Interlineations, alterations and erasures must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change."

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall make no additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. The Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

§ 4.2 BID SECURITY

§ 4.2.1 Each Bid shall be accompanied by a bid security in the form and amount required if so stipulated in the Instructions to Bidders. The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and will, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. The amount of the bid security shall not be forfeited to the Owner in the event the Owner fails to comply with Section 6.2.

§ 4.2.2 If a surety bond is required, it shall be written on AIA Document A310, Bid Bond, unless otherwise provided in the Bidding Documents, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney.

§ 4.2.3 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and bonds, if required, have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn or (c) all Bids have been rejected.

§ 4.3 SUBMISSION OF BIDS

§ 4.3.1 All copies of the Bid, the bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.2 Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.

§ 4.3.3 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.4 Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids will not be considered.

§ 4.4 MODIFICATION OR WITHDRAWAL OF BID

§ 4.4.1 A Bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and each Bidder so agrees in submitting a Bid.

§ 4.4.2 Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date- and

time-stamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid.

§ 4.4.3 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

§ 4.4.4 Bid security, if required, shall be in an amount sufficient for the Bid as resubmitted.

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 OPENING OF BIDS

At the discretion of the Owner, if stipulated in the Advertisement or Invitation to Bid, the properly identified Bids received on time will be publicly opened and will be read aloud. An abstract of the Bids may be made available to Bidders.

§ 5.2 REJECTION OF BIDS

The Owner shall have the right to reject any or all Bids. A Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.

§ 5.3 ACCEPTANCE OF BID (AWARD)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's own best interests.

§ 5.3.2 The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 CONTRACTOR'S QUALIFICATION STATEMENT

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request, a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.

§ 6.2 OWNER'S FINANCIAL CAPABILITY

The Owner shall, at the request of the Bidder to whom award of a Contract is under consideration and no later than seven days prior to the expiration of the time for withdrawal of Bids, furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. Unless such reasonable evidence is furnished, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 SUBMITTALS

§ 6.3.1 The Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, after notification of selection for the award of a Contract, furnish to the Owner through the Architect in writing:

.1 a designation of the Work to be performed with the Bidder's own forces;

.2 names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the Work; and

.3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder in writing if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option,

(1) withdraw the Bid or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or Alternate Bid to cover the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 BOND REQUIREMENTS

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds may be secured through the Bidder's usual sources.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 If the Owner requires that bonds be secured from other than the Bidder's usual sources, changes in cost will be adjusted as provided in the Contract Documents.

§ 7.2 TIME OF DELIVERY AND FORM OF BONDS

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to be commenced prior thereto in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. Both bonds shall be written in the amount of the Contract Sum.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment Is a Stipulated Sum.

SECTION 00 21 14 – SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

The Instructions to Proposing Contractors of the Contract are the Instructions to Bidders, AIA Document A701, 1997 Edition, Articles 1 through 8, hereinafter referred to as the "INSTRUCTIONS TO BIDDER". Pre-qualified Contractors submitting proposals are hereinafter referred to as either "bidders" or "proposing Contractors"

ARTICLE 3 - BIDDING DOCUMENTS

3.1 COPIES

3.1.1 Revise to read "Proposing Contractors may obtain downloadable (PDF Format) proposal documents, specifications, and drawings on-line, at no charge, by logging onto the following website:

http://www.garrettcollege.edu/stem/prequalified-contractors

3.3 SUBSTITUTIONS

3.3.2 Revise to read "No substitution will be considered prior to receipt of Proposals unless written request for approval has been received by the College Procurement Office at least fourteen (14) days prior to the date for receipt of Proposals. The College shall refer this information to the Architect for decision. The Architect's decision of approval or disapproval of the proposed substitution shall be final."

3.4 ADDENDA

3.4.5 Add as follows: "Addenda will become part of the Contract Documents when the Construction Contract is executed."

3.4.6 Add as follows: "All questions regarding the proposal shall be directed in writing to the College and the Architect no later than noon on February 14, 2017. Contractors are advised that the Architect reserves the right to use its best judgement in responding to any questions received after the above stated cut-off date for questions. Questions shall be submitted in writing via e-mail and sent to the following e-mail addresses: rmorrison@gparch.com, and gcstem@garrettcollege.edu.

ARTICLE 4 – BIDDING PROCEDURES

4.1 PREPARATION OF BIDS

4.1.1 Revise to read "Proposals shall be submitted on forms identical to the forms included with the Proposal and Contract Documents. Proposals shall be submitted in the quantity stated under revised section 4.3.5.

4.2 **BID SECURITY**

4.2.4 Add as follows: "Each proposal shall be accompanied by a bid bond or guarantee of five percent (5%) of the amount of the bid, which shall be a certified check, cashier's check or bid bond payable to Garrett College. The sureties of all bonds shall be of such surety company or companies as are approved by the State of Maryland and are authorized to transact business in Garrett County. Such bid bond or check shall be submitted with the understanding that it shall guarantee that the proposing Contractor will not withdraw such proposal during the period of 90 days following the opening of proposals: that if such bid is accepted, the proposing Contractor will accept and perform under the terms of the Contract. The bid guarantee will be returned upon award of the Contract.

4.3 SUBMISSION OF BIDS

4.3.2 Add as follows: "Late proposals will not be considered and will be logged in and then returned to the Contractor unopened. ALL PROPOSALS ARE DUE AT THE TIME AND ADDRESS LISTED IN THE PROPOSAL INVITATION ."

4.3.4 Revise to read "oral, telephone, telegraphic, emailed or faxed proposals are invalid and will not receive consideration."

4.3.5 Add as follows: "One original and three (3) copies of the Proposal shall be submitted, signed, sealed and addressed "Garrett College STEM Building."

4.4 MODIFICATION OR WITHDRAWAL OF BID

4.4.1 Revise to read as follows: "A proposal may not be modified, withdrawn or cancelled by the proposing Contractor for a period of 90 days after the time and date of the bid.

4.4.2 Revise to read "Contractors are responsible for the accuracy of their Proposals. Proposals may be amended or withdrawn by the proposing Contractor up to the date and time designated for receipt of the proposals."

4.4.5 Add as follows: "After the proposal due date, in the event of an error, proposals may not be amended. The College does, however, reserve the right to contact any or all proposing Contractors to verify information included in the proposal and to clarify any questions regarding the information submitted in the proposal, in order to ascertain whether the proposal received are both responsive and responsible. The College also reserves the right to waive any formalities, informalities or technicalities as are deemed appropriate, necessary or in the College's best interest. Specific to cost proposals, in the event of unit price and its extension, the unit price will govern."

ARTICLE 5 – CONSIDERATION OF BIDS

5.1 **OPENING THE BIDS**
Delete paragraph in its entirety

5.3 **ACCEPTANCE OF BID (AWARD)**

5.3.1 Revise to read "The Owner shall have the right to waive informalities, formalities or irregularities in a proposal received; to request any additional information necessary to clarify or determine whether the proposal is in fact responsive and responsible; and to accept the proposal only, if, in the Owner's judgement, it is reasonable and in the Owner's best interest to accept the proposal."

5.3.3 Add as follows: Proposing Contractors are advised that this project is to be jointly funded by both State and local funds and therefore is subject to all applicable Federal, State and local laws, codes, regulations and Board of Public Works Advisories. To that end, determination of the successful bidder may be subject to any and all applicable State laws, regulations, codes and Board of Public Works Advisories. These may include but not be limited to economic benefits factors, reciprocal preference, etc.

ARTICLE 6 – POST BID INFORMATION

6.1 CONTRACTOR'S QUALIFICATION STATEMENT: Replace 6.1.1 with:

6.1.1 "The Owner reserves the right to request any additional information it deems necessary to determine the overall responsibility and responsiveness of a proposing Contractor(s) and the respective proposal(s) and also the right to make such investigations as are deemed necessary to determine the ability of the proposing Contractor to perform the work specified. This may include, but is not limited to, the right to request any or all information necessary to clarify a bid, a copy of a proposing Contractor's current, audited financial statements which have been prepared within the last six (6) months, additional references, a list of projects currently under way, etc. The Owner reserves the right to reject any bid if the evidence submitted by, or the investigation of such proposing Contractor fails to satisfy the Owner that the bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein. Conditional proposals will not be accepted."

ARTICLE 7 – PERFORMANCE AND PAYMENT BOND REQUIREMENTS

7.1 BOND REQUIREMENTS: Replace 7.1.1 as follows:

7.1.1 "The Owner shall require the selected proposing Contractor to furnish a Performance Bond and a Labor and Materials Bond covering the faithful performance of the Contract and the payment of all obligations arising thereunder in such form and amount as specified in the Specifications. Unless otherwise approved, bonds shall be obtained from the same surety that furnished the Bid security. The issuing surety must be licensed to write bonds in the State of Maryland. The Bond shall be executed on AIA Document A312, in an amount equal to 100 percent of the Contract Sum."

7.2 TIME AND DELIVERY AND FORM OF BONDS

7.2.1 Revise to read " the proposing Contractor shall deliver the required bond to the Owner not later than 10 days following the execution of the Contract and before

any work begins. If the work is commenced prior thereto, in response to a letter of intent, the proposing Contractor shall furnish and deliver such bonds to the Owner, prior to commencement of work."

7.2.2 Revise to read "the bonds shall be issued on AIA Document A312."

7.2.3 Revise to read "The bonds shall be dated on or before the date of the Contract in accordance with subparagraph 7.2.1."

ARTICLE 9 – SUPPLEMENTARY INFORMATION

9.1 PRE-BID CONFERENCE: A pre-proposal conference will be held on February 7th at 11:00 A.M. at the College in building 200. Response to any questions regarding the project, bid specifications or process will be handled at the pre-bid conference and communicated to all bidders of record via formal written addenda to the bid, as deemed appropriate and necessary.

9.2 PERMITS: The Owner shall obtain zoning permits and easements. The Owner shall apply for the building permit, but the Contractor shall pick up the permit and pay for the permit and charge the cost of the permit fees to the allowance 2. All other permits, trade permits, fees, certificates and licenses necessary for the execution and completion of the work are the responsibility of the Contractor and all such fees are to be included in the Bid Price.

A copy of the approved and stamped plans will be provided to the Contractor at the commencement of work. These documents are to be kept in good condition at the job site as required by Garrett County and the State of Maryland.

9.3 ALL PROPOSAL AWARDS are subject to final approval of contract award by the Garrett College Board of Trustees. Proposing Contractors are reminded that funding for this project comes from both State and local funds and thus final award of contract is subject to the availability of funding for this project. Moreover, final award of contract is subject to all applicable Federal, State and local laws, codes, regulations and Board of Public Works Advisories, and must also be approved by the State of Maryland Board of Public Works.

9.4 The Contractor shall be responsible to the College and the State for acts and omissions of his employees, subcontractors and suppliers at any tier of the project, and their agents and employees performing any of the work to or for the project.

END OF SECTION

SECTION 00 42 00 - BID FORM

Date:_____

Project: Garrett Stem Building # 200 Renovation and Addition
Garrett College
687 Mosser Road
McHenry, Maryland 21541

Bid Submitted By: _____
Name

_____
Address

_____
City, State, Zip

_____
Telephone Number

Submitted To: Office of the Vice President of Administration & Finance.
Garrett College
687 Mosser Road
McHenry, Maryland 21541

The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Contract Documents to complete all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the Contract Documents.

BIDDER has examined the site and locality where the Work is to be performed, the legal requirements (Federal, State and local laws, ordinances, rules and regulations) and the conditions affecting cost, progress or performance of the Work and has made such independent investigations as BIDDER deems necessary.

The Owner reserves the right to select or reject any, all or none of the Alternates in any order.

The Owner may retain the sum of **One Thousand, Six Hundred Dollars ($1,600.00)** as liquidated damages for each calendar day in excess of the Substantial Completion Date. In addition, The Owner may retain the sum of **Five Hundred Dollars ($500.00)** as liquidated damages for each calendar day in excess of the Final Completion Date.

I/We agree to achieve Substantial Completion of the Work by **360 days following Notice to Proceed**.
I/We agree to achieve Final Completion of the Work within **60 days following Substantial Completion.**

Receipt of the following addenda to the drawings and specifications is hereby acknowledged:

Addendum No. _____ Dated _____ Addendum No. _____ Dated _____
Addendum No. _____ Dated _____ Addendum No. _____ Dated _____
Addendum No. _____ Dated _____ Addendum No. _____ Dated _____

BIDDER hereby agrees to furnish all labor, materials, equipment and services required to erect and complete the Project in strict accordance with the Contract Documents for the following price (Note that the base bid price below shall include the cost of all allowances):

Base Bid Price:

The sum of _____ Dollars ($_____)

Add Alternates:

ADD ALTERNATE NO. 1: Adding a building mounted wind turbine:
_____ Dollars ($_____)
ADD ALTERNATE NO. 2: Provide an energy dashboard, related software and tie in to mechanical, electrical and plumbing systems:
_____ Dollars ($_____)
ADD ALTERNATE NO. 3: Add ice and snow melt system in entrance sidewalks:
_____ Dollars ($_____)

Allowances:

The following Lump Sum Allowances shall be included in the Base Bid:

A. Allowance No. 1: Unforeseen conditions contingency allowance
   1. Provide in the Base Bid an allowance of $50,000 for unforeseen conditions.
B. Allowance No. 2: Building Permit and Utility company fees
   1. Provide in the Base Bid an allowance of $20,000 for building permit fees and utility company fees.

Informational Prices:

Provide informational pricing for the items listed below. Note that the cost of these items shall be part of the base bid price listed on the bid form and the intent of these informational prices is just to determine the cost for the items listed below.

A. Contactor shall furnish and install a complete 8-inch waterline extension including the water line, fittings, bedding, select backfill, all excavation, surface restoration, asphalt, concrete, stone, and for all materials, labor, equipment, tools, and incidentals necessary to complete the work to the limits shown on the Contract documents.

   _____ Dollars ($_____)

Unit Prices:

Provide unit price cost for the items listed below. Note that unit costs are only used for requested additions or reductions in the base bid work.

A.	Furnish and install riprap Class 1	Ton	$_____
B.	Earth excavation-machine and disposal on-site	Cu/yd	$_____
C.	Earth excavation-machine and disposal offsite	Cu/yd	$_____
D.	Earth excavation-hand and disposal on-site	Cu/yd	$_____
E.	Earth excavation-hand and disposal offsite	Cu/yd	$_____
F.	Trench excavation and soil disposal on-site	Cu/yd	$_____
G.	Trench excavation and soil disposal offsite	Cu/yd	$_____
H.	Excavate and legally dispose offsite contaminated soil	Cu/yd	$_____
I.	Rock Removal and Offsite Disposal (Hydraulic Hammer)	Ton	$_____
J.	Rock Removal and Offsite Disposal (Blasting)	Ton	$_____
K.	Unsuitable Material Excavation and Offsite Disposal	Cu/yd	$_____
L.	Suitable Material Import, Placement and Compaction	Cu/yd	$_____
M.	Undercut, dispose on-site, refill with MSHA #2 or #57 stone compact per specified requirements at trench areas only	Cu/yd	$_____
N.	Undercut, dispose offsite, and refill with CR-6 and compact per specified requirements at trench areas only	Cu/yd	$_____
O.	Undercut, dispose on-site, refill with MSHA #2 or #57 stone compact per specified requirements in open areas only	Cu/yd	$_____
P.	Undercut, dispose offsite, refill with CR-6 compact per specified requirements in open areas only	Cu/yd	$_____

Affidavit:

_____, being first duly sworn deposes and says that he is an officer in the building construction organization known as_____, and the party making a certain proposal or bid dated _____, **2017**, and that this bid is genuine and not collusive or sham; that said bidder has not colluded, conspired, connived or agreed, directly or indirectly, with any bidder or person to put in a sham bid or to refrain from bidding, and has not in any manner, directly or indirectly, sought by agreement or collusion, or communication or conference, with any person to fix the bid prices of the affidavit or any other bidder, or to fix any overhead, profit or cost element of said bid price, or that of any bidder, or to secure any advantage against the Owner or any other person interested in the proposed contract; and that all statements in said proposal or bid are true.

Signature of:

_____
Bidder if the bidder is an individual

_____
Partner if the bidder is a partnership

_____
Officer if the bidder is a corporation

Registered Maryland Contractor No.: _____.

Subscribed and sworn before me this ____ day of _____, 20___.

_____
Notary Public

My commission expires: _____, 20____.

NOTE: The following items shall be completed, attached to this Bid Form and shall be submitted herewith:

1. Bid Bond.
2. Form of MBE Utilization Affidavit.
3. List of major subcontractors
4. Resumes of project management team and superintendent to be used
5. Approach Narrative

*****

GARRETT COLLEGE
EXPERIENCE. EXPLORE. EXCEL.

FORM OF MBE UTILIZATION AFFIDAVIT

The undersigned as General Contractor does hereby make the following affidavit.

I acknowledge the Minority Business Enterprise participation goal of 10% of the total contract dollar value directly or indirectly from Certified minority business enterprise. I am committed to making a good faith effort to achieve this goal for this contract for Garrett College.

In the solicitation of subcontract quotations or offers all Minority Business Enterprise (MBE) subcontractors were provided not less than the same information and amount of time to respond to the solicitations.

The solicitation process was conducted in such a manner so as to otherwise not place MBE subcontractors at a competitive disadvantage to non-MBE subcontractors.

I do solemnly declare and affirm under the penalty of perjury that the contents of the foregoing document are true and correct to the best of my knowledge, information and belief.

Signature of Applicant: _____

Printed Name: _____

_____

Representing: _____

Date: _____

Sworn and subscribed before me this_____day of_____, 2016.

WHEREAS, I hereunto set my hand and Notary Seal.

_____

My Commission Expires:

_____

AIA® Document A101™ – 2007

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

AGREEMENT made as of the 1 day of February in the year 2017
(In words, indicate day, month and year.)

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

Garrett College Board of Trustees
687 Mosser Road
McHenry, Maryland 21541

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

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

Garrett College STEM Building
687 Moser Road
McHenry, Maryland 21541
This project includes renovations and additions to Building 200 at Garrett College to accommodate the science and engineering programs at the College. Functions include teaching labs for Biology, Chemistry, Physical Sciences and Engineering; classrooms; administrative space; and a student lounge. The total resulting area is to be approximately 21,500 gross square feet plus associated site work.

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

Grimm + Parker Architecture, Inc.
11720 Beltsville Drive, Suite #600
Calverton, Maryland 20705
Project #21620

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.

AIA Document A201™–2007, 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.

TABLE OF ARTICLES

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 the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.
(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

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

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than ( ) days from the date of commencement, or as follows:
(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

Portion of Work	Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

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 ($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

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

Item	Units and Limitations	Price Per Unit ($0.00)

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price

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 certified amount 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 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, unless objected to by the Architect, 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 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of ten percent (10 %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add 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), less retainage of ten percent (10 %);

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:
(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

Retainage will be reduced to five percent (5%) at substantial completion. No further reduction in Retainage shall be made until all Punch List work is completed.

§ 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 Section 12.2.2 of AIA Document A201–2007, 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:

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as 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 Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, 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.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[X] Litigation in a court of competent jurisdiction in the state of Maryland.

[ ] Other *(Specify)*

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 A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 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.)

%

§ 8.3 The Owner's representative:
(Name, address and other information)

§ 8.4 The Contractor's representative:
(Name, address and other information)

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

§ 8.6 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 9.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

Section	Title	Date	Pages

§ 9.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

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

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.
(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of insurance or bond	Limit of liability or bond amount ($0.00)

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

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

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)
Garrett College Board of Trustees
687 Mosser Road
McHenry, Maryland 21541

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)
Garrett College STEM Building
687 Mosser Road,
McHenry, Maryland

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 18

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

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

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)
Garrett College Board of Trustees
687 Mosser Road
McHenry, Maryland 21541

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		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		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)
Garrett College Board of Trustees
687 Mosser Road
McHenry, Maryland 21541

CONSTRUCTION CONTRACT
Date:
Amount: $
Description:
(Name and location)
Garrett College STEM Building
687 Mosser Road
McHenry, Maryland 21541

BOND
Date:
(Not earlier than Construction Contract Date)

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 16

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		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:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)
Garrett College Board of Trustees
687 Mosser Road
McHenry, Maryland 21541

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.

Init.
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§ 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		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:	_____	Signature:	_____
Name and Title:		Name and Title:	
Address:		Address:	

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)
Garrett College Board of Trustees
687 Mosser Road
McHenry, Maryland 21541

BOND AMOUNT: $

PROJECT:
(Name, location or address, and Project number, if any)
Garrett College STEM Building
687 Mosser Road
McHenry, Maryland 21541

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.

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.

Signed and sealed this day of ,

	(Contractor as Principal) *(Seal)*
(Witness)	*(Title)*
	(Surety) *(Seal)*
(Witness)	*(Title)*

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
Garrett College STEM Building
687 Moser Road
McHenry, Maryland 21541

THE OWNER:
(Name, legal status and address)
Garrett College Board of Trustees
687 Moser Road
McHenry, Maryland 21541

THE ARCHITECT:
(Name, legal status and address)
Grimm + Parker Architecture, Inc.
11720 Beltsville Drive, Suite #600
Calverton, Maryland 20705
Project #21620

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.

TABLE OF ARTICLES

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(Topics and numbers in bold are section headings.)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

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

§ 1.1.2 THE CONTRACT

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

§ 1.1.3 THE WORK

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

§ 1.1.4 THE PROJECT

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

§ 1.1.5 THE DRAWINGS

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

§ 1.1.6 THE SPECIFICATIONS

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

§ 1.1.7 INSTRUMENTS OF SERVICE

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

§ 1.1.8 INITIAL DECISION MAKER

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

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

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

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

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

§ 1.3 CAPITALIZATION

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

§ 1.4 INTERPRETATION

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

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

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

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

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

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

ARTICLE 2 OWNER

§ 2.1 GENERAL

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

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

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

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

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

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

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

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

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

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

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

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

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

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

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

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

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

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

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

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

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

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

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

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

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

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

§ 3.4 LABOR AND MATERIALS

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

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

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

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

§ 3.5 WARRANTY

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

§ 3.6 TAXES

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

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

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

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

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

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

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

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

§ 3.8 ALLOWANCES

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 SUPERINTENDENT

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

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

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

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

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

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

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

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

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

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

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

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

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

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

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

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

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

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

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

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

§ 3.13 USE OF SITE

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

§ 3.14 CUTTING AND PATCHING

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

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

§ 3.15 CLEANING UP

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

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

§ 3.16 ACCESS TO WORK

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

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

§ 3.18 INDEMNIFICATION

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

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

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

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

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

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

§ 4.2 ADMINISTRATION OF THE CONTRACT

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

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

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

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

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

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

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

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

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

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

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

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

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

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

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

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

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

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

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

§ 5.3 SUBCONTRACTUAL RELATIONS

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

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

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 MUTUAL RESPONSIBILITY

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

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

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

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

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

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

§ 6.3 OWNER'S RIGHT TO CLEAN UP

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

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

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

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

§ 7.2 CHANGE ORDERS

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

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

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

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

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

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

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

.4 As provided in Section 7.3.7.

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

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

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

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

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

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

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

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

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

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

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

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

§ 7.4 MINOR CHANGES IN THE WORK

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

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

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

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

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

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

§ 8.2 PROGRESS AND COMPLETION

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

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

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

§ 8.3 DELAYS AND EXTENSIONS OF TIME

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

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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

§ 9.2 SCHEDULE OF VALUES

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

§ 9.3 APPLICATIONS FOR PAYMENT

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

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

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

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

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

§ 9.4 CERTIFICATES FOR PAYMENT

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

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

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

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

.1 defective Work not remedied;

.2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a separate contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

§ 9.6 PROGRESS PAYMENTS

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

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

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

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

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

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

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

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding

dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

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

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

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

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

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

§ 9.9 PARTIAL OCCUPANCY OR USE

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

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

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

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

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

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

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

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

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

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

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

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

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

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

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

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

§ 10.3 HAZARDOUS MATERIALS

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

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

extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

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

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

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

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

§ 10.4 EMERGENCIES

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

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

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

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the

Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

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

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

§ 11.2 OWNER'S LIABILITY INSURANCE

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

§ 11.3 PROPERTY INSURANCE

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

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

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

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

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

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

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

§ 11.3.3 LOSS OF USE INSURANCE

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

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

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

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

§ 11.3.7 WAIVERS OF SUBROGATION

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

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

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

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

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

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

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

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

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

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

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

nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

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

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

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

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

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

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

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

§ 13.2 SUCCESSORS AND ASSIGNS

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

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

§ 13.3 WRITTEN NOTICE

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

§ 13.4 RIGHTS AND REMEDIES

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

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

§ 13.5 TESTS AND INSPECTIONS

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

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

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

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

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

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

§ 13.6 INTEREST

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

§ 13.7 TIME LIMITS ON CLAIMS

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

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

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

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

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

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

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

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

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

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

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

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

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

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

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

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

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

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

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

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

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

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

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

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

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

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

§ 15.1.2 NOTICE OF CLAIMS

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

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

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

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

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

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

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

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

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

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

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

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

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

§ 15.2 INITIAL DECISION

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

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

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

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

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

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

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

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

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

§ 15.3 MEDIATION

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

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

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

§ 15.4 ARBITRATION

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

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

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

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

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration

permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

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

SECTION 00 73 00 - SUPPLEMENTARY GENERAL CONDITIONS

A. General

The following supplements modify, change, delete from or add to the "General Conditions of the Contract for Construction," AIA Document A201, 2007 Edition. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered provisions of the General Conditions shall remain in effect.

B. Article 7: Changes in the Work

1. Add the following:

"7.1.4 Allowable Overhead And Profit On Changes In Work

7.1.4.1 For the Contractor, for Work performed by the Contractor's own forces, the combined overhead and profit shall be based on the following schedule:

Value of Work	Combined Overhead & Profit
$ 0 - $ 1,000	15 percent
$ 1,001- $ 5,000	10 percent
$ 5,001 - $10,000	8 percent
$10,001- $25,000	5 percent
$25,000 and over	Negotiated but not more than 5 percent.

7.1.4.2 For the Contractor, for Work performed by the Contractor's Subcontractor, the overhead and profit allowance shall be 3 percent of the amount due the Subcontractor.

7.1.4.3 For each Subcontractor involved, for Work performed by that Subcontractor's own forces, the combined overhead and profit allowance shall be based on the same schedule above.

7.1.4.4 In order to facilitate checking quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs, including labor, materials and Subcontracts. Labor and materials shall be itemized in the manner described above. Where major cost items are Subcontracts, they shall be itemized also. In no case will a change be approved without such itemization. The Contractor shall not be allowed at add costs to any change for additional superintendent or project manager's time."

7.1.5 "The Owner may initiate the change order procedure by issuing a request for proposal to the Contractor. The Contractor shall, within the time period stated in the request for proposal, submit to the Owner and Architect for evaluation detailed information concerning the cost and time adjustments, if any, as may be necessary to perform the proposed change order work."

C. Article 9: Payments and Completion

1. **9.11** Add and insert the following:
"9.11 LIQUIDATED DAMAGES

9.11.1 . The Contractor acknowledges that 'Time is of the Essence' and agrees that the Work must be Substantially Complete with all building systems fully operational and an Occupancy Permit obtained no later than the proposing Contractor's **Proposed Date of Substantial Completion** and the Work must be Finally Complete no later than sixty (60) days after the Substantial Completion date (the 'Final Complete date').

The Contractor agrees that the Owner shall retain One Thousand, Six Hundred Dollars ($1,600) from the amount of compensation to be paid the Contractor for each calendar day after the scheduled date for substantial completion. Once Substantial Completion is achieved, the sum of Five Hundred Dollars ($500) shall be retained for each day past 60 days from the actual Substantial Completion date it take the Contractor to achieve Final Completion.

The Contractor acknowledges and agrees that the Owner has established this liquidated damages system and selected the liquidated damages amounts as the proper measure of damages which the Owner will suffer and incur per day by the failure of the Contractor to complete the Work by the agreed Contract Time and established Substantially Complete Date.
The Contractor and the Contractor's surety stipulate that these liquidated damages provisions are reasonable, valid, and enforceable and waive any right to claim otherwise and waives any defense as to the validity of any liquidated damages stated herein as they may appear on the grounds that such liquidated damages are void as penalties or are not reasonably related to actual damages. The Contractor and the Owner agree that this provision and these requirements are not to be construed as a penalty but instead these requirements are an attempt to fairly compensate Owner for the substantial consequential damages which the Owner will suffer if the Contractor fails to perform by the Contract Time and dates established hereunder which damages are difficult to determine using standard contract damages methods. The liquidated damages requirements shall be an exception to any waiver or other elimination of the Owner's right to recover consequential damages. The Contractor acknowledges that Owner would not enter into a contract with the Contractor for the Work without the inclusion of these liquidated damages requirements."

9.11.2 In addition to Liquidated Damages, the Contractor shall pay to the Owner the cost of those extended services incurred by the Owner (including Architect), beginning at 61 days from the date of Substantial Completion required by the Contract and until Final Completion is achieved.

END OF SUPPLEMENTAL GENERAL CONDITIONS

Maryland Division of Labor & Industry

STATE OF MARYLAND

DEPARTMENT OF LABOR, LICENSING AND REGULATION
DIVISION OF LABOR AND INDUSTRY
PREVAILING WAGE SECTION
1100 N. Eutaw Street, Room 607
Baltimore, MD 21201
(410) 767-2342

11/28/2016

REQUEST FOR ADVERTISEMENT AND NOTICE TO PROCEED

Kathleen Meagher - Procurement Officer
Garrett College
687 Mosser Rd
McHenry, MD 21541

Re: STEM Building Renovation & Addition

Project No: 445

Enclosed please find the Prevailing Wage Determination and Instructions for Contractors for the project referenced above.

Upon advertisement for bid or proposal of this project, you are requested to submit to this office the date and name of publication in which such advertisement appeared.

Once awarded, you are further directed to submit to this office, the NOTICE TO PROCEED for the project, complete with the date of notice, the name of the general contractor, and the dollar amount of the project. In addition, we ask that a representative of the prevailing wage Unit be invited to attend the Pre-Construction Conference.

Any questions concerning this matter may be referred to PrevailingWage@dllr.state.md.us

Sincerely,

Enclosures
Wage Determination
Instruction for the Contractor

Prevailing Wage Unit

PREVAILING WAGE INSTRUCTIONS FOR THE CONTRACTOR & SUBCONTRACTOR

The contractor shall electronically submit completed copies of certified payroll records to the Commissioner of Labor & Industry, Prevailing Wage Unit by going on-line to https://www.dllr.state.md.us/prevwage and following the instructions for submitting payroll information (NOTE: A contractor must register prior to submitting on-line certified payroll information).

If you have technical questions regarding electronic submittal, contact the Department at prevailingwage@dllr.state.md.us.

All certified payroll records shall have an accurate week beginning and ending date. The contractor shall be responsible for certifying and submitting to the Commissioner of Labor and Industry, Prevailing Wage Unit all of their subcontractors' payroll records covering work performed directly at the work site. By certifying the payroll records, the contractor is attesting to the fact that the wage rates contained in the payroll records are not less than those established by the Commissioner as set forth in the contract, the classification set forth for each worker or apprentice conforms with the work performed, and the contractor or subcontractor has complied with the provisions of the law.

A contractor or subcontractor may make deductions that are (1) required by law; (2) required by a collective bargaining agreement between a bona fide labor organization and the contractor or subcontractor; or (3) contained in a written agreement between an employee and an employer undertaken at the beginning of employment, if the agreement is submitted by the employer to the public body awarding the public work and is approved by the public body as fair and reasonable.

A contractor or subcontractor is required to submit information on-line on their fringe benefit packages including a list of fringe benefits for each craft employed by the contractor or subcontractor, by benefit and hourly amount. Where fringe benefits are paid in cash to the employee or to an approved plan, fund, or program, the contribution is required to be indicated.

Payroll records must be electronically submitted and received within 14 calendar days after the end of each payroll period. If the contractor is delinquent in submitting payroll records, processing of partial payment estimates may be held in abeyance pending receipt of the records. In addition, if the contractor is delinquent in submitting the payroll records, the contractor shall be liable to the contracting public body for liquidated damages. The liquidated damages are $10.00 for each calendar day the records are late.

Only apprentices registered with the Maryland Apprenticeship and Training Council shall be employed on prevailing wage projects. Apprentices shall be paid a percentage of the determined journey person 's wage for the specific craft.

Overtime rates shall be paid by the contractor and any subcontractors under its contracts and agreements with their employees which in no event shall be less than time and one-half the prevailing hourly rate of wages for all hours worked in excess of ten (10) hours in any one calendar day; in excess of forty (40) hours per workweek; and work performed on Sundays and legal holidays.

Contractors and subcontractors employing a classification of worker for which a wage rate was not issued SHALL notify the Commissioner of Labor & Industry, Prevailing Wage Unit, for the purpose of obtaining the wage rate for said classification PRIOR TO BEING EMPLOYED on the project. To obtain a prevailing wage rate which was NOT listed on the Wage Determination, a contractor or subcontractor can look on the DLLR webpage under prevailing wage.

Contractors and subcontractors shall maintain a valid copy of proper State and county licenses that permit the contractor and a subcontractor to perform construction work in the State of Maryland. These licenses must be retained at the worksite and available for review upon request by the Commissioner of Labor and Industry’s designee.

**Each contractor under a public work contract subject to Section 17-219 shall:

1. Post a clearly legible statement of each prevailing wage rate to be paid under the public work contract; and
2. Keep the statement posted during the full time that any employee is employed on the public work contract.
3. The statement of prevailing wage rates shall be posted in a prominent and easily accessible place at the site of the public work.

Penalty - Subject to Section 10-1001 of the State Goverment Article, the Commissioner may impose on a person that violates this section a civil penalty of up to $50.00 per violation.

Under the Maryland Apprenticeship and Training Council requirements, consistent with proper supervision, training and continuity of employment and applicable provisions in collective bargaining agreements, a ratio of one journey person regularly employed to one apprentice shall be allowed. No deviation from this ratio shall be permitted without prior written approval from the Maryland Apprenticeship and Training Council.

Laborers may NOT assist mechanics in the performance of the mechanic's work, NOR USE TOOLS peculiar to established trades.

ALL contractors and subcontractors shall employ only competent workers and apprentices and may NOT employ any individual classified as a HELPER or TRAINEE on a prevailing wage project.

The State Apprenticeship and Training Fund (Fund) law provides that contractors and certain subcontractors performing work on certain public work contracts are required to make contributions toward apprenticeship. See §17-601 through 17-606, State Finance and Procurement, Annotated Code of Maryland. Contractors and subcontractors have three options where they can choose to make their contributions: (1) participate in a registered apprenticeship training program; (2) contribute to an organization that has a registered apprenticeship training program; or (3) contribute to the State Apprenticeship and Training Fund.

The Department of Labor, Licensing and Regulation (DLLR) is moving forward with final adoption of regulations. The regulations were published in the December 14, 2012 edition of the Maryland Register.

IMPORTANT: Please note that the obligations under this law will become effective on JULY 1, 2013. This law will require that contractors and certain subcontractors make contributions toward apprenticeship and report those contributions on their certified payroll records that they submit pursuant to the prevailing wage law.

The Department is offering outreach seminars to any interested parties including contractors, trade associations, and any other stakeholders. Please contact the Department at prevailingwage@dllr.state.md.us or (410) 767-2968 for seminar times and locations. In addition, information regarding this law will be provided at pre-construction meetings for projects covered by the Prevailing Wage law.

For additional information, contact:
Division of Labor and Industry
Maryland Apprenticeship and Traning
1100 North Eutaw Street, Room 606
Baltimore, Maryland 21201
(410) 767-2246
E-Mail Address: matp@dllr.state.md.us.

STATE OF MARYLAND

DEPARTMENT OF LABOR, LICENSING AND REGULATION
DIVISION OF LABOR AND INDUSTRY
PREVAILING WAGE SECTION
1100 N. Eutaw Street, Room 607
Baltimore, MD 21201
(410) 767-2342

The wage rates to be paid laborers and mechanics for the locality described below is announced by order of Commissioner of Labor and Industry.

It is mandatory upon the successful bidder and any subcontractor under him, to pay not less than the specific rates to all workers employed by them in executing contracts in this locality. Reference: Annotated Code of Maryland State Finance and Procurement, Section 17-201 thru 17-226.

These wage rates were taken from the locality survey of 2015 for Garrett County, issued pursuant to the Commissioner's authority under State Finance and Procurement Article Section 17-209, Annotated Code of Maryland or subsequent modification.

**Note: If additional Prevailing Wage Rates are needed for this project beyond those listed below, contact the Prevailing Wage Unit. Phone: (410) 767-2342, email: prevailingwage@dllr.state.md.us.

Name and Title of Requesting Officer: Kathleen Meagher - Procurement Officer

Department, Agency or Bureau: Garrett College
687 Mosser Rd McHenry, MD 21541

Project Number
445

Determination Number
32122

Location and Description of work:

Garrett County: Renovate the existing 200 Building (15000 sq ft) and build a 6500 sq ft addition for the college's Science, Technology, Engineering & Math Programs.

Date of Issue: Nov 28, 2016

BUILDING CONSTRUCTION

CLASSIFICATION	MODIFICATION REASON	BASIC HOURLY RATE	BORROWED FROM	FRINGE BENEFIT PAYMENT
BALANCING TECHNICIAN	AD	$15.00		$6.03
BOILERMAKER	AD	$25.58	043	$17.85
BRICKLAYER	AD	$27.12	001	$19.86
CARPENTER	AD	$26.95		$15.75
CEMENT MASON	AD	$25.53		$14.53
COMMUNICATION INSTALLER TECHNICIAN	AD	$22.29	001	$7.35
DRYWALL - SPACKLING, TAPING, & FINISHING	AD	$26.95		$15.75
ELECTRICIAN	AD	$31.00		$16.88
ELEVATOR MECHANIC	AD	$37.00	001	$9.58
FIREPROOFER - SPRAYER	AD	$35.75	043	$21.41
FIRESTOPPER	AD	$26.06	043	$5.85

GLAZIER	AD	$40.76	001	$7.98	
INSULATION WORKER	AD	$33.86		$23.20	
IRONWORKER - FENCE ERECTOR	AD	$26.73	001	$12.08	
IRONWORKER - REINFORCING	AD	$27.19		$17.15	
IRONWORKER - STRUCTURAL	AD	$27.19		$17.15	
MILLWRIGHT	AD	$27.55	001	$15.75	
PAINTER	AD	$24.89	001	$8.97	
PLUMBER	AD	$32.73		$12.28	
POWER EQUIPMENT OPERATOR - ASPHALT DISTRIBUTOR	AD	$17.02	043	$3.17	
POWER EQUIPMENT OPERATOR - BACKHOE	AD	$28.97		$13.65	
POWER EQUIPMENT OPERATOR - BOOM TRUCK	AD	$18.50		$6.03	
POWER EQUIPMENT OPERATOR - BROOM / SWEEPER	AD	$28.97	001	$13.65	
POWER EQUIPMENT OPERATOR - BULLDOZER	AD	$28.97		$13.65	
POWER EQUIPMENT OPERATOR - CONCRETE PUMP	AD	$29.52	001	$13.65	
POWER EQUIPMENT OPERATOR - CRANE	AD	$30.12		$13.65	
POWER EQUIPMENT OPERATOR - CRANE - TOWER	AD	$30.12	001	$13.65	a + b
POWER EQUIPMENT OPERATOR - EXCAVATOR	AD	$28.97		$13.65	
POWER EQUIPMENT OPERATOR - FORKLIFT	AD	$28.97		$13.65	
POWER EQUIPMENT OPERATOR - GRADALL	AD	$15.70		$3.11	
POWER EQUIPMENT OPERATOR - GRADER	AD	$24.82	043	$13.10	a + b
POWER EQUIPMENT OPERATOR - LOADER	AD	$28.97		$13.65	
POWER EQUIPMENT OPERATOR - MECHANIC	AD	$34.16		$13.65	
POWER EQUIPMENT OPERATOR - MILLING MACHINE	AD	$13.50	043	$0.00	
POWER EQUIPMENT OPERATOR - OILER	AD	$19.57	001	$6.15	
POWER EQUIPMENT OPERATOR - PAVER	AD	$20.40		$3.68	
POWER EQUIPMENT OPERATOR - ROCK / STUMP TUB GRINDER	AD	$28.97		$13.65	
POWER EQUIPMENT OPERATOR - ROLLER - ASPHALT	AD	$17.26		$3.59	
POWER EQUIPMENT OPERATOR - ROLLER - EARTH	AD	$28.97		$13.65	
POWER EQUIPMENT OPERATOR - SCREED	AD	$16.00	043	$0.00	
POWER EQUIPMENT OPERATOR - SKID STEER (BOBCAT)	AD	$28.97		$13.65	
POWER EQUIPMENT OPERATOR - SKIDDER	AD	$28.97		$13.65	
RESILIENT FLOOR	AD	$29.38	043	$9.65	
ROOFER/WATERPROOFER	AD	$28.00		$9.65	
SHEETMETAL WORKER	AD	$26.11		$19.15	
SPRINKLERFITTER	AD	$31.87		$18.48	
STEAMFITTER/PIPEFITTER	AD	$32.73		$12.28	
TILE & TERRAZZO FINISHER	AD	$21.96	043	$9.61	
TILE & TERRAZZO MECHANIC	AD	$27.50	043	$10.78	
TRUCK DRIVER - DUMP	AD	$16.75		$6.03	
TRUCK DRIVER - DUMP - ARTICULATING	AD	$28.97		$13.65	
TRUCK DRIVER - FLATBED	AD	$15.00		$6.03	
TRUCK DRIVER - TACK/TAR TRUCK	AD	$15.45		$3.48	
TRUCK DRIVER - TRACTOR TRAILER	AD	$22.50		$6.03	
TRUCK DRIVER - WATER	AD	$28.97		$13.65	
LABORER GROUP II					
LABORER - ASPHALT RAKER	AD	$16.74		$6.03	

LABORER - COMMON	AD	$16.74	$6.03
LABORER - CONCRETE PUDDLER	AD	$16.74	$6.03
LABORER - CONCRETE TENDER	AD	$16.74	$6.03
LABORER - CONCRETE VIBRATOR	AD	$16.74	$6.03
LABORER - DENSITY GAUGE	AD	$16.74	$6.03
LABORER - FIREPROOFER - MIXER	AD	$16.74	$6.03
LABORER - FLAGGER	AD	$16.74	$6.03
LABORER - GRADE CHECKER	AD	$16.74	$6.03
LABORER - HAND ROLLER	AD	$16.74	$6.03
LABORER - JACKHAMMER	AD	$16.74	$6.03
LABORER - LANDSCAPING	AD	$16.74	$6.03
LABORER - LAYOUT	AD	$16.74	$6.03
LABORER - LUTEMAN	AD	$16.74	$6.03
LABORER - MORTAR MIXER	AD	$16.74	$6.03
LABORER - PLASTERER - HANDLER	AD	$16.74	$6.03
LABORER - TAMPER	AD	$16.74	$6.03
LABORERS GROUP I			
LABORER - AIR TOOL OPERATOR	AD	$19.84	$17.30
LABORER - ASPHALT PAVER	AD	$19.84	$17.30
LABORER - BLASTER - DYNAMITE	AD	$19.84	$17.30
LABORER - BURNER	AD	$19.84	$17.30
LABORER - CONCRETE SURFACER	AD	$19.84	$17.30
LABORER - HAZARDOUS MATERIAL HANDLER	AD	$19.84	$17.30
LABORER - MASON TENDER	AD	$19.84	$17.30
LABORER - PIPELAYER	AD	$19.84	$17.30
LABORER - SCAFFOLD BUILDER	AD	$19.84	$17.30

FRINGE REFERENCES AS NOTED:

a. PAID HOLIDAYS: New Year Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day & Christmas Day.

b. PAID VACATIONS: Employees with 1 year service - 1 week paid vacation;
2 years service - 2 weeks paid vacation;
10 years service - 3 weeks paid vacation.

Incidental Craft Data: Caulker, Man Lift Operator, Rigger, Scaffold Builder, and Welder receive the wage and fringe rates prescribed for the craft performing the operation to which welding, scaffold building, rigging, operating a Man Lift, or caulking is incidental.

These **Informational Prevailing Wage Rates** may not be substituted for the requirements of pre-advertisement or onsite job posting for a public work contract that exceeds $500,000 in value and either of the following criteria are met: (1) the contracting body is a unit of State government or an instrumentality of the State and there is any State funding for the project; or (2) the contracting body is a political subdivision, agency, person or entity (such as a county) and the State funds 50% or more of the project.

Modification Codes:

(AD) 17-209 Annual Determination from Survey Wage Data Received
(CH) 17-211 Commissioners' Hearing
(CR) 17-208 Commissioners' Review
(SR) 17-208 Survey Review by Staff

Each "Borrowed From" county is identified with the FIPS 3-digit county code unique for the specific jurisdiction in Maryland.

For additional information on the FIPS (Federal Information Processing Standard) code, see http://www.census.gov/datamap/fipslist/AllSt.txt

The Prevailing Wage rates appearing on this form were originally derived from Maryland's annual Wage Survey. The Commissioner of Labor & Industry encourages all contractors and interested groups to participate in the voluntary Wage Survey, detailing wage rates paid to workers on various types of construction throughout Maryland.

A mail list of both street and email addresses is maintained by the Prevailing Wage Unit to enable up-to-date prevailing wage information, including Wage Survey notices to be sent to contractors and other interested parties. If you would like to be included in the mailing list, please forward (1) your Name, (2) the name of your company (if applicable), (3) your complete postal mailing address, (4) your email address and (5) your telephone number to PWMAILINGLIST@dllr.state.md.us. Requests for inclusion can also be mailed to: Prevailing Wage, 1100 N. Eutaw Street - Room 607, Baltimore MD 21201-2201.

SECTION 01 10 00 - SUMMARY

PART 1 GENERAL

1.1 PROJECT

A. Project Name: Garrett College STEM Building.

B. Owner's Name: Garrett Community College.

C. The Project consists of the renovation and addition of the existing 200 building. The building was constructed in 1979 as a mining technology center. In the 1980s it was renovated to house classrooms and offices. The current building is approximately 15,000 gross SF and the addition is approximately 6,300 gross square feet. The existing building 200 is connected to the 300 building through an enclosed corridor link. The link is separated from the building through fire walls and doors, and allows students to reach the other five original classroom buildings through similar linked corridors. The renovation and addition to the 200 building will provide four new STEM labs, programmed for use as biology, chemistry/microbiology, engineering/robotics, and physical science/earth science. Each lab will have associated preparation and work areas. The project also includes four new general use classrooms, which allow for the types of collaborative learning spaces the college is seeking. Student space, faculty offices, faculty meeting rooms, storage areas will also be provided. The project also includes a mechanical rooftop penthouse, and associated site and new utility work.

D. The project will earn LEED Silver Certification.

1.2 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in the Agreement.

1.3 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent existing buildings during the entire construction period.

B. Owner intends to occupy the Project upon Substantial Completion.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.4 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.

B. Provide access to and from site as required by law and by Owner:

1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
2. Do not obstruct roadways, sidewalks, or other public ways without permit.

C. Working hours: Contractor shall be permitted to work during the hours of 7:00am until 8:00pm 7 days a week. Contractor shall not do any work on Saturdays or Sundays that require County or third party inspections or testing without advanced notice and approval of the College and the applicable inspection entity.

1.5 COORDINATION

A. Web-based Project Management Software:

1. RFIs, project submittals and contractor change proposals will be submitted, managed and responded to through a web-based solution for construction administration.
2. The Owner and Architect have selected Newforma Project Cloud as the web-based solution for this Project. Refer to www.newformaprojectcloud.com for additional information on the service.
3. Newforma will provide a training session via web conference.
4. Additional PDF mark-up software may be required for electronic processing.
5. The service fees to be included within Base Bid.
6. Newforma Project Cloud Contact: Dan Taschereau; Tel. 603-440-3908; dtaschereau@newforma.com.
7. Provide a project record CD or DVD containing all data managed through the web-based project management software, at the conclusion of the Project.

1.6 WARRANTY

A. The contractor shall provide a 1-year warranty for all work, materials and equipment, unless a longer warranty is required by the specific specification sections.

1.7 CONCURRENT WORK

A. The Owner reserves the right to perform concurrent work in the area at the same time as this project. Contractor shall cooperate with Owner's contractors if required.

1.8 SPECIAL CONSIDERATIONS

A. The following special considerations shall be carefully reviewed and considered by the contractor in preparation of their bids. No additional compensation will be allowed due to the contractor failing to properly understand and include costs associated with these items in their bid.

1. The site shall be bid as "Unclassified" to subgrade elevations. Unclassified excavated materials may include rock, soil materials, obstructions, and other buried debris. No changes in the contract sum or contract time will be permitted for rock excavation, removal of unsuitable soils and removal of other obstructions for work down to the subgrade. When subgrade is reached, if additional work is required by the geotechnical engineer, that work will be considered as an additional service.

2. The quality of the topsoil has not been tested. The contractor shall test the topsoil during the bidding phase and include in their bid any costs associated with amending the topsoil in order to meet the requirements of the specifications.

3. The project is required to achieve LEED Silver rating. The Contractor shall carefully review and understand their roll and requirements in this process.

4. This project requires commissioning of the mechanical, plumbing and electrical systems. Refer to commissioning specification sections and commissioning plan.

1.9 CORRELATION AND INTENT OF THE CONSTRUCTION DOCUMENTS

A. Design requirements when either drawn or specified, or both, shall prevail over the standard product of the companies specified. Any deviation from such must have the approval of the Architect and Owner.
B. It is the responsibility of the Contractor to construct the work under this Contract so that it will be complete and finished in every detail. If mention has been omitted in the Contract

Documents of any item of work or materials usually furnished or necessary for the completion or proper functioning of the project, it will be included without extra cost.

C. All systems in all divisions are to be bid and constructed as wholly closed, connected and fully working systems. Any doubts by the Contractor as to the intent of the Contract Document requirements for such total system shall be verified before bidding.

D. Whenever a conflict exists between drawings, drawings and specifications, or between specifications, the more stringent and costlier shall apply. Items specified but not shown on drawings must be supplied. Items shown on the drawings but not specified must be supplied. The Architect is to be notified of the conflict to determine the final precedent to follow.

E. if there is a conflict between the General Conditions and the Specifications, the more stringent and costlier shall apply unless clarified during bidding.

F. Where a device or piece of equipment is referred to in the singular number, such reference shall be deemed to apply to as many devices as are required to complete the installation.

1.10 ADAAG

A. Contractor to be aware of 2010 ADA Standards for Accessible Design as indicated on the drawings and shall complete construction in compliance with these standards.

1.11 UTILITY COORDINATION

A. The Contractor will take on the responsibility of being the main correspondent between the project and all utilities inherent in the project. The Contractor's duties shall include the following:

1. The Contractor shall be solely responsible for the coordination of all utilities inherent in the project, both new and keeping the existing in operation. Any delay in response to the Contractor's requests and submittals by any of the project's utility companies will be considered non-compensable should the delay effect the construction critical path of the project's sequence of construction.
2. The Contractor shall be solely responsible for all bond and permit costs for all utilities required by the project, if any.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 20 00 - PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Correlation of Contractor submittals based on changes.

E. Procedures for preparation and submittal of application for final payment.

1.2 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.

B. Forms filled out by hand will not be accepted.

C. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.

D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization and bonds and insurance.
   1. Identify site mobilization and bonds and insurance.
   2. Include additional line items identified by subsection titles, for Work exceeding $15,000.

F. Revise schedule to list approved Change Orders, with each Application For Payment.

1.3 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Present required information in typewritten form.

E. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.

F. Execute certification by signature of authorized officer.

G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed .

H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.

I. Submit three copies of each Application for Payment.

J. Include the following with the application:
   1. Transmittal letter as specified for Submittals in Section 01 30 00.
   2. Construction progress schedule, revised and current as specified in Section 01 32 16.
   3. Current construction photographs specified in Section 01 30 00.

4. Partial release of liens from major Subcontractors and vendors.
5. LEED submittals applicable to work for which application is being made; see Section 01 35 16.

K. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

L. Clearly indicate on the Application for Payment those line items which include materials or equipment, purchased or fabricated and stored, but not yet installed.
1. Differentiate between items stored on-site and items stored off-site.
2. Payments for material and equipment stored off-site will be at the sole discretion of the Owner. If required, Contractor will be responsible for all costs of travel and lodging for Architect, Engineers, and Owner to off-site storage locations to examine these items and the conditions of storage.
3. For items stored off-site, provide a bill of sale from supplier/Trade Contractors and certificates of insurance for the full value of stored materials with the Owner named as the insured.
4. For items stored off-site show a separate line item for the value of delivering and unloading the items at the Project site.
5. For items stored on or off-site, provide in a separate line item for the value of the installation of these items.

M. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
2. Staff names and assignments.
3. Schedule of Values.
4. Contractor's Construction Schedule (preliminary if not final).
5. Products list.
6. Schedule of unit prices.
7. Submittals Schedule (preliminary if not final).
8. Copies of building permits.
9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
10. Initial progress report.
11. Certificates of insurance and insurance policies.
12. Performance and payment bonds.
13. Data needed to acquire Owner's insurance.

N. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

1.4 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Price or Contract Time, Architect will issue instructions directly to Contractor.

B. Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710.

C. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

D. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 7 days.

E. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation .

F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
   3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
   4. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.

G. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

J. Promptly enter changes in Project Record Documents.

1.5 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 70 00, Section 01 77 00 and Section 01 78 00.
   2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   3. Updated final statement, accounting for final changes to the Contract Sum.
   4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
   5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
   6. AIA Document G707, "Consent of Surety to Final Payment."
   7. Evidence that claims have been settled.
   8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
   9. Final, liquidated damages settlement statement.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 21 00 - ALLOWANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cash allowances.

B. Contingency allowance.

C. Payment and modification procedures relating to allowances.

1.2 RELATED REQUIREMENTS

A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.3 CASH ALLOWANCES

A. Costs Included in Cash Allowances: Cost of product to Contractor or subcontractor, less applicable trade discounts, less cost of delivery to site, less applicable taxes.

B. Costs Not Included in Cash Allowances: Product delivery to site and handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing.

C. Architect Responsibilities:
   1. Select products in consultation with Owner and transmit decision to Contractor.
   2. Prepare Change Order.

D. Contractor Responsibilities:
   1. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
   2. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
   3. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

E. Differences in costs will be adjusted by Change Order.

1.4 CONTINGENCY ALLOWANCE

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

B. Funds will be drawn from the Contingency Allowance only by Change Order.

C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.5 ALLOWANCES SCHEDULE

A. Contingency Allowance: Include the stipulated sum/price of $50,000 for use upon Owner's instructions for unforseen conditions.

B. Cash Allowance: Include the stipulated sum of $20,000 for the building permit and utility company fees.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 22 00 - UNIT PRICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Measurement and payment criteria applicable to Work performed under a unit price payment method when requested by Owner during construction.

B. These unit prices are only for requested additions or reductions in the fixed price base bid Work.

1.2 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work and overhead and profit.

1.3 MEASUREMENT OF QUANTITIES

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. Take all measurements and compute quantities. Measurements and quantities will be verified by Owner.

C. Assist by providing necessary equipment, workers, and survey personnel as required.

1.4 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.

1.5 SCHEDULE OF UNIT PRICES

A.	Furnish and install riprap Class 1	Ton	_____
B.	Earth excavation-machine and disposal on-site	Cu/yd	_____
C.	Earth excavation-machine and disposal offsite	Cu/yd	_____
D.	Earth excavation-hand and disposal on-site	Cu/yd	_____
E.	Earth excavation-hand and disposal offsite	Cu/yd	_____
F.	Trench excavation and soil disposal on-site	Cu/yd	_____
G.	Trench excavation and soil disposal offsite	Cu/yd	_____
H.	Excavate and legally dispose offsite contaminated soil	Cu/yd	_____
I.	Rock Removal and Offsite Disposal (Hydraulic Hammer)	Ton	_____
J.	Rock Removal and Offsite Disposal (Blasting)	Ton	_____
K.	Unsuitable Material Excavation and Offsite Disposal	Cu/yd	_____
L.	Suitable Material Import, Placement and Compaction	Cu/yd	_____
M.	Undercut, dispose on-site, refill with MSHA #2 or #57 stone compact per specified requirements at trench areas only	Cu/yd	_____
N.	Undercut, dispose offsite, and refill with CR-6 and compact per specified requirements at trench areas only	Cu/yd	_____

O. Undercut, dispose on-site, refill with MSHA #2 or #57 stone compact per specified requirements in open areas only Cu/yd _____

P. Undercut, dispose offsite, refill with CR-6 compact per specified requirements in open areas only Cu/yd _____

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 23 00 - ALTERNATE BIDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements for Alternate Bids.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
   1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.
   2. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate. Include costs of related coordination, modification, or adjustment.

1.3 ACCEPTANCE OF ALTERNATE BIDS

A. Alternate Bids quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternate Bids will be identified in the Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.4 SCHEDULE OF ALTERNATE BIDS

A. Alternate No. 1.: Building Mounted Wind Turbine
   1. Base Bid: Do not provide the building mounted wind turbine, but only provide the rough in for future installation of the turbine.
   2. Add Alternate: Provide a complete wind turbine system as indicated in specification section 11 00 05 and on the drawings including sheet E-6.4. System shall include pole and all mounting hardware and be provided with a software package to monitor the system energy generation.

B. Alternate No. 2.: Energy Dashboard and related software and tie-ins to MEP systems
   1. Base Bid: Do not provide the energy dashboard and related software and tie-ins.
   2. Add Alternate: Provide the energy dashboard and related software and tie-ins to MEP systems per specification section 23 09 00 and the drawings.

C. Alternate No.3: Ice/Snow Melt System in sidewalks
   1. Base Bid: Do not provide the ice/snow melt systems in the new concrete walks and paved areas.
   2. Add Alternate: Provide a complete ice and snow melt system (including heating elements, sensors and a controller) for the new concrete walks and paving as indicated. See drawing M-7.4 for locations and requirements for additional information.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project coordination.
B. Requests for interpretation (RFI).
C. Subcontract list.
D. Staff names and assignments.
E. Preconstruction meeting.
F. Progress meetings.
G. Progress photographs.
H. Submittals for review, information, and project closeout.
I. Number of copies of submittals.
J. Submittal procedures.
K. Contractor's use of Architect's CAD files.
L. Delegated design.
M. Contractor's review.
N. Architect's action.
O. Daily construction reports.

1.2 PROJECT COORDINATION

A. Project Coordinator: General Contractor.
B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for vehicle and truck access, traffic, and parking facilities.
C. During construction, coordinate use of site and facilities through the Project Coordinator.
D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.
F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
G. Make the following types of submittals to Architect through the Project Coordinator:
    1. Requests for interpretation.
    2. Requests for substitution.
    3. Shop drawings, product data, and samples.
    4. Test and inspection reports.
    5. Design data.
    6. Manufacturer's instructions and field reports.
    7. Applications for payment and change order requests.
    8. Progress schedules.
    9. Coordination drawings.
    10. Correction Punch List and Final Correction Punch List for Substantial Completion.

11. Closeout submittals.

1.3 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
   1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
   3. Frivolous RFIs: The Contractor will compensate the Owner for the Architect's time and expenses to process RFIs resulting from the Contractor's lack of studying and comparing the Contract Documents, coordinating their own Work, or repeating previous RFIs.
   4. Submit RFIs through the Web-based Project Management Software, in PDF format.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
   1. Project name.
   2. Date.
   3. Name of Contractor.
   4. Name of Architect.
   5. RFI number, numbered sequentially.
   6. Specification Section number and title and related paragraphs, as appropriate.
   7. Drawing number and detail references, as appropriate.
   8. Field dimensions and conditions, as appropriate.
   9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
   10. Contractor's signature.
   11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
      a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

C. Format of RFIs: Content provided by CSI Form 13.2.A, as provided at end of this Section.
   1. Software-Generated RFIs:
      a. Preferred format.
      b. Software-generated form with substantially the same content as indicated above.
      c. Photographs shall be electronic files in JPG format.
      d. Attachments shall be electronic files in Adobe Acrobat PDF format.
   2. Hard-Copy RFIs:
      a. Permitted under conditions where electronic RFI is not feasible.
      b. Identify each page of attachments with the RFI number and sequential page number.

D. Architect's Action: Architect will review each RFI, determine action required, and respond through the Web-based Project Management Software. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
   1. The following RFIs may be returned without action:
      a. Requests for approval of submittals.
      b. Requests for approval of substitutions.

c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.
e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or RFIs with numerous errors.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
3. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, submit Change Order Request within 10 days of receipt of the RFI response as provided by General Conditions of the Contract.

E. On receipt of Architect's action, immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

F. RFI Log: Prepared and maintained by the Architect within the Web-based Project Management Software; Contractor to maintain a separate RFI log with subcontractors.

1.4 SUBCONTRACT LIST

A. Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Number of Copies: Submit four copies of subcontractor list, unless otherwise indicated. Architect will return two copies.
a. Mark up and retain one returned copy as a Project Record Document.

1.5 STAFF NAMES AND ASSIGNMENTS

A. Submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site, prior to or coinciding with initial Application for Payment.

B. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers.

C. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

D. Post copies of list in Project meeting room, in temporary field office, and by each temporary phone.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice of Award.

B. Attendance Required:
1. Owner.
2. Architect.
3. Contractor.

C. Agenda:
1. Execution of Owner-Contractor Agreement.

2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
5. Designation of personnel representing the parties to Contract, Owner and Architect.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.

D. 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.

3.2 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum bi-weekly intervals.

B. Architect will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Contractor's project manager and job superintendent, major Subcontractors and suppliers, Owner, Architect, as appropriate to agenda topics for each meeting.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Maintenance of quality and work standards.
11. Effect of proposed changes on progress schedule and coordination.
12. LEED requirements and documentation progess.
13. Other business relating to Work.

E. 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.

3.3 PROGRESS PHOTOGRAPHS

A. Document construction progress monthly with photographs.

B. Photography Type: Digital; electronic files.

C. Photograph site and general construction throughout progress of the Work, acceptable to Architect.

D. In addition to periodic, recurring views, take photographs of each of the following events:
1. Excavations in progress.
2. Foundations in progress and upon completion.
3. Structural framing in progress and upon completion.
4. Enclosure of building, upon completion.

5. Final completion, minimum of ten (10) photos.

E. Views:
1. Provide non-aerial photographs from four cardinal views at each specified time, until Date of Substantial Completion.
2. Provide factual presentation.
3. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

F. Digital Photographs: 24 bit color, minimum resolution of 10 megapixel, in jpg or pdf format; provide files unaltered by photo editing software.
1. Delivery Medium: Web-based Project Management Software.
2. File Naming: Include project identification, date and time of view, and view identification.
3. Hard Copy: Printed hardcopy (grayscale) of PDF file and point of view sketch.

G. Additional Photographic Requirements: Refer to Section 01 57 21 for photographic documentation requirements for Indoor Air Quality Controls.

3.4 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.
5. LEED submittals and reports.

B. Package these submittals by specification section, except closeout submittals or Work performed by separate trades, in a single delivery to the Architect; failure of the Contractor to package these submittals in a single delivery may cause the Architect to withhold action on submittal until associated submittals required by the particular specification section are received.
1. LEED Submittal and LEED Report data required by the Contract Documents and the LEED Certification process to be assembled separately from other submittal types and organized as the first items in any package of submittals; do not rely on the Architect or LEED consultant discovering the required data within product data or any other sort of submittal.

C. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

D. Product data and shop drawings to be submitted and managed through the Web-based Project Management Software.

E. Samples will be reviewed only for aesthetic, color, or finish selection.

F. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - CLOSEOUT SUBMITTALS.

3.5 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
1. Design data.
2. Certificates.

3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Daily construction reports.
8. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

3.6 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout:
1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.7 SUBMITTAL PROCEDURES

A. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
2. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.

B. Transmit each submittal with a copy of approved submittal form.

C. Submittals not requested will not be recognized or processed.

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

E. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 21 days for initial review of each submittal; duration of time is defined by date received in Architect's office until the day sent from the Architect's office. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 21 days for review of each resubmittal; duration of time is defined by date received in Architect's office until the day sent from the Architect's office.
4. Concurrent Review: Where concurrent review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal;

duration of time is defined by date received in consultant's office until the day sent to the Contractor. Submittals required within the following divisions to be sent directly to the Architect's consultants:

a. All required submittals indicated in Division 3 section.
b. The following required submittals indicated in Division 4:
    1) Product data, shop drawings, material certificates, mix designs, and cold-weather procedures.
c. All required submittals indicated in the following Division 5 Sections:
    1) Structural Steel
    2) Steel Joists
    3) Steel Decking
    4) Cold-Formed Metal Framing
    5) Metal Stairs
    6) Railings and Handrails
    7) Metal Fabrications
d. All required submittals indicated in the following Division 8 Section:
    1) Door Hardware
    2) Curtainwall
e. All required submittals indicated in Mechanical Divisions 21 through 23 sections.
f. All required submittals indicated in Division 26 sections.
g. All required submittals indicated in Divisions 31 through 33 sections.

5. Color Selection: Architect will select colors within 60 days (to allow time for presentation to Owner and for Owner comments) after all color samples have been submitted including, but not limited to items listed below. The submittal data shall be complete, including shop drawings, product data, and color samples, and all required submittals and materials shall be in compliance with the specifications and be subsequently approved by the Architect. Color samples shall be actual samples of the material and not photographs. If there is a variation in color, shade, texture, or pattern, submit multiple samples to show full range of variation.
    a. Interior Items (including but not limited to):
        1) Plastic laminate and millwork.
        2) Wood door veneer.
        3) Ceramic and Porcelain tile.
        4) Resilient floor tile.
        5) Resilient wall base and accessories.
        6) Resinous flooring.
        7) Carpet Tile.
        8) Acoustical wall panels.
        9) Paint.
        10) High-performance coatings.
        11) Toilet compartments.
        12) Signs and cast letters.
        13) Casework veneer.
    b. Prefinished Exterior Items (including but not limited to):
        1) Metal panels.
        2) Copings, perimeter edge systems.
        3) Site furnishings and equipment.

F. Submittal Identification: Place a permanent label or title block on each submittal for identification.
   1. Indicate name of firm or entity that prepared each submittal on label or title block.
   2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
   3. Include the following information on label for processing and recording action taken:
      a. Project name.
      b. Date.
      c. Name and address of Architect.
      d. Name and address of Contractor.
      e. Name and address of subcontractor.
      f. Name and address of supplier.
      g. Name of manufacturer.
      h. Submittal number or other unique identifier, including revision identifier.
         1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 10 00.01.A).
         2) Number and title of appropriate Specification Section.
         3) Drawing number and detail references, as appropriate.
         4) Location(s) where product is to be installed, as appropriate.
         5) Other necessary identification.

G. Deviations: Encircle or otherwise specifically identify deviations from the Contract Documents on submittals.

H. Resubmittals:
   1. Resubmit submittals until they are marked "No Exception Taken" or "Note Markings".
   2. Resubmission of items rejected or marked "Revise and Resubmit" will be reviewed one time by the Architect at no cost to the Contractor. Should the re-submittal be rejected or marked "Revise and Resubmit", the Contractor will reimburse the Owner by credit Change Order for all costs to the Owner for additional time spent by the Architect and the Architect's consultants to review the second (and subsequent) resubmission.

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

J. Use for Construction: Use only final submittals with mark indicating "No Exceptions Taken" or "Note Markings" taken by Architect.

3.8 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

A. At Contractor's written request, copies of Architect's CAD Drawing files will be provided to Contractor for Contractor's use in connection with Project; Contractor must sign and return the release form at the end of this Section.

B. Allow one week for processing, shipping and handling after Architect receives the signed form.

C. Only the files indicated on Agreement included at the end of this Section shall be made available for use as backgrounds for preparation of shop drawings and coordination drawings. No other CAD Drawing files, for this Project, will be made available.

3.9 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

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

3.10 CONTRACTOR'S REVIEW

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

B. Verify:
   1. Field Measurements.
   2. Field Construction Criteria.
   3. Catalog Numbers and Similar Data.
   4. Quantities.

C. Contractor's responsibility regarding errors and omissions in submittals is not relieved by Architect's review of submittals.

D. Contractor's responsibility regarding deviations in submittals from requirements of Contract Documents is not relieved by Architect's review of submittals, unless Architect gives written acceptance of specific deviations as approved by Owner.

E. When work is directly related and involves more than one trade, coordinate submittal with other trades and submit under one cover.

F. After a submittal has been submitted for review, no changes may be made to that Submittal other than changes resulting from review notes made by the Architect unless such changes are clearly identified and circled before being resubmitted. Any failure to comply with this requirement shall nullify and invalidate the Architect's review.

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

THIS IS TO CERTIFY THAT THE SPECIFICATION REQUIREMENTS HAVE BEEN MET AND ALL DIMENSIONS, CONDITIONS, AND QUANTITIES ARE VERIFIED AS SHOWN AND/OR CORRECTED ON THESE DRAWINGS.
SIGNED _____

3.11 ARCHITECT'S/ACTION

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

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it; except where indicated otherwise. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
   1. NO EXCEPTION TAKEN: The Work covered by the submittal is accepted as specified and the Work may proceed provided it complies with requirements of the Contract Documents.
   2. NOTE MARKINGS: The Work covered by the submittal is accepted as noted and the Work may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents.
   3. REVISE AND RESUBMIT: Do not proceed with the Work covered by the submittal. Revise or prepare a new submittal according to the notations and requirements of the Contract Documents, and resubmit without delay. Unmarked items may be fabricated if indicated.
   4. REJECTED: Architect will list reasons for rejection on the submittal or in the transmittal letter accompanying the submittal. Do not proceed with the Work covered by the submittal. Prepare new submittal according to the notations and requirements of the Contract Documents, and resubmit without delay.
   5. ACTION NOT REQUIRED: Either the submittal was not requested or the submittal was for information only or for record purposes.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

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

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

3.12 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report, recording the following information concerning events at the site.
   1. List of Trade Contractors at the site.
   2. List of major items of equipment on site.
   3. List of construction activities performed (for each trade).
   4. Approximate count of personnel at the site for each trade.
   5. High and low temperatures, general weather conditions.
   6. Accidents and unusual events.
   7. Meetings and significant decisions.
   8. Stoppages, delays, shortages, losses.
   9. Meter readings and similar recordings.
   10. Emergency procedures.
   11. Orders and requests of governing authorities.
   12. Change Orders received, implemented.
   13. Services connected, disconnected.

14. Equipment or systems tests and start-ups.
15. Partial Completions, occupancies.

B. Daily construction reports are to be uploaded to the Web-based Project Management Software no more that 7 days after the date of the report.

C. Duplicate copies of the daily construction reports shall accompany the progress report and be turned over to the Architect at the job conference.

END OF SECTION

Advancement of Construction Technology

REQUEST FOR INTERPRETATION

Project: _____ R.F.I. Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Section: Paragraph: Drawing Reference: Detail:

Request:

Signed by: Date:

Response:

☐ Attachments

Response From: To: Date Rec'd: Date Ret'd:

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Advancement of Construction Technology

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: _____ From (Contractor): _____

_____ Date: _____

To (A/E): _____ A/E Project Number: _____

_____ Contract For: _____

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (Fax Number)	Contact

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

July 1994
CSI Form 1.5A

Advancement of Construction Technology

SUBMITTAL TRANSMITTAL

Project: _____ Date: _____

_____ A/E Project Number: _____

TRANSMITTAL A

To (Contractor): _____ Date: _____ Submittal No. _____

From (Subcontractor): _____ By: _____ ☐ Resubmission

Qty.	Reference / Number	Title / Description / Manufacturer	Spec. Section Title and Paragraph / Drawing Detail Reference

☐ Submitted for review and approval
☐ Resubmitted for review and approval
☐ Complies with contract requirements
☐ Will be available to meet construction schedule
☐ A/E review time included in construction schedule

☐ Substitution involved - Substitution request attached
☐ If substitution involved, submission includes point-by-point comparative data or preliminary details
☐ Items included in submission will be ordered immediately upon receipt of approval

Other remarks on above submission:

☐ One copy retained by sender

TRANSMITTAL B

To (A/E): _____ Attn: _____ Date Rec'd by Contractor: _____

From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

☐ Approved
☐ Approved as noted

☐ Revise / Resubmit
☐ Rejected / Resubmit

Other remarks on above submission:

☐ One copy retained by sender

TRANSMITTAL C

To (Contractor): _____ Attn: _____ Date Rec'd by A/E: _____

From (A/E): _____ ☐ Other By: _____ Date Trnsmt'd by A/E: _____

☐ Approved
☐ Approved as noted
☐ Not subject to review
☐ No action required
☐ Revise / Resubmit
☐ Rejected / Resubmit
☐ Approved as noted / Resubmit

☐ Provide file copy with corrections identified
☐ Sepia copies only returned
☐ Point-by-point comparative data required to complete approval process
☐ Submission Incomplete / Resubmit

Other remarks on above submission:

☐ One copy retained by sender

TRANSMITTAL D

To (Subcontractor): _____ Attn: _____ Date Rec'd by Contractor: _____

From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ One copy retained by sender

An Agreement between Architect and Contractor for Transfer of Computer Aided Drafting (CAD) Drawing Files on Electronic Media

Architect	Grimm + Parker Architects 11720 Beverly Road, Suite 600 Calverton, MD 20705	Contractor	_____ _____ _____
Project No.	21620.00	Date	_____
Project Name:	Garrett STEM Building		
Location:	McHenry, Maryland		

The Architect will provide the following CAD Drawings files, dated at no cost, for the convenience of the Contractor in preparing shop fabrication drawings:

□ Drawings: Architectural Floor Plans and Architectural Ceiling Plans. These are the only files to be made available.

TERMS AND CONDITIONS:

1. Architect makes no representation as to the compatibility of the CAD Drawing files with any hardware or software.

2. Since the information set forth on the CAD Drawing files can be modified unintentionally or otherwise, the Architect reserves the right to remove all indicia of its ownership and/or involvement from each electronic display.

3. All information on the CAD Drawing files is considered instruments of service of the Architect and shall not be used for other projects, for additions to this project, or completion of this project by others. CAD Drawing files shall remain the property of the Architect, and in no case shall the transfer of these files be considered a sale.

4. Architect makes no representation regarding the accuracy, completeness, or permanence of CAD Drawing files; nor for their merchantability or fitness for a particular purpose. Addenda information or revisions made after the date indicated on the CAD Drawing files may not have been incorporated. In the event of a conflict between the Architect's sealed contract drawings and CAD Drawing files, the sealed contract drawings shall govern. It is the Contractor's responsibility to determine if any conflicts exist. The CAD Drawing files shall not be considered to be Contract Documents as defined by the General Conditions of Contract.

5. The use of CAD Drawing files prepared by the Architect shall not in any way obviate the Contractor's responsibility of the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection.

6. The Contractor shall, to the fullest extent permitted by law, indemnify, defend and hold harmless the Architect, and its Consultants from all claims, damages, losses, expenses, penalties and liabilities of any kind, including attorney's fees, arising out of or resulting from the use of the CAD Drawing files by the Contractor, or by third party recipients of the CAD Drawing files from the Contractor.

7. The Architect believes that no licensing or copyright fees are due to others on account of the transfer of the CAD Drawing files, but to the extent any are, the Contractor will pay the appropriate fees and hold the Architect harmless from such claims.

8. Any purchase order number provided by the Contractor is for Contractor's accounting purposes only. Purchase order terms and conditions are void and are not a part of this agreement.

9. This agreement shall be governed by the laws of the principal place of business of the Architect.

AUTHORIZED ACCEPTANCE

by Architect	by Contractor
_____	_____
Signature	*Signature*
_____	_____
Print Name and Title	*Print Name and Title*
_____	_____
Date	*Date*

SECTION 01 31 14 - FACILITY SERVICES COORDINATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination documents.

1.2 SUBMITTALS

A. Submit coordination drawings and schedules prior to submitting shop drawings, product data, and samples.

B. Coordination Drawings are required for the entire building. Complete the requirements for Coordination Drawings within 75 days of starting construction operations. Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Content: Project-specific information, drawn accurately to scale.
2. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. The Construction Documents in their original, copies or electronic file form are the Architect's instrument of service and are protected under copyright laws.
3. Include the following information, as applicable:
    a. Follow routing shown on Contract Drawings for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs.
    b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    c. Indicate required installation sequences.
    d. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
4. Number of Copies: Submit digitally via the web-based project management software system.
    a. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.
5. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
6. Each trade shall sign and date the Coordination Drawings after the addition of their information.
7. Do not begin fabrication until receipt of completed Coordination Drawings are acknowledged by the each contractor in writing to the Architect.
8. No progress payments will be made for any work affected by coordination drawings until coordination drawings governing that work have been accepted.
9. Any work installed prior to approval of coordination drawings shall be modified or replaced, as necessary, to conform to subsequently-approved construction drawings, at no additional cost to Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 COORDINATION REQUIRED

A. Coordinate the work listed below:
   1. Fire Suppression: Division 21.
   2. Plumbing: Division 22.
   3. Heating, Ventilating, and Air Conditioning: Division 23.
   4. Integrated Automation: Division 25.
   5. Electrical: Division 26.
   6. Communications: Division 27.
   7. Electronic Safety and Security: Division 28.
   8. Site Utilities: Division 33.
   9. Commissioning requirements throughout the Project Manual.

B. Coordinate progress schedules, including dates for submittals and for delivery of products.

C. Conduct meetings among Subcontractors and others concerned, to establish and maintain coordination and schedules, and to resolve coordination matters in dispute.

D. Participate in progress meetings. Report on progress of work to be adjusted under coordination requirements, and any required changes in schedules. Transmit minutes of meetings and reports to concerned parties.

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

F. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

G. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.

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

3.2 COORDINATION DOCUMENTS

A. Prepare coordination drawings to organize installation of products for efficient use of available space, for proper sequence of installation, and to identify potential conflicts.
   1. Priority of Construction Space:
      a. Coordinate installation of different components to ensure performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
      b. Following is the Order of Priority of construction space:
         1) First: Ductwork.
         2) Second: Fire protection piping.
         3) Third: Other piping.
         4) Fourth: Conduit.

B. Prepare a master schedule identifying responsibilities for activities that directly relate to this work, including submittals and temporary utilities; organize by specification section.

C. Identify electrical power characteristics and control wiring required for each item of equipment.

D. Maintain maximum headroom at all locations without finished ceilings.

E. Maintain finished ceiling heights as indicated.

F. Coordinate installations with other trades to prevent conflict with Work of other trades and cooperate in making reasonable modifications in layout as needed.

G. Where conflicts occur with placement of mechanical and electrical materials as they relate to placement of other building materials, the Architect shall be consulted for assistance in coordination of the available space to accommodate all trades.

H. Maintain documents for the duration of the work, recording changes due to site instructions, modifications or adjustments.

I. Any construction delays required to accomplish coordination, approval of submittals or re-submittals, or consequent to coordination work, shall be incurred at no additional cost to Owner; such delays may include, but not be limited to , the following:
   1. Time taken for preparation and submission of acceptable coordination drawings, including a reasonable period for Architect's review and approval.
   2. Time taken for preparation and approval of acceptable mock-ups.
   3. Time taken for modifications and replacements of non-conforming work.

3.3 COORDINATION OF SUBMITTALS

A. Review shop drawings, product data, and samples for compliance with Contract Documents and for coordination with related work. Transmit copies of reviewed documents to Architect.

B. Check field dimensions and clearances and relationship to available space and anchors.

C. Check compatibility with equipment and work of other sections, electrical characteristics, and operational control requirements.

D. Check motor voltages and control characteristics.

E. Coordinate controls, interlocks, wiring of switches, and relays.

F. Coordinate wiring and control diagrams.

G. When changes in the work are made, review their effect on other work.

H. Verify information and coordinate maintenance of record documents.

3.4 COORDINATION OF SUBSTITUTIONS AND MODIFICATIONS

A. Review proposals and requests for substitution prior to submission to Architect.

B. Verify compliance with Contract Documents and for compatibility with work of other sections.

3.5 OBSERVATION OF WORK

A. Observe work for compliance with Contract Documents.

B. Maintain a list of observed deficiencies and defects; promptly submit.

3.6 EQUIPMENT START-UP

A. Verify utilities, connections, and controls are complete and equipment is in operable condition as required by Section 01 70 00.

B. Observe start-up and adjustments, test run, record time and date of start-up, and results.

C. Observe equipment demonstrations made to Owner; record times and additional information required for operation and maintenance manuals.

3.7 INSPECTION AND ACCEPTANCE OF EQUIPMENT

A. Prior to inspection, verify that equipment is tested, operational, clean, and ready for operation.

B. Assist Architect with review. Prepare list of items to be completed and corrected.

END OF SECTION

SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, with network analysis diagrams and reports.

C. Responsibility for completion of Work per schedule and preparation of recovery schedules.

1.2 SUBMITTALS

A. Within 15 days after date of Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

1. Include written certification that major contractors have reviewed and accepted proposed schedule.
2. Submit digitally through Web-Based Project Management Software in PDF form and in original file format.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment digitally in PDF form as well as the original file format.

1.3 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a preliminary network diagram.

3.2 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Include Building Flush-Out or Air Contaminant Testing per section 01 57 21 in the schedule as an activity.

C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

D. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, Products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.

E. Coordinate content with schedule of values specified in Section 01 20 00 - Price and Payment Procedures.

F. Provide legend for symbols and abbreviations used.

3.3 NETWORK ANALYSIS

A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.

B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.

C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
1. Preceding and following event numbers.
2. Activity description.
3. Estimated duration of activity, in maximum 15 day intervals.
4. Earliest start date.
5. Earliest finish date.
6. Actual start date.
7. Actual finish date.
8. Latest start date.
9. Latest finish date.
10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
11. Monetary value of activity, keyed to Schedule of Values.
12. Percentage of activity completed.
13. Responsibility.

D. Analysis Program: Capable of compiling monetary value of completed and partially completed activities, accepting revised completion dates, and recomputation of all dates and float.

E. Required Reports: List activities in sorts or groups:
1. By preceding work item or event number from lowest to highest.
2. By amount of float, then in order of early start.

3.4 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.5 FLOAT TIME

A. Float is not for the exclusive benefit of either Contractor or Owner.

B. Manage work according to early start dates, by commencing activities on the early start date (calculated by the latest approved Contract Schedule) or earlier if possible, unless constrained by a bona fide resource limitation.

C. Owner may reserve and apportion float time according to the needs of the Project.

D. Actual or projected Owner-caused delays that do not exceed available float time shall not have any effect upon Contractor's adherence to specified time constraints and shall not be a basis for any time extension.

E. Contractor acknowledges the following:
   1. Activity delays shall not automatically result in adjustment of specified time constraints.
   2. A Change Order or other Owner action or inaction may not affect existing critical activities or cause non-critical activities to become critical.
   3. A Change Order or delay may result in only absorbing a part of the available total float that may exist within an activity chain of the network, thereby not causing any effect on specified time constraints.

F. Pursuant to the above float sharing requirements, use of float releaded by elimination of float suppression techniques such as preferential sequencing, special lead/lag logic restraints, unreasonably extended activity durations, or imposed dates shall be distributed by Owner to the benefit of Owner and Contractor.

G. In the event of the Contractor wishes to complete the Work earlier than the time specified therefore:
   1. Continue to calculate float based on the Work completion date specified as of Contract execution, by maintaining the specified Work completion date as a "finish-no-later-than" constraint.
   2. The completion time for the Work shall be amended by Owner's acceptance of or acquiescence to Contractor's proposed earlier completion date.
   3. Contractor shall not, under any circumstances, receive additional compensation for indirect, general, administrative or other forms of overhead costs, for the period between the time of earlier completion proposed by Contractor and the completion time for the Work specified as of NTP.

3.6 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. With each schedule submission or update submitted, include with the hard copy an electronic file in the original scheduling software format so that logic can be reviewed.

C. Indicate progress of each activity to date of revision, with projected completion date of each activity.

D. Annotate diagrams to graphically depict current status of Work.

E. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

F. Indicate changes required to maintain Date of Substantial Completion.

G. Submit reports required to support recommended changes.

H. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect including the effects of changes on schedules of separate contractors.

3.7 RESPONSIBILTY FOR COMPLETION

A. Take a combination of the following actions, at no additional cost to the Owner, when the progress schedule illustrates that the Contract Substantial Completion date can not be met:
   1. Increase construction manpower in such quantities and trades to substantially eliminate the backlog of Work.
   2. Increase the number of work hours per shift, shifts per working day, working days per week, or the amount of construction equipment, or any combination to substantially eliminate the backlog of Work.

3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities.

B. Recovery Schedule: Prepare a recovery schedule from all trades to accelerate progress, if a milestone is missed, a single duration work activitiy is incomplete for ten work days, or overall work progress is deemed insufficient by the Owner/Architect.
   1. A recovery schedule must be initiated by the Contractor, reviewed by effected trade contractors and submitted ten working days after one of the above conditions occurs.
   2. Submit recovery schedule in same number of copies as original.
   3. Trades must execute means necessary to bring the Project back on schedule using the recovery schedule; accelerated Work and additional overhead necessary to keep the Project on schedule is included in the Contract.
   4. Recovery schedule to be double the size of the original diagram, as a minimum, illustrating existing and revised activities alongside original data; revised activities must be easily differentiated from originial schedule.

C. Failure of the Contractor to comply with requirements of this subsection may be a basis for determination that the Contractor is not prosecuting the Work with such diligence as will ensure completion within the time stipulated; upon such determination, the Owner may take such action deemed appropriate.

3.8 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

END OF SECTION

SECTION 01 35 14 - LEED SCORECARD

PART 1 GENERAL

1.1 The attached scorecard indicates each LEED point that the project is to achieve.

A. LEED Certification Goal: Silver 50 Points.

1.2 ATTACHMENT

A. LEED Scorecard.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

LEED 2009 for New Construction and Major Renovations

Project Checklist

GRIMM AND PARKER

Garrett College STEM Renovation and Addition 01/30/17

Sustainable Sites — Possible Points: 26

Y	?	N			
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
		5	Credit 2	Development Density and Community Connectivity	5
1			Credit 3	Brownfield Redevelopment	1
		6	Credit 4.1	Alternative Transportation—Public Transportation Access	6
		1	Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
3			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
		1	Credit 5.1	Site Development—Protect or Restore Habitat	1
	1		Credit 5.2	Site Development—Maximize Open Space	1
1			Credit 6.1	Stormwater Design—Quantity Control	1
1			Credit 6.2	Stormwater Design—Quality Control	1
	1		Credit 7.1	Heat Island Effect—Non-roof	1
1			Credit 7.2	Heat Island Effect—Roof	1
	1		Credit 8	Light Pollution Reduction	1

Water Efficiency — Possible Points: 10

Y			Prereq 1	Water Use Reduction—20% Reduction	
4			Credit 1	Water Efficient Landscaping	2 to 4
		2	Credit 2	Innovative Wastewater Technologies	2
2	1	1	Credit 3	Water Use Reduction	2 to 4

Energy and Atmosphere — Possible Points: 35

Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
6	2	11	Credit 1	Optimize Energy Performance	1 to 19
	2	5	Credit 2	On-Site Renewable Energy	1 to 7
2			Credit 3	Enhanced Commissioning	2
	2		Credit 4	Enhanced Refrigerant Management	2
1	2		Credit 5	Measurement and Verification	3
	2		Credit 6	Green Power	2

Materials and Resources — Possible Points: 14

Y			Prereq 1	Storage and Collection of Recyclables	
3			Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2
		2	Credit 3	Materials Reuse	1 to 2

Materials and Resources, Continued

Y	?	N			
2			Credit 4	Recycled Content	1 to 2
1	1		Credit 5	Regional Materials	1 to 2
		1	Credit 6	Rapidly Renewable Materials	1
1			Credit 7	Certified Wood	1

Indoor Environmental Quality — Possible Points: 15

Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1			Credit 1	Outdoor Air Delivery Monitoring	1
		1	Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
1			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
1			Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems—Lighting	1
1			Credit 6.2	Controllability of Systems—Thermal Comfort	1
1			Credit 7.1	Thermal Comfort—Design	1
1			Credit 7.2	Thermal Comfort—Verification	1
	1		Credit 8.1	Daylight and Views—Daylight	1
	1		Credit 8.2	Daylight and Views—Views	1

Innovation and Design Process — Possible Points: 6

1			Credit 1.1	Innovation in Design: Green User Ed	1
1			Credit 1.2	Innovation in Design: E.P. MRc4 Recycled (over 30%) or MRc5 Regional	1
	1		Credit 1.3	Innovation in Design: Green Housekeeping	1
	1		Credit 1.4	Innovation in Design: E.P. EAc6 Green Power 100%	1
1			Credit 1.5	Innovation in Design: Low Mercury Lamping or Other	1
1			Credit 2	LEED Accredited Professional	1

Regional Priority Credits — Possible Points: 4

	1		Credit 1.1	SSc6: SWM Quantity or SSc7.1 Heat Island Effect-Nonroof	1
1			Credit 1.2	SSc4.4 Alt. Transportation - Parking Capacity	1
1			Credit 1.3	MRc2: CWM 50%	1
1			Credit 1.4	EAc2 (1%) On-Site Renewable Energy or SSc8 Light Pollution	1

Total — Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

SECTION 01 35 15 - LEED CERTIFICATION PROCEDURES

PART 1 GENERAL

1.1 PROJECT GOALS

A. This project has been designed to achieve the LEED Silver (minimum 53 points) rating as defined in the LEED(r) Green Building Rating System(tm) for New Construction and Major Renovations, 2009 Edition.

B. Contractor is responsible for documenting the following credits: MRc2, MRc4, MRc5, MRc7, IEQc3, IEQc4 and IDc1.2; and assisting with documenting SSc1, SSc7.1, SSc7.2, and WEc1.

C. Many of the LEED credits can be achieved only through intelligent design of the project and are beyond the control of the Contractor. However, certain credits relate to the products and procedures used for construction. Therefore, the full cooperation of the Contractor and subcontractors is essential to achieving final certification.

D. Contractor shall familiarize himself with the relevant requirements and provide the necessary information and instruction to all subcontractors and installers.

E. Since Contractor and subcontractors may not be familiar with LEED requirements, this section includes a summary of the products and procedures intended to achieve LEED credits.
   1. Some credits are marked PREREQUISITE; these must be achieved regardless of the level of certification; many are dependent on proper performance by Contractor and subcontractors.
   2. Other credits involve quantifying percentages by weight and cost; these require careful recordkeeping and reporting by the Contractor.
   3. See www.usgbc.org for more information.

1.2 RELATED REQUIREMENTS

A. Sections that include requirements intended to achieve LEED credits include, but are not limited to, the following:

B. Section 01 35 16 - LEED Submittal Forms: Procedures for using the forms.
   1. 01 35 16.07 - LEED Prohibited Content Installer Certification; for each installer to certify compliance with the low-emitting criteria specified in Section 01 61 16.

C. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: List of product categories having VOC content restrictions, evidence required, and reporting requirements.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, Section 01 61 16 - Low-Emitting Materials and Section 01 35 16 - LEED Submittal Forms for additional submittal procedures.

B. LEED Submittal/Report: For each product with the notation "show quantity on LEED submittal or report," submit a report with the following information:
   1. Submit with each Application for Payment; update the Report each period with latest period shown separately:
   2. Identify each product with:
      a. Name and manufacturer.
      b. Specification section number.
      c. Applicable Credit(s).
      d. Net weight per unit.
      e. Quantity installed.

f. Material cost per unit.
g. Total material cost.
h. Other information specified for specific item.

3. Attach evidence of compliance from either the manufacturer or an independent agency.

C. Action Plan:

1. Submit a LEED Action Plan, based on the LEED Credit Summary and this Section, indicating approaches to achieve those credits; submit within 45 days of mobilization.
   a. Credit MR 2.1 and 2.2: Waste Management Plan as specified within the Project Manual.
   b. Credit MR 4.1 and 4.2: List of proposed materials.
      1) Provide preliminary matrix, using USGBC's LEED Online Template or spreadsheet verifying that the credit requirements will be met based on the identified materials containing recycled content.
      2) Indicate post-consumer recycled and pre-consumer recycled content for each product having recycled content, its source and material cost.
   c. Credit MR 5.1 and 5.2: List of proposed regionally manufactured and extracted, harvested or recovered materials.
      1) Provide preliminary matrix, using USGBC's LEED Online Template or spreadsheet verifying that the credit requirements will be met based on the identified regionally manufactured and regionally extracted, harvested or recovered materials.
      2) Identify each regionally manufactured material, and each regionally extracted, harvested or recovered material by source and material cost.
   d. Credit MR 7.0: List of proposed certified wood products.
      1) Provide preliminary matrix, using USGBC's LEED Online Template or spreadsheet verifying that the credit requirements will be met based on the identified certified wood products.
      2) Identify each FSC-certified wood product, its source, cost and Chain of Custody number.
   e. Credit EQ 3.1 and 3.2: Construction Indoor Air Quality Management Plan complying with requirements of Section 01 57 21.
   f. Construction Waste Management Plan.

1.4 MONTHLY REPORTS

A. Monthly Progress Tracking: With each application for payment, submit reports comparing actual purchasing and construction activities with LEED Action Plans. Provide updated information submittal using LEED Online Template or spreadsheet, for the following LEED Credits sought for this Project:

1. Material costs per LEED guidelines:
   a. MR Credit 4 - Recycled Content Materials.
   b. MR Credit 5 - Regional Materials.
2. Total percentages of all permanently-installed wood value, for each item as it relates to the following credits.
   a. MR Credit 7 - Certified Wood Materials.
3. Construction Waste Management monthly summary reporting.

1.5 CLOSEOUT SUBMITTALS

A. At completion of construction and prior to contract closeout; Submit the following documentation in electronic format:
   1. Final waste management package per requirements of Section 01 74 19.
   2. Final Materials and Resource Package: Provide individual electronic folders for Materials and Resources Credits 3, 4, 5 and 7 containing:
      a. Legible electronic copies of relevent material product data for each product listed on the LEED Online Template.
      b. Final PDF of completed LEED Online Template including the total project materials cost and a complete product list with costs demonstrating compliance with required level of achievement.
   3. Final Indoor Environmental Quality, Construction Indoor Air Quality Management package per requirements of Section 01 57 21.
   4. Final Indoor Environmental Quality, Low Emitting Materials package per requirements of Sections 01 57 21 and 01 61 16.

B. LEED Online: Final completed LEED Online Template and associated required documentation uploaded to LEED Online Project Database including:
   1. Legible electronic copies of relevant material product data for each product listed on the LEED Online Template.
   2. LEED Online Template including all low-emitting materials utilized on the Project.
   3. Materials and Resources Credit 2, Construction Waste Management: Section 01 74 19.
   4. Materials and Resources Credit 4, Recycled Content.
   5. Materials and Resources Credit 5, Regional Materials.
   6. Materials and Resources Credit 7, Certified Wood.
   7. Indoor Environmental Quality Credit 3: Sections 01 57 21 and 01 61 16.
   8. Indoor Environmental Quality Credit 4: Sections 01 57 21 and 01 61 16.

1.6 INFORMATION SOURCES

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE); 1791 Tullie Circle, NE, Atlanta, GA 30329. Tel: (404) 636-8400. Fax: (404) 321-5478. www.ashrae.org.

B. Center for Resource Solutions (CRS); Presidio Building, 49 P.O. Box 29512, San Francisco, CA 94129. Tel: (415) 561-2100. Fax: (415) 561-2105. www.resource-solutions.org or www.green-e.org.

C. Green Seal; 1001 Connecticut Avenue, NW, Suite 827, Washington, DC 20036-5525. Tel: (202) 872-6400. Fax: (202) 872-4324. www.greenseal.org.

D. South Coast Air Quality Management District (SCAQMD); 21865 E. Copley Drive, Diamond Bar, CA 91765. Tel: (909) 396-2000. www.aqmd.gov.

E. U.S. Green Building Council (USGBC); 2101 L Street NW, Suite 500, Washington, DC 20037. Fax: (202) 828-5110. www.usgbc.org.

PART 2 PRODUCTS (NOT USED)

END OF SECTION

SECTION 01 35 16 - LEED SUBMITTAL FORMS

LEED SUBMITTAL FORMS

1.1 PURPOSE

A. These forms are for the Contractor's use in submitting documentation to be used to determine whether particular credits have been achieved. The cooperation of subcontractors, suppliers, and manufacturers is required.

1.2 FORMS

A. 01 35 17 - LEED Submittal Form: Coversheet for all LEED submittals.

B. LEED Submittal Form for filter media installed during construction and prior to occupancy and photographs of SMACNA measures, as specified in Section 01 57 21 for EQ Credit 3.1.

1.3 PROCEDURES

A. All LEED submittal forms are to be submitted by Contractor; certifications are to be made by indicated party.

B. Where a LEED Submittal is called for, fill out and submit the appropriate form.
   1. Fill out one form for each different brand name product and each different manufacturer of a lot of commodity products.
   2. Where required attachments are specified, attach the documentation to the back of the form.

C. Each form must be signed by the entity capable of certifying the information.
   1. Certification signatures must be made by an officer of the company.
   2. For products, certification must be made by the manufacturer not the supplier.
   3. For custom fabricated products, certification by the fabricator is acceptable.

D. Submit the completed forms in accordance with the requirements of Section 01 30 00 - Administrative Requirements, as information submittals.
   1. Give each form a unique submittal number.
   2. Do not combine LEED forms with product data or shop drawing submittals.

END OF SECTION

SECTION 01 35 17 - LEED SUBMITTAL FORM

1.1 LEED SUBMITTAL FORM

A. Instructions:
1. Contractor shall include this form with each LEED submittal as required by the specifications for Divisions 3-10 and 31-32.
2. For each item checked below, Contractor shall include supporting documentation. See supporting documentation types below.
3. It is mandatory that the Contractor provide material cost as described below.

B. Material Costs:
1. Complete the following:
a. In accordance with Specification Section _____ we are providing _____ (*name of material*).
b. Cost of materials, including taxes and delivery costs incurred by the Contractor, excluding installation labor $_____.

C. Check the applicable LEED Credits below:
___ MR Credit 3 - Materials Reuse.
___ MR Credit 4 - Recycled Content.
___ MR Credit 5 - Regional Materials.
___ MR Credit 6 - Rapidly Renewable Materials.
___ MR Credit 7 - Certified Wood.
___ EQ Credit 4.1 - Adhesives & Sealants.
___ EQ Credit 4.2 - Paints and Coatings.
___ EQ Credit 4.3 - Flooring Systems.
___ EQ Credit 4.4 - Composite Wood and Agrifiber Products.

1.2 MR Credit 4.1 - Recycled Content, complete both:

Pre - Consumer Recycled Content %_____.

Post - Consumer Recycled Content %_____.

1.3 MR Credits 5.1 & 5.2 - Regional Materials:

A. ___ Check here to indicated the final manufacturering of the referenced material/product is within 500 miles of the Project Site.
Manufacturer: _____.
Address: _____.
Miles from Project: _____.

B. ___ Check here to indicate that raw material(s) for this project are extracted or harvested within 500 miles of the Project Site.
_____ % (by cost) of raw materials used to manufacture this material/product that were extracted/harvesed or recovered within 500 miles of the Project Site.
Raw Material Name/Description: _____.
Raw Material Supplier: _____.
Extraction or Harvest Site of Raw Materials: _____.
Miles From Project: _____.

1.4 MR Credit 7 - Certified Wood:

_____ % of this material/product is composed of FSC Certified Wood.

Description of FSC Material/Component: _____.

Describe the source of the FSC Certified Wood: _____.

Vendor COC Number: _____.

FSC Certification Attached: Yes _____ or No _____.

___ Check here to indicate that invoice for this product and all other wood products will be submitted to the General Contractor.

1.5 EQ Credits 4.1 and 4.2 - Low Emitted Material (Adhesives, Sealants, Paints, Coatings):

_____ g/l of VOC contained in submitted product _____ g/l allowed.

1.6 EQ Credit 4.3 - Flooring Systems:

___ Carpets meet Carpet and Rug Institute (CRI) Green Lable Plus Standard.

___ Carpet cusion is used, and meets Carpet and Rug Institute (CRI) Green Lable Standard.

___ Hard Flooring is certified as compliant with FloorScore Standard.

___ Carpet or Flooring adhesives are used, and their VOC content is _____ g/l.

___ Sealants or Sealant Primers are used, and their VOC content is _____ g/l.

___ Floor Coatings are used, and meet SCAQMD Rule 13. VOC content is _____ g/l.

1.7 EQ Credit 4.4 - Composite Wood & Agrifiber Products:

___ Check here to indicate that all composite woods used on the interior are free of urea-formaldehyde.

1.8 SUPPORTING DOCUMENTATION - Check those documents attached:

___ MSDS Sheet.

___ Manufacturer's Cut Sheet.

___ Manufacturer's Statement.

___ Industry Statement.

___ Other Verification.

1.9 COMPANY/MANUFACTURER: _____ Phone _____

Print Name: _____

Signature: _____

Title: _____ Date: _____

END OF SECTION

SECTION 01 35 53 - SECURITY PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Security measures including formal security program, entry control, personnel identification, and miscellaneous restrictions.

1.2 SECURITY PROGRAM

A. Protect Work, existing premises and Owner's operations from theft, vandalism, and unauthorized entry.

B. Initiate program at project mobilization.

C. Maintain program throughout construction period until Owner occupancy.

1.3 ENTRY CONTROL

A. Restrict entrance of persons and vehicles into Project site and existing facilities.

B. Allow entrance only to authorized persons with proper identification.

C. Maintain log of workers and visitors, make available to Owner on request.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. References and standards.

B. Quality assurance submittals.

C. Mock-ups.

D. Control of installation.

E. Tolerances.

F. Testing and inspection services.

G. Manufacturers' field services.

1.2 REFERENCE STANDARDS

A. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.

B. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Testing Agency Qualifications:
   1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time specialist and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

C. Schedule of Tests and Inspections: Prepare in tabular form, within 30 days following mobilization, and include the following:
   1. Specification section number and title.
   2. Description of test and inspection.
   3. Identification of applicable standards.
   4. Identification of test and inspection methods.
   5. Number of tests and inspections required.
   6. Time schedule or time span for tests and inspections.
   7. Entity responsible for performing tests and inspections.
   8. Requirements for obtaining samples.
   9. Unique characteristics of each quality-control service.

D. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.

E. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
   1. Include:
      a. Date issued.

b. Project title and number.
c. Name of inspector.
d. Date and time of sampling or inspection.
e. Identification of product and specifications section.
f. Location in the Project.
g. Type of test/inspection.
h. Date of test/inspection.
i. Results of test/inspection.
j. Conformance with Contract Documents.
k. When requested by Architect, provide interpretation of results.

2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.

F. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

G. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

H. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
1. Submit report in duplicate within 30 days of observation to Architect for information.
2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.4 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.5 TESTING AND INSPECTION AGENCIES

A. Contractor shall employ and pay for services of an independent testing agency to perform specified testing, unless specifically indicated as by Owner.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Contractor Employed Agency:
   1. Testing agency: Comply with requirements of ASTM E 329.
   2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
   3. Laboratory: Authorized to operate in the State of Maryland.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

H. Contractor must develop a plan to monitor and control installation and protection of Work to ensure compliance with LEED requirements specified elsewhere and acoustical integrity, including but not limited to the following:
   1. Clear airspace with no bridging elements at structural isolation joints.
   2. Independence of steel stud framing and/or masonry at double/triple wall construction.
   3. Mass and airtightness of gypsum board assemblies.
   4. Solidity, mass, and airtightness of concrete and masonry construction.
   5. Grout fill at sound-rated/sound-control door and window frames.
   6. Mass of sound-control door leaves.
   7. Tolerances between sound-rated/sound-control doors, frames, thresholds, and perimeter seals.
   8. Proper compression and adjustment of perimeter seals at sound-rated/sound-control doors.
   9. Locations and quiet operation of door latching and closer hardware.
   10. Tolerances between window sashes, frames, and perimeter seals.
   11. Thicknesses of laminated glazing and airtightness of perimeter seals at sound-control windows
   12. Extent and coverage of sound-attenuation blankets above ceilings and in partitions.
   13. Shaping of wall and ceiling finishes.

14. Extent, location, and thickness of sound-absorbing finishes.
15. Extent, location, operation, and storage of adjustable sound-absorbing drapery.
16. Extent and shaping of ceiling reflectors.
17. Acoustical transparency of scrim materials.
18. Rigid attachment of finish materials to substrates.
19. Restrictions on routing of ductwork, piping, conduit, wiring, cable and sleeves.
20. Resilient sealing of penetrations.
21. Sheet caulking at electrical boxes within gypsum board assemblies.
22. Flexible connections of plumbing, mechanical, electrical, and communications systems at equipment and structural isolation joints.
23. Sound power/pressure level limits of mechanical equipment and air devices.
24. Vibration isolation of conveying, plumbing, mechanical, electrical, and communications systems.
25. Location and performance of duct sound attenuators.
26. Internal duct lining in ductwork, plenums, and shafts.
27. External lagging of ductwork and piping.
28. Locations of volume control dampers.
29. Location and orientation of transfer ducts.
30. Reports for testing, adjusting, and balancing of HVAC systems.
31. Silent operation of theatrical and architectural lighting.
32. Silent operation of fluorescent ballasts.
33. Silent operation of fire alarm system in standby mode.
34. Remote location of transformers and power supplies.

3.2 MOCK-UPS

A. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.4 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.

3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
5. Perform additional tests and inspections required by Architect.
6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the Work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
a. To provide access to Work to be tested/inspected.
b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
c. To facilitate tests/inspections.
d. To provide storage and curing of test samples.
4. Notify laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.

E. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.5 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.6 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary telecommunications services.

B. Temporary telephone service.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

1.2 RELATED REQUIREMENTS

A. Section 01 51 00 - Temporary Utilities.

B. Section 01 52 13 - Field Offices and Sheds.

C. Section 01 55 00 - Vehicular Access and Parking.

D. Section 01 35 53 - Security Procedures.

E. Section 01 57 21 - Indoor Air Quality Controls.

F. Section 01 58 13 - Temporary Project Signage.

G. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.3 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
   1. Service will not be available from existing buildings.

B. Telecommunications services shall include:
   1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
   2. Telephone Land Lines: One line, minimum; one handset per line.
   3. Internet Connections: Minimum of one; DSL modem or faster.
   4. Email: Account/address reserved for project use.
   5. Facsimile Service: Minimum of one dedicated fax machine/printer, with dedicated phone line.

1.4 TEMPORARY SANITARY FACILITIES

A. Provide, maintain, and pay for required facilities and enclosures. Provide at time of project mobilization until completion.

B. Maintain daily in clean and sanitary condition.

1.5 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.6 FENCING

A. Provide 6 foot high fence around construction area; equip with vehicular and pedestrian gates with locks.

1.7 EXTERIOR ENCLOSURES

A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

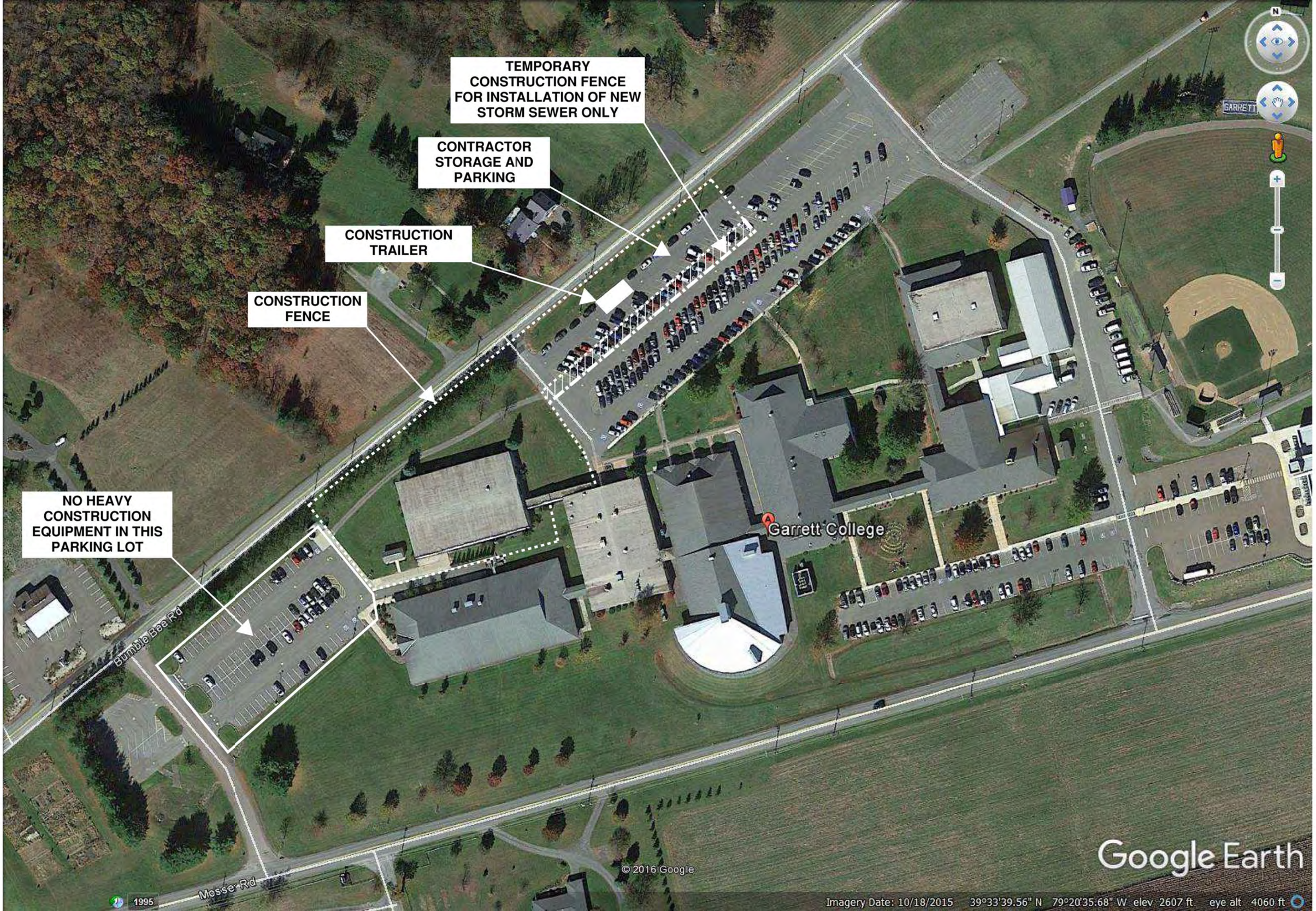
1.8 STAGING AREAS

A. See attached staging plan.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION


TEMPORARY CONSTRUCTION FENCE FOR INSTALLATION OF NEW STORM SEWER ONLY
CONTRACTOR STORAGE AND PARKING
CONSTRUCTION TRAILER
CONSTRUCTION FENCE
NO HEAVY CONSTRUCTION EQUIPMENT IN THIS PARKING LOT
Garrett College
Bumble Bee Rd
Mosser Rd
GARRETT
© 2016 Google
Google Earth
Imagery Date: 10/18/2015 39°33'39.56" N 79°20'35.68" W elev 2607 ft eye alt 4060 ft

SECTION 01 51 00 - TEMPORARY UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heat, and water.

1.2 RELATED REQUIREMENTS

A. Section 01 50 00 - Temporary Facilities and Controls: Telephone service for administrative purposes.

1.3 TEMPORARY ELECTRICITY

A. Cost: By Contractor.

B. Provide power service required from utility source, service will not be available from existing buildings.

C. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.

D. Provide main service disconnect and over-current protection at convenient location and meter.

E. Permanent convenience receptacles may be utilized during construction.

F. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft .

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Maintain lighting and provide routine repairs.

1.5 TEMPORARY HEATING

A. Cost of Energy: By Contractor.

B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.

C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

D. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.6 TEMPORARY COOLING

A. Cost of Energy: By Contractor.

B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.

C. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

D. Prior to operation of permanent equipment for temporary cooling purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.7 TEMPORARY WATER SERVICE

A. Cost of Water Used: By Owner.

B. Contractor may use a hose bib from an adjacent building for temporary construction water.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 52 13 - FIELD OFFICES AND SHEDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary field offices for use of Contractor.

B. Maintenance and removal.

PART 2 PRODUCTS

2.1 MATERIALS, EQUIPMENT, FURNISHINGS

A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.

2.2 CONSTRUCTION

A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.

B. Construction: Structurally sound, secure, weather tight enclosures for office. Maintain during progress of Work; remove when no longer needed.

C. Lighting for Offices: 50 fc at desk top height, exterior lighting at entrance doors.

2.3 ENVIRONMENTAL CONTROL

A. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions.

2.4 CONTRACTOR OFFICE AND FACILITIES

A. Size: For Contractor's needs and to provide space for project meetings.

B. Furnishings in Meeting Area: Conference table and chairs to seat at least eight persons; racks and files for Contract Documents, submittals, and project record documents.

C. Other Furnishings: Contractor's option.

D. Equipment: Six adjustable band protective helmets for visitors, one 10 inch outdoor weather thermometer .

PART 3 EXECUTION

3.1 PREPARATION

A. Fill and grade sites for temporary structures to provide drainage away from buildings.

3.2 INSTALLATION

A. Install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed.

3.3 MAINTENANCE AND CLEANING

A. Weekly janitorial services for offices; periodic cleaning and maintenance for offices.

B. Maintain approach walks free of mud, water, and snow.

3.4 REMOVAL

A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

END OF SECTION

SECTION 01 55 00 - VEHICULAR ACCESS AND PARKING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Driveways, entrance and traffic routes.

B. Parking.

C. Existing pavements and parking areas.

D. Permanent pavements and parking facilities.

E. Construction parking controls.

F. Haul routes.

G. Traffic signs and signals.

H. Maintenance.

I. Removal, repair.

J. Mud from site vehicles.

PART 2 PRODUCTS

2.1 MATERIALS

A. Temporary Construction: Contractor's option.

B. Materials for Permanent Construction: As specified in product specification sections, including earthwork, paving base, and topping.

2.2 SIGNS, SIGNALS, AND DEVICES

A. Post Mounted and Wall Mounted Traffic Control and Informational Signs: Specified in Section 01 58 13 - Temporary Project Signage.

B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

C. Flag Person Equipment: As required by local jurisdictions.

PART 3 EXECUTION

3.1 DRIVEWAYS, ENTRANCE AND TRAFFIC ROUTES

A. Keep driveways and entrances serving premises and site surrounding Project clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Provide continuous monitoring of site.

1. Schedule deliveries to minimize use of driveways and entrances.
2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Truck deliveries shall be scheduled so that the streets adjacent to the site do not back up with delivery trucks waiting to deliver materials. Trucks must be scheduled accordingly, or wait to unload inside the fence in the project site or off the Owner's property.

3.2 PARKING

A. Use of designated areas of existing parking facilities by construction personnel is permitted, coordinate with Owner for exact location.

B. Do not allow heavy vehicles or construction equipment in existing parking lot West of building.

C. When site space is not adequate, provide additional off-site parking.

3.3 Permanent pavements and parking facilities

A. Prior to Substantial Completion the base for permanent roads and parking areas may be used for construction traffic.

B. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

3.4 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.

B. Monitor parking of construction personnel's vehicles . Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.5 HAUL ROUTES

A. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

3.6 TRAFFIC SIGNS AND SIGNALS

A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

B. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.

C. Relocate as Work progresses, to maintain effective traffic control.

3.7 MAINTENANCE

A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, Products, mud, snow, and ice.

B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.8 REMOVAL, REPAIR

A. Repair existing and new permanent facilities damaged by use, to original condition.

B. Remove equipment and devices when no longer required.

C. Repair damage caused by installation.

3.9 MUD FROM SITE VEHICLES

A. Provide means of removing mud from vehicle wheels before entering streets.

END OF SECTION

SECTION 01 57 21 - INDOOR AIR QUALITY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Construction procedures to promote adequate indoor air quality during and after construction.

B. Building flush-out after construction and before occupancy.

C. Testing indoor air quality after completion of construction.

1.2 PROJECT GOALS

A. See Section 01 35 15 - LEED Certification Procedures, for overall project goals relating to environment and energy.

B. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
   1. Cleaning of ductwork is not contemplated under this Contract.
   2. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.

C. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
   1. Furnish products meeting the specifications.
   2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.

1.3 REFERENCE STANDARDS

A. ASTM D5197 - Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology); 2009.

B. 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.

C. EPA 600/4-90/010 - Compendium of Methods for the Determination of Air Pollutants in Indoor Air; April 1990.

D. EPA 625/R-96/010b - Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air; January 1999.

E. SMACNA (OCC) - IAQ Guideline for Occupied Buildings Under Construction; 2007.

1.4 DEFINITIONS

A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.

B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.

C. Particulates: Dust, dirt, and other airborne solid matter.

D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

E. Ventilation: The process of supplying and removing air to and from interior spaces by natural or mechanical means.

F. Volatile Organic Compound (VOC): Carbon compounds that participate in atmospheric photochemical reactions, (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates, and ammonium carbonate); the compounds vaporize (become a gas) at normal room temperatures.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Indoor Air Quality Management Plan: Describe in detail measures to be taken to promote adequate indoor air quality upon completion; use SMACNA (OCC) as a guide.
   1. Submit not less than 60 days before enclosure of building.
   2. Identify potential sources of odor and dust.
   3. Identify construction activities likely to produce odor or dust.
   4. Identify areas of project potentially affected, especially occupied areas.
   5. Evaluate potential problems by severity and describe methods of control.
   6. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters and schedule for replacement of filters.
   7. Describe cleaning and dust control procedures.
   8. Describe coordination with commissioning procedures.

C. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.

D. Duct and Terminal Unit Inspection Report.

E. Air Contaminant Test Plan: Identify:
   1. Testing agency qualifications.
   2. Locations and scheduling of air sampling.
   3. Test procedures, in detail.
   4. Test instruments and apparatus.
   5. Sampling methods.

F. Air Contaminant Test Reports: Show:
   1. Location where each sample was taken, and time.
   2. Test values for each air sample; average the values of each set of 3.
   3. HVAC operating conditions.
   4. Certification of test equipment calibration.
   5. Other conditions or discrepancies that might have influenced results.

G. LEED Closeout Submittals:
   1. General: At completion of construction and prior to contract close-out, submit the following for information purposes in electronic format.
   2. Final Construction Indoor Air Quality Management, During Construction, Package for IEQ Credit 3.1: At completion of construction and prior to contract close-out, submit:
      a. Approved Construction Indoor Air Quality Management Plan.
      b. Construction Photographs: Six taken at 3 separate times for a total of eighteen (18) digital photographs of required construction indoor air quality management measures.
         1) HVAC protection.
         2) Source Control.

3) Pathway Interruption.
4) Housekeeping.
5) Scheduling.
6) Protection of absorptive or dry sink materials, including but not limited to carpet, gypsum board, acoustical ceiling tiles, and insulation.
7) Temporary filtration media, if HVAC is operated during construction.

c. Product data of filtration media used during construction and installed immediately prior to occupancy including MERV values, manufacturer's name and model number.
d. Meeting minutes, checklists, worksheets, notifications and deficiency or resolution logs related to the project IAQ issues.
e. Final LEED IEQ Credit 3.1 Online Template indicating compliance with credit requirements.

3. Final Construction Indoor Air Quality Management Plan, Prior to Occupancy, Package for IEQ Credit 3.2: At completion of construction and prior to contract close-out, submit:
   a. Compliance Path Option 1: Approved Building Flush-out Schedule including a statement that space was not occupied until after delivery of minimum outside air requirements were met.
   b. Compliance Path Option 2: Baseline Indoor Air Quality Testing reports showing results and location of each test indicating that the maximum chemical contaminate concentration requirements are not exceeded, a summary of HVAC operating conditions, a listing of discrepancies and recommendations for corrective actions, if needed.
      1) Include certification of test equipment calibration with each test report.
   c. Final LEED IEQ Credit 3.2 Online Template indicating compliance with credit requirements.
4. Final Low Emitting Materials Package for IEQ Credits 4.1, 4.2, 4.3, and 4.4: Provide individual electronic folders for each credit containing:
   a. Legible electronic copies of relevant material product data, with applicable criteria highlighted, for each product listed on the LEED Online Template.
   b. Final LEED Online Template including all low-emitting materials used on Project.
5. LEED Online: Final LEED Online Template and associated required documentation uploaded to LEED Online for each of the following Credits:
   a. IEQ Credit 3.1, Construction Indoor Air Quality Management, During Construction.
   b. IEQ Credit 3.2, Construction Indoor Air Quality Management, Prior to Occupancy.
   c. IEQ Credit 4.1, Low Emitting Materials, Adhesives and Sealants.
   d. IEQ Credit 4.2, Low Emitting Materials, Paints and Coatings.
   e. IEQ Credit 4.3, Low Emitting Materials, Carpet Systems.
   f. IEQ Credit 4.4, Low Emitting Materials, Composite Wood and Agrifiber Products.

1.6 SCHEDULING

A. Coordinate construction activities to minimize or eliminate disruption of operations in occupied portions of building.

B. Schedule for storage, installation, and protection of all components of air distribution systems.

C. Schedule for storage, installation, and protect of absorptive materials (woven, fibrous or porous in nature, such as carpet, ceiling tiles, insulation, and fabrics) from exposure to emissions during and after installation from materials and finishes with potential for short-term release of off-gassing volatile organic compounds.

1. Highlight critical methods used to protect absorptive materials from airborne pollutants such as: dust, debris, moisture, gaseous and microbial contamination.
2. Sequence installation of absorptive materials after odor-emitting activities have occurred and have been mitigated by ventilation.

D. Do not store absorptive materials on-site if protection measures as described above cannot be ensured.

E. Avoid building occupancy while construction related pollutants are present.

F. Ensure proper and complete curing of concrete before covering.

PART 2 PRODUCTS

2.1 MATERIALS

A. Low VOC Materials: See other sections for specific requirements for materials with low VOC content.

B. Auxiliary Air Filters:
1. MERV of 8, minimum, when tested in accordance with ASHRAE 52.2, during construction.
2. MERV of 13, minimum, when tested in accordance with ASHRAE 52.2, installed prior to occupancy.

PART 3 EXECUTION

3.1 CONSTRUCTION PROCEDURES

A. Prevent the absorption of moisture and humidity by adsorptive materials by:
1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
3. Provide sufficient ventilation for drying within reasonable time frame.

B. Begin construction ventilation when building is substantially enclosed.

C. HVAC system shall be kept clean, free of dust, debris, moisture, gaseous and microbial contamination during storage, handling, installation and punch-out. Inspect all air inlets, air outlets, grilles, diffusers, plenums, and ducts upon completion of Work.
1. Cover and protect (taped plastic or similar method) all exposed air inlet and outlet openings, grilles, ducts, plenums, to prevent water, moisture, dust and other contaminate intrusion.
2. Apply protection immediately after installation of equipment and ducting.
3. Ducting runs that require more than a single day to install shall be protected at end of each day's Work.
4. Leaks in return ducts and air handlers shall be checked and repaired.
5. Inspect filtration monthly and replace as needed with new media throughout the HVAC system; filtration media shall be minimum MERV 8.
6. After final phase of construction, install new filtration media throughout the HVAC system; filtration media shall be minimum MERV 8.
7. Cleaning of ductwork is not part of this contract; however Contractor shall bear cost of cleaning required by Owner due to failure of Contractor to protect ducts and equipment from construction pollutants as specified.

D. HVAC equipment and ductwork may NOT be used for ventilation during construction:
1. Provide temporary ventilation equivalent to 1.5 air changes per hour, minimum.

2. Exhaust directly to outside.
3. Seal HVAC air inlets and outlets immediately after duct installation.

E. Do not store construction materials or waste in mechanical or electrical rooms.

F. Provide direct exhaust to the exterior during installation of strong emitting materials, including touch-up activities; keep exhaust away from intakes and occupied spaces.

G. Provide adequate ventilation of packaged dry products prior to installations. Remove from package and place in a secure, dry, well-ventilated space, free from contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree maximum continuously during ventilations period. Do not ventilate within limits of Work unless otherwise approved by Architect.

H. "Bake-out" or "super-heating" of spaces to accelerate the release of gaseous emissions is not permitted.

I. Prohibit smoking and use of fossil-fueled temporary heating units inside the building and near building entrances, windows and intakes and within 25 feet of building entrances.

J. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
1. Inspect duct intakes, return air grilles, and terminal units for dust.
2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
3. Clean tops of doors and frames.
4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
5. Clean return plenums of air handling units.
6. Remove intake filters last, after cleaning is complete.

K. Use low-toxic pest control chemicals such as boron, if needed, unless otherwise directed.

L. Remove spills or excess application of solvent-containing products as soon as possible. Use low-emitting cleaning agents, giving preference to Green Seal products.

M. Keep work areas as dry as possible; replace any absorptive (dry sink) material that is exposed to moisture.

N. Use other relevant recommendations of SMACNA (OCC) for avoiding unnecessary contamination due to construction procedures.

3.2 PATHWAY INTERUPTION

A. Provide negative pressurization of spaces under construction and/or demolition and positive pressurization of occupied or finished spaces while construction work proceeds in adjacent areas.

B. Relocate pollutant sources when project equipment or staging areas coincide with critical air flow pathways and place plastic barriers to contain construction areas.

C. Temporarily seal building, including air intakes and exhaust vents, and any other building openings, when dust-generating or strong-emitting construction products or procedures are used on the exterior of the building.

D. Once spaces within building become occupied, work areas must remain under negative pressure. Exhaust air at a rate at least 10% greater than the rate of supply. Do not exhaust air where it can be drawn back into occupied spaces and place a continuous plastic barriers creating a seal between construction areas and occupied spaces.

3.3 INDOOR AIR QUALITY MANAGEMENT - PRIOR TO OCCUPANCY

A. Provide Air Contaminant Testing, if testing fails, provide Building Flush-Out.

3.4 BUILDING FLUSH-OUT

A. Perform building flush-out before occupancy, with all interior finishes installed and new filtration media in place.

B. Do not start flush-out until:
   1. All construction is complete.
   2. HVAC systems have been tested, adjusted, and balanced for proper operation.
   3. Inspection of inside of return air ducts and terminal units confirms that cleaning is not necessary.
   4. New HVAC filtration media have been installed.

C. Building Flush-Out: Operate all ventilation systems at normal flow rates with 100 percent outside air until a total air volume of 14,000 cubic feet per square foot of floor area has been supplied.
   1. Obtain Owner's concurrence that construction is complete enough before beginning flush-out.
   2. Maintain interior temperature of at least 60 degrees F and interior relative humidity no higher than 60 percent.
   3. If additional construction involving materials that produce particulates or any of the specified contaminants is conducted during flush-out, start flush-out over.
   4. Space may be occupied following delivery of a minimum of 3,500 cubic feet of outside air per square feet of floor area to space, until the total of 14,000 cubic feet per square foot of outside air has been delivered to the space, and:
      a. Begin ventilation at least three hours prior to daily occupancy.
      b. Continue ventilation during all occupied periods.
      c. Provide minimum outside air volume of 0.30 cfm per square foot or design minimum outside air rate, whichever is greater.
   5. Do not start flush-out in any area until:
      a. All construction is complete.
      b. HVAC systems have been tested, adjusted, and balanced for proper operation.
      c. Inspection of inside of return air ducts and terminal units confirms that cleaning is not necessary.
      d. New HVAC filtration media have been installed.

D. Install new HVAC filtration media after completion of flush-out and before occupancy or further testing.

3.5 AIR CONTAMINANT TESTING

A. Perform air contaminant testing before occupancy.

B. Do not start air contaminant testing until:
   1. All construction is complete, including interior finishes.
   2. HVAC systems have been tested, adjusted, and balanced for proper operation.
   3. Cleaning of inside of HVAC ductwork, specified elsewhere, has been completed.
   4. New HVAC filtration media have been installed.

C. Indoor Air Samples: Collect from spaces representative of occupied areas:

1. Collect samples while operable windows and exterior doors are closed, HVAC system is running normally as if occupied, with design minimum outdoor air, but with the building unoccupied.
2. Collect samples from spaces in each contiguous floor area in each air handler zone, but not less than one sample per 25,000 square feet; take samples from areas having the least ventilation and those having the greatest presumed source strength.
3. Collect samples from height from 36 inches to 72 inches above floor.
4. Collect samples from same locations on 3 consecutive days during normal business hours; average the results of each set of 3 samples.
5. Exception: Areas with normal very high outside air ventilation rates, such as laboratories, do not need to be tested.
6. For each sampling point where maximum concentration limits are exceeded conduct flush-out with outside air and retest the specific parameter(s) that were exceeded to indicate the requirements are achieved; repeat procedure until all requirements have been met.
7. When retesting the same building areas, take samples from at least the same locations as in first test.

D. Outdoor Air Samples: Collect samples at outside air intake of each air handler at the same time as indoor samples are taken.

E. Analyze air samples and submit report.

F. Air Contaminant Concentration Limits:
1. Formaldehyde: Not more than 27 parts per billion.
2. PM10 Particulates: Not more than 50 micrograms per cubic meter.
3. Total Volatile Organic Compounds (TVOCs): Not more than 500 micrograms per cubic meter.
4. Chemicals Listed in CAL (CDPH SM) Table 4-1, except Formaldehyde: Allowable concentrations listed in Table 4-1.
5. Carbon Monoxide: Not more than 9 parts per million and not more than 2 parts per million higher than outdoor air.

G. Air Contaminant Concentration Test Methods:
1. Formaldehyde: ASTM D5197, EPA 625 Method TO-11A, or EPA 600 Method IP-6.
2. Particulates: EPA 600 Method IP-10.
3. Total Volatile Organic Compounds (TVOC): EPA 625 Method TO-1, TO-15, or TO-17; or EPA 600 Method IP-1.
4. Chemicals Listed in CAL (CDPH SM) Table 4-1, except Formaldehyde: ASTM D5197, or EPA 625 Method TO-1, TO-15, or TO-17.
5. Carbon Monoxide: EPA 600 Method IP-3, plus measure outdoor air; measure in ppm; report both indoor and outdoor measurements.

END OF SECTION

SECTION 01 58 13 - TEMPORARY PROJECT SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project identification sign.

B. Project informational signs.

1.2 QUALITY ASSURANCE

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Shop Drawing: Show content, layout, lettering, color, foundation, structure, sizes and grades of members.

PART 2 PRODUCTS

2.1 SIGN MATERIALS

A. Structure and Framing: New, wood, structurally adequate.

B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch thick, standard large sizes to minimize joints.

C. Rough Hardware: Galvanized.

D. Paint and Primers: Exterior quality, two coats; sign background of color as selected.

E. Lettering: Exterior quality paint, contrasting colors.

2.2 PROJECT IDENTIFICATION SIGN

A. One painted sign, 48 sq ft area, bottom 6 feet above ground.

B. Graphic Design, Colors, Style of Lettering: Designated by Architect.

2.3 PROJECT INFORMATIONAL SIGNS

A. Provide signs designation construction access at entrances designated for construction access.

B. Provide no trespassing and hard hat area signs.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install project identification sign within 30 days after date fixed by Notice to Proceed.

B. Erect at designated location.

C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

D. Install sign surface plumb and level, with butt joints. Anchor securely.

3.2 MAINTENANCE

A. Maintain signs and supports clean, repair deterioration and damage.

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations and procedures.

F. Procedures for Owner-supplied products.

G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.2 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

1.3 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 45 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

E. LEED Submittals: Use forms provided in Section 01 35 16.

PART 2 PRODUCTS

2.1 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

D. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

2.2 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. Where all other criteria are met, Contractor shall give preference to products that:
   1. If used on interior, have lower emissions, as defined in Section 01 61 16.
   2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.
   3. Are extracted, harvested, and/or manufactured closer to the location of the project.
   4. Have longer documented life span under normal use.
   5. Result in less construction waste.
   6. Are made of vegetable materials that are rapidly renewable.
   7. Have a published GreenScreen Chemical Hazard Analysis.

C. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

D. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," Architect will make selection.
   5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
   6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

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

2.3 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products of Named Manufacturers: Contractor to provide products from named manufacturers; refer to other provisions regarding substitutions.

C. Or Equal Product: Product that is demonstrated and approved through submittal process, as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

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

2.4 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.1 SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.

B. Timing: Architect will not consider requests for substitution after bid, except for extenuating circumstances described below; requests may be considered or rejected at discretion of Architect.
   1. The specification permits "Or Equal."
   2. The product is no longer manufactured.
   3. The product is not available due to a strike.
   4. The specified product is identified as incompatible or inappropriate for the project.
   5. The specified item fails to comply with building code requirements.
   6. The manufacturer or fabricator declares a specified product to be unsuitable for the use intended and refuses to warrant its installation.
   7. Significant cost savings to the Owner.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
   1. Statement indicating why specified material or product cannot be provided.
   2. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
   3. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   4. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   5. Samples, where applicable or requested.
   6. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
   7. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   8. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
   9. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
   10. Cost information, including a proposal of change, if any, in the Contract Sum.
   11. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.

12. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

D. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:
   1. Substitution Request Form: Use CSI Form 13.1A.
   2. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
   3. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
   4. Architect will consider Contractor's request for substitution when the following conditions are met. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
      a. Substitution requested must meet or exceed specified material, product or equipment items appearance, function and quality level as determined by the Architect and Owner.
      b. Requests for substitution must include clear identification of the material, product or equipment item and complete description including drawings, cuts, performance and test data, along with any other information necessary for a complete evaluation.
      c. Requested substitution shall not require extensive revisions to the Contract Documents or changes to any other materials, products or equipment items.
      d. Requested substitution is consistent with the Contract Documents and will produce indicated results.
      e. Substitution request is fully documented and properly submitted.
      f. Requested substitution will not adversely affect Contractor's Construction Schedule.
      g. Requested substitution has received necessary approvals of authorities having jurisdiction.
      h. Requested substitution is compatible with other portions of the Work.
      i. Requested substitution provides specified warranty.
      j. Requested substitution will not delay the Work.
      k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
      l. The Architect's/Owner's decision to accept or reject the proposed substitution shall be final and will be set forth in writing.

G. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later. Architect's notification will be in one the following forms:
   1. Form of Acceptance:
      a. After Contract signing: Change Order.
   2. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

3.2 OWNER-SUPPLIED PRODUCTS

A. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.
   3. On delivery, inspect products jointly with Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
   3. Handle, store, install and finish products.
   4. Repair or replace items damaged after receipt.

3.3 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.4 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

J. Prevent contact with material that may cause corrosion, discoloration, or staining.

K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

L. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

Advancement of Construction Technology

SUBSTITUTION REQUEST

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Phone: _____ _____

Trade Name: _____ Model No.: _____

Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 2-5 years old ☐ 5-10 yrs old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-point comparative data attached - REQUIRED BY A/E

Reason for not providing specified item: _____

_____

Similar Installation: See attached "Project List"

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

_____

Savings to Owner for accepting substitution: _____ ($ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____
Upon request

SUBSTITUTION REQUEST
(Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

_____

_____

_____

A/E's REVIEW AND ACTION

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

Signed by: Date:

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ _____

_____

_____

_____

_____

_____

_____

_____

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

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Low-emitting restrictions for product categories listed below under "DEFINITIONS."

B. VOC-restricted products.

C. All products of each category that are installed in the project must comply; Owner's project goals do not allow for partial compliance.

1.2 RELATED REQUIREMENTS

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

1.3 DEFINITIONS

A. Low-Emitting Products: All products of each of the following categories when installed or applied on-site in the building interior:
   1. Adhesives, sealants, and sealer coatings.
   2. Carpet tile.
   3. Resilient floor coverings.
   4. Paints and coatings.
   5. Insulation.
   6. Gypsum board.
   7. Acoustical ceilings and panels.
   8. Cabinet work.
   9. Wall coverings.
   10. Composite wood and agrifiber products used either alone or as part of another product.

B. Interior of Building: Within the building waterproofing envelope.

C. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

D. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

1.4 REFERENCE STANDARDS

A. CRI (GLP) - Green Label Plus Testing Program - Certified Products; Carpet and Rug Institute; Current Edition.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Evidence of Compliance: Submit for each different product in each applicable category.
   1. Identify evidence submittals with the words "LEED Report".

C. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.
   1. Adhesives, sealants, paints and coatings: VOC content as measured in grams per Liter (g/L).

PART 2 PRODUCTS

2.1 MATERIALS

A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.

B. Adhesives applied within the building waterproofing envelope shall comply with the current VOC Content limits, as expressed in grams per liter, of South Coast Air Quality Management District (SCAQMD) Rule 1168 "Adhesive and Sealant Applications," amended January 7, 2005, or more stringent levels, as follows:
   1. Indoor Carpet & Pad Adhesives: 50.
   2. Wood Flooring Adhesive: 100.
   3. Rubber Floor Adhesives: 60.
   4. Subfloor Adhesives: 50.
   5. Ceramic Tile Adhesives: 65.
   6. VCT and Asphalt Tile (& Linoleum) Adhesives: 50.
   7. Dry Wall and Panel Adhesives: 50.
   8. Cove Base Adhesives: 50.
   9. Multipurpose Construction Adhesives: 70.
   10. Structural Glazing Adhesives: 100.
   11. PVC Welding: 510.
   12. CPVC Welding: 490.
   13. ABS Welding: 325.
   14. Plastic Cement Welding: 250.
   15. Adhesive Primer for Plastic: 550.
   16. Contact Adhesive: 80.
   17. Special Purpose Contact Adhesive: 250.
   18. Structural Wood Member Adhesive: 140.
   19. Metal to metal substrates: 30.
   20. Plastic foam substrate: 50.
   21. Porous substrate except wood: 50.
   22. Wood substrate: 30.
   23. Fiberglass substrate: 80.
   24. All Other Welding & Installation Adhesives: 250.

C. Aerosol Adhesives applied within building waterproofing envelope shall comply with the VOC Content limits, as expressed in percentage of VOCs by weight, of Green Seal (GS) Standard GS-36 “Commercial Adhesives,” October 19, 2000 as follows:
   1. General Purpose Mist Spray: 65% VOCs by weight.
   2. General Purpose Web Spray: 55% VOCs by weight.
   3. Special Purpose Aerosol Adhesives (all types): 70% VOCs by weight.

D. Sealants applied within building waterproofing envelope shall comply with VOC Content limits, as expressed in grams per liter, less water and exempt compounds, of SCAQMD Rule 1168 “Adhesive and Sealant Applications,” amended January 7, 2005, as follows:
   1. Architectural Sealants: 250.
   2. Non-membrane Roof: 300.
   3. Single-Ply Roof Membrane: 450.
   4. Other: 420.

E. Sealant primers applied within building waterproofing envelope shall comply with VOC Content limits, as expressed in grams per liter, less water and exempt compounds, of SCAQMD Rule 1168 "Adhesive and Sealant Applications," amended January 7, 2005, as follows:
   1. Architectural, Nonporous: 250.
   2. Architectural, Porous: 775.
   3. Other: 750.

F. Paints and Coatings:
   1. Provide coatings that comply with the most stringent requirements specified in the following:
      a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   2. Credit EQ 4.2: VOC limits.
      a. Flat Paints, Coatings, and Primers: VOC not more than 50 g/L.
      b. Non-Flat Paints, Coatings, and Primers: VOC not more than 150 g/L.
      c. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
      d. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
      e. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
      f. Floor Coatings: VOC not more than 100 g/L.
      g. Shellacs, Clear: VOC not more than 730 g/L.
      h. Shellacs, Pigmented: VOC not more than 550 g/L.
      i. Stains: VOC not more than 250 g/L.
      j. Flat Interior Topcoat Paints: VOC not more than 50 g/L.
      k. Non-Flat Interior Topcoat Paints: VOC not more than 150 g/L.
      l. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
      m. Clear Wood Finishes, Varnishes and Sanding Sealers: VOC not more than 350 g/L.
      n. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
      o. Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.
      p. Dry-Fog Coatings: VOC not more than 400 g/L.
      q. Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L.
      r. Pretreatment Wash Primers: VOC not more than 420 g/L.
      s. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
      t. Restricted Components: Paints and coatings shall not contain any of the following:
         1) Acrolein.
         2) Acrylonitrile.
         3) Antimony.
         4) Benzene.
         5) Butyl benzyl phthalate.
         6) Cadmium.
         7) Di (2-ethylhexyl) phthalate.
         8) Di-n-butyl phthalate.
         9) Di-n-octyl phthalate.
         10) 1,2-dichlorobenzene.

11) Diethyl phthalate.
12) Dimethyl phthalate.
13) Ethylbenzene.
14) Formaldehyde.
15) Hexavalent chromium.
16) Isophorone.
17) Lead.
18) Mercury.
19) Methyl ethyl ketone.
20) Methyl isobutyl ketone.
21) Methylene chloride.
22) Naphthalene.
23) Toluene (methylbenzene).
24) 1,1,1-trichloroethane.
25) Vinyl chloride.

3. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
4. Evidence of Compliance: Acceptable types of evidence are:
   a. Report of laboratory testing performed in accordance with requirements.

G. Carpet Tile and Adhesive: Provide products having VOC content not greater than that required for CRI Green Label Plus certification.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Current Green Label Plus Certification.
      b. Report of laboratory testing performed in accordance with requirements.

H. Carpet Tile and Adhesive: Provide products having VOC content as specified in Section 09 68 13.

I. Composite Wood and Agrifiber Products and Adhesives Used for Laminating Them: Provide products having no added urea-formaldehyde resins.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Published product data showing compliance with requirements.

J. Other Product Categories: Comply with limitations specified elsewhere.

PART 3 EXECUTION

3.1 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 01 61 16.01 - ACCESSORY MATERIAL VOC CONTENT CERTIFICATION FORM

.1 FORM

A. Identification:
   1. Project Name: _____
   2. Project No.: _____
   3. Architect: _____

B. Use of This Form:
   1. Because installers are allowed and directed to choose accessory materials suitable for the applicable installation, there is a possibility that such accessory materials might contain VOC content in excess of that permitted, especially where such materials have not been explicitly specified.
   2. Contractor is required to obtain and submit this form from each installer of work on this project.
   3. For each product category listed, circle the correct words in brackets: either [HAS] or [HAS NOT].
   4. If any of these accessory materials has been used, attach to this form product data and MSDS sheet for each such product.

C. VOC content restrictions are specified in Section 01 61 16.

1.1 PRODUCT CERTIFICATION

A. I certify that the installation work of my firm on this project:
   1. [HAS] [HAS NOT] required the use of any ADHESIVES.
   2. [HAS] [HAS NOT] required the use of any JOINT SEALANTS.
   3. [HAS] [HAS NOT] required the use of any PAINTS OR COATINGS.
   4. [HAS] [HAS NOT] required the use of any COMPOSITE WOOD or AGRIFIBER PRODUCTS.

B. Product data and MSDS sheets are attached.

2.1 CERTIFIED BY: (Installer/Manufacturer/Supplier Firm)

A. Firm Name: _____
B. Print Name: _____
C. Signature: _____
D. Title: _____ (officer of company)
E. Date: _____

END OF SECTION

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Pre-installation meetings.

D. Cutting and patching.

E. Surveying for laying out the work.

F. Cleaning and protection.

G. Starting of systems and equipment.

1.2 RELATED REQUIREMENTS

A. Section 01 50 00 - Temporary Facilities and Controls: Temporary exterior enclosures.

B. Section 01 50 00 - Temporary Facilities and Controls: Temporary interior partitions.

C. Section 07 84 00 - Firestopping.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in conformance with Contract Documents.
   3. Submit surveys and survey logs for the project record.

C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.
   6. Include in request:
      a. Identification of Project.
      b. Location and description of affected work.
      c. Necessity for cutting or alteration.
      d. Description of proposed work and products to be used.
      e. Alternatives to cutting and patching.
      f. Effect on work of Owner or separate Contractor.
      g. Written permission of affected separate Contractor.
      h. Date and time work will be executed.

D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.4 QUALIFICATIONS

A. For survey work, employ a land surveyor registered in the State of Maryland and acceptable to Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

1.5 PROJECT CONDITIONS

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

C. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

D. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

E. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

F. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

G. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

PART 2 PRODUCTS

2.1 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.
   3. Review conflicts and compatibility issues.
   4. Review environmental limitations and protection.
   5. Examine substrates.
   6. Review requirements of the following:
      a. Contract Documents.
      b. Options.
      c. Related Change Orders.
      d. Submittals.
      e. Mockups.
      f. Testing and inspection.

E. 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.

3.4 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

F. Utilize recognized engineering survey practices.

G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
2. Grid or axis for structures.
3. Building foundation, column locations, ground floor elevations.

H. Periodically verify layouts by same means.

I. Maintain a complete and accurate log of control and survey work as it progresses.

3.5 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.6 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
1. Verify that construction and utility arrangements are as shown.
2. Report discrepancies to Architect before disturbing existing installation.
3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on drawings.
2. Provide sound retardant partitions of construction indicated on drawings in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

D. Remove existing work as indicated and as required to accomplish new work.
1. Remove items indicated on drawings.
2. Relocate items indicated on drawings.
3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.

1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
3. 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.
    a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    b. Provide temporary connections as required to maintain existing systems in service.
4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

F. Protect existing work to remain.
    1. Prevent movement of structure; provide shoring and bracing if necessary.
    2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
    3. Repair adjacent construction and finishes damaged during removal work.
    4. Patch as specified for patching new work.

G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

H. Refinish existing surfaces as indicated:
    1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
    2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
    3. Patch as specified for patching new work.

I. Clean existing systems and equipment.

J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

K. Do not begin new construction in alterations areas before demolition is complete.

L. Comply with all other applicable requirements of this section.

3.7 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
    1. Complete the work.
    2. Fit products together to integrate with other work.
    3. Provide openings for penetration of mechanical, electrical, and other services.
    4. Match work that has been cut to adjacent work.

5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-conforming work.

D. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.

E. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

F. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

G. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

H. Restore work with new products in accordance with requirements of Contract Documents.

I. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

J. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.

K. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

L. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

M. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.

3.8 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.9 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Prohibit traffic from landscaped areas.

H. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.10 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.12 FINAL CLEANING

A. Employ experienced workers or professional cleaners for final cleaning; clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program.

B. Use cleaning materials that are nonhazardous.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

E. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

F. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

G. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

H. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

I. Remove tools, construction equipment, machinery, and surplus material from Project site.

J. Remove snow and ice to provide safe access to building.

K. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

L. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

M. Sweep concrete floors broom clean in unoccupied spaces.

N. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

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

P. Remove labels that are not permanent.

Q. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
   1. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
   2. Revise seven subparagraphs below to suit Project. Check for conflict or duplication with provisions in other Sections, particularly Divisions 20 through 29.

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

S. Replace parts subject to unusual operating conditions.

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

U. Clean exposed surfaces of diffusers, registers, and grills.

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

W. Leave Project clean and ready for occupancy.

END OF SECTION

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.
   1. Minimum requirement is 75 Percent per LEED Credit MRc2.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
   1. Aluminum and plastic beverage containers.
   2. Corrugated cardboard.
   3. Wood pallets.
   4. Clean dimensional wood: May be used as blocking or furring.
   5. Land clearing debris, including brush, branches, logs, and stumps.
   6. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.

E. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

F. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.

G. The following sources may be useful in developing the Waste Management Plan:
   1. "Maryland Recycles" website: http://www.mdrecycles.org/ for local resources related to construction materials recycling and salvage.
   2. Maryland Commercial Recycling Specialists (410) 333-3066.
   3. "Builders' Guide to Reuse & Recycling: A Directory for Construction and Demolition Materials in the Metropolitan Washington Region": www.mwcog.org/buidersrecyclingguide/
   4. "MACREDO: Mid-Atlantic Consortium of Recycling and Economic Development Officials" provides a recycling markets and sources directory for the Mid-Atlantic States; website: http://macredo.libertynet.org/index.html
   5. Habitat Restore of Northern Virginia, for construction materials reuse, 7770 Richmond
   6. Highway, Alexandria, VA 22306, (703) 360-6700, http://www.restorenova.org.
   7. “Used Building Materials Association (UBMA)” www.ubma.org.
   8. The Loading Dock, Inc., Baltimore, MD.
   9. Second Chance Inc., Baltimore, MD.
   10. RecycleOne, Hyattsville, MD, http://www.recycleone.net.

H. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

I. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.2 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. Section 01 50 00 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.

C. Section 01 60 00 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

D. Section 01 70 00 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

E. Section 02 41 19 - Selective Demolition.

F. Section 31 10 00 - Site Clearing: Handling and disposal of land clearing debris.

1.3 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Waste Management Plan: Include the following information:
   1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
   2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
   3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
   4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
   5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
   6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.

C. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
   1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
   2. LEED Online: Complete LEED Template including the amount of recycled and salvaged construction and demolition waste to date.
   3. Landfill Disposal: Include the following information:
      a. Identification of material.
      b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
      c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
      d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   4. Recycled and Salvaged Materials: Include the following information for each:
      a. Identification of material, including those retrieved by installer for use on other projects.
      b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
      c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
      d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
      e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.

5. Material Reused on Project: Include the following information for each:
   a. Identification of material and how it was used in the project.
   b. Amount, in tons or cubic yards.
   c. Include weight tickets as evidence of quantity.
6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

D. Final Waste Management Documentation: Submit at completion of Substantial Completion and prior to contract closeout:
1. All information required in Monthly Report Submittals.
2. Legible copies of on-site logs, manifests, weight tickets, and receipts.
3. Final LEED Template uploaded to LEED Online, including appropriate documentation of total amount (by weight or volume) of diverted construction and demolition waste, and the total amount (by weight or volume) of landfilled waste excluding site clearing.
   a. MR Credit 2, Construction Waste Management.

PART 2 PRODUCTS

2.1 PRODUCT SUBSTITUTIONS

A. See Section 01 60 00 - Product Requirements for substitution submission procedures.

B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 60 00:
1. Relative amount of waste produced, compared to specified product.
2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Sum.
3. Proposed disposal method for waste product.
4. Markets for recycled waste product.

PART 3 EXECUTION

3.1 WASTE MANAGEMENT PROCEDURES

A. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 50 00 for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 70 00 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.2 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Pre-bid meeting.
   2. Pre-construction meeting.
   3. Regular job-site meetings.

E. Records: Maintain onsite logs for each load of materials removed from site:
   1. Landfill Log: Include type of material, load (by weight or volume), recycling/hauling service, date accepted by landfill, and facility fee.
   2. Waste Diversion: Include type of material, load (by weight or volume), recycling/hauling service, date accepted by recycling service, or non-profit receiver and facility fee.
   3. Where comingling occurs prior to collection, track the amount of construction waste diverted from landfill based on the weight or volume of the removed co-mingled waste and provide the documentation of percentages of recycled from the sorting facility.

F. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide temporary enclosures around piles of separated materials to be recycled or salvaged.
   3. Provide materials for barriers and enclosures that are nonhazardous, recyclable, or reusable to the maximum extent possible; reuse project construction waste materials if possible.
   4. Locate enclosures out of the way of construction traffic.
   5. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   6. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
   7. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
   8. Provide bi-lingual signage.

G. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

H. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
   1. Coordinate work of recycling, composting and salvaging waste haulers with other trades.
   2. Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

I. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

J. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Inspection procedures.

1.2 RELATED REQUIREMENTS

A. Section 01 20 00 - Payment Procedures.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
   1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
   2. Advise Owner of pending insurance changeover requirements.
   3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   5. Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
   6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
   7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
   8. Complete startup testing of systems.
   9. Submit test/adjust/balance records.
   10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
   11. Advise Owner of changeover in heat and other utilities.
   12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
   13. Complete final cleaning requirements, including touchup painting.
   14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
   1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
   2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
   1. Submit a final Application for Payment according to Division 1 Section "Price and Payment Procedures."
   2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
   3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
   4. Submit pest-control final inspection report and warranty.
   5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
   1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.
   1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
   3. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Architect.
      d. Name of Contractor.
      e. Page number.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

Advancement of Construction Technology

PUNCH LIST

Project: _____

_____

To (Contractor): _____

_____

From (A/E): _____

Site Visit Date: _____

A/E Project Number: _____

Contract For: _____

The following items require the attention of the Contractor for completion or correction. This list may not be all-inclusive, and the failure to include any items on this list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Item Number	Room Number	Location (Area)	Description	Correction/Completion Date	Verification A/E Check

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

September 1996
CSI Form 14.1A

SECTION 01 78 00 - CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.2 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. Individual Product Sections: Warranties required for specific products or Work.

1.3 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:

1. Submit preliminary draft or proposed formats and outlines of contents before start of Work via Web-Based Project Management Software. Architect will review and provide comments.
2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
3. Submit initial copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
4. Submit three sets of revised final documents in hard copy form as well as digitally on CD within 10 days after final inspection.

C. Warranties and Bonds:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.

4. Change Orders and other modifications to the Contract.
5. Reviewed shop drawings, product data, and samples.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish first floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

3.2 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.3 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.4 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
1. Description of unit or system, and component parts.
2. Identify function, normal operating characteristics, and limiting conditions.
3. Include performance curves, with engineering data and tests.
4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

E. Provide servicing and lubrication schedule, and list of lubricants required.

F. Include manufacturer's printed operation and maintenance instructions.

G. Include sequence of operation by controls manufacturer.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Provide control diagrams by controls manufacturer as installed.

J. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

K. Lamp Submittal: Include data on all lamps labeled according to fixture type; this data shall include:
   1. Manufacturer.
   2. Lamp designation (ex. PAR38, M16, T5HO).
   3. Manufacturer's catalog number.
   4. Wattage.
   5. Color temperature.
   6. CRI.
   7. Beam spread.
   8. Initial lumens.
   9. Catalog spec sheet for each fixture type.

L. Additional Requirements: As specified in individual product specification sections.

3.5 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

D. Prepare data in the form of an instructional manual.

E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

L. Arrangement of Contents: Organize each volume in parts as follows:
   1. Project Directory.
   2. Table of Contents, of all volumes, and of this volume.
   3. Operation and Maintenance Data: Arranged by system, then by product category.
      a. Source data.
      b. Product data, shop drawings, and other submittals.
      c. Operation and maintenance data.
      d. Field quality control data.
      e. Photocopies of warranties and bonds.

M. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

N. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.

O. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

P. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.6 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for

items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.1 SUMMARY

A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections; comply with pertinent LEED requirements.

B. Training of Owner personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. HVAC systems and equipment.
   3. Plumbing equipment.
   4. Electrical systems and equipment.
   5. Security and audio visual systems.
   6. Energy Dashboard.
   7. Wind Turbine.
   8. Items specified in individual product Sections.

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
   1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
   2. Finishes, including flooring, wall finishes, ceiling finishes.
   3. Fixtures and fittings.
   4. Items specified in individual product Sections.

1.2 SUBMITTALS

A. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
   1. Format: DVD Disc.
   2. Label each disc and container with session identification and date.

1.3 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
   1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
   2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.

C. Demonstration may be combined with Owner personnel training if applicable.

D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.
   2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
   1. Perform demonstrations not less than two weeks prior to Substantial Completion.

F. Coordinate demonstration and training requirements with commissioning requirements.

END OF SECTION

SECTION 01 91 13 – GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 1 and other applicable Sections, apply to Work of this Section. Failure to meet Cx requirements and failure to correct noncompliance and/or deficiencies subjects the Contractor to withholding of payments and completion. See General Conditions.

B. Section 01 91 15 Commissioning Plan (Cx Plan) – Stipulates the relationships between the parties involved with the Cx process. Defines the milestones in completion incorporating the Cx process.

C. Section 01 78 00 Closeout Submittals: Provides general requirements and specifications for O&M Documentation for Work across all Divisions.

1.2 REFERENCE STANDARDS

A. ASHRAE Guideline 0-2013, *The Commissioning Process*, American Society of Heating, Refrigeration, and Air Conditioning Engineers, Atlanta, GA. www.ashrae.org

B. ASHRAE Guideline 1.1-2007, *The HVAC Commissioning Process*, American Society of Heating Refrigeration, and Air Conditioning Engineers, Atlanta, GA.
www.ashrae.org

C. ASHRAE Guideline 4-2008, *Preparation of Operating and Maintenance Documentation for Building Systems*, American Society of Heating Refrigeration, and Air Conditioning Engineers, Atlanta, GA.
www.ashrae.org

D. National Environmental Balancing Bureau, 'Procedural Standards for Building Systems Commissioning'.

1.3 SUMMARY

A. Commissioning (Cx) is a systematic process of ensuring that building systems perform interactively according to the design intent and the owner's operational needs. For purposes of this project, the Cx process occurs during the design, construction, acceptance, and occupancy phases. The objectives of this Cx process are as follows:

1. Ensure that installed systems are operable and maintainable.
2. Maintain a high level of quality assurance.
3. Test and verify the applicable heating, ventilating, and air conditioning (HVAC), domestic water, and electrical systems to ensure they are interacting and performing optimally.
4. Ensure proper documentation of the Cx process including meeting minutes, equipment start-ups, pre-functional checklists (PFC), and functional performance tests (FPTs). (Responsible party for completing specific documentation is outlined in Cx Responsibilities section and the Cx Plan).
5. Identify, track, record, and report all system and equipment deficiencies in the Cx Issues Log.
6. Provide technical expertise for the correction of deficiencies.
7. Ensure O&M documentation delivered to Owner is complete.
8. Verify Training on all Commissioned Systems is carried out and properly documented.
9. Document warranty start and end dates.
10. Conduct ten month review of Commissioned Systems in accordance with LEED.

1.4 DEFINITIONS AND ABBREVIATIONS

A. Refer to the Cx Plan for additional definitions and abbreviations related to the Cx process.

B. Commissioning Agent (CxA): Independent firm retained by the Owner to conduct the Cx Program. The CxA shall work with the various subcontractors, the Architect, and the Engineer-of-Record (EOR) to direct and oversee the Cx process and perform Functional Performance Testing (FPT).

C. Commissioning Milestones: Cx Milestones are scheduled events that mark defining progress completion points in the execution of the Cx process. Cx Milestones include specific Meetings and Training Events as defined in the Cx Plan. Regularly scheduled construction progress or working meetings are not considered Cx Milestones.

D. Commissioning Plan (Cx Plan): The Cx Plan outlines the entire Cx process in detail. The Cx Plan is part of the Contract Documents and outlines many of responsibilities, procedures and tasks throughout the Cx process from Design through Occupancy. It also indicates the details of the FPT that the Construction Manager/General Contractor (CM/GC) and associated Contractors must participate in. The Cx Plan provides a detailed description of the work required by the CxA. Further, it is imperative that the CM/GC and all associated Contractors read and understand the implications and procedures outlined in the Cx Plan prior to submitting their bid for the Work.

E. Commissioning Program: This is a general reference to the entire Cx process and associated documents. The Cx process refers to all work described in the Cx Plan and all

other specification sections relating to Cx.

F. Commissioning Team: The group of individuals who will collaborate to ensure the facility is fully and completely commissioned. The Cx Team will generally include a core group of individuals involved with all systems. This core group shall include the CxA, the GC, the Owner, and Owner's Construction Manager (if applicable). On any given system, the team will also include the member of the contractor(s) responsible for the systems or equipment.

G. Functional Performance Test(ing) (FPT): The detailed and thorough testing of the building systems and their interactions with the building components and other building systems to ensure they are operating in accordance with the final design intent. Testing is performed in various modes of operation and conditions. Both component performance and environmental design objectives will be monitored during this testing. Functional Performance Tests (FPTs) are tests developed by the CxA with input from appropriate Cx Team members that, when passed, indicate Functional Completion of the system or equipment.

1.5 COMMISSIONING TEAM

A. The CxA shall designate a Commissioning Team (Cx Team) consisting of all members needed to execute the approved Cx Program. Definitions of these Parties are provided in the Cx Plan. Minimum Cx Team participation shall include:

1. CxA
2. Owner's Representatives (Owner)
3. Engineer of Record (EOR)
4. Architect
5. Construction Manager/General Contractor (CM/GC)
6. Controls Contractor (CC)
7. Mechanical Contractor (MC)
8. Plumbing Contractor (MC)
9. Electrical Contractor (EC)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 COMMISSIONED SYSTEMS

A. The following mechanical and electrical systems, equipment and components will be commissioned by Kibart, Inc., the CxA under this project. Where applicable, sampling may be used to test the equipment listed below. Refer to the Cx Plan for sampling rates. This would allow for a representative portion of the equipment to be tested and not every unit. All general references to the equipment in this document refer only to equipment that shall be commissioned.

1. 100% of central heating and cooling plants, including all supporting equipment (pumps, combustion air, controls, etc).
2. 100% without sampling of Air handlers, roof-top units, etc.
3. 25% with sampling of HVAC terminal systems, such as VRF units, heat pump

units, heaters, fan coil units, exhaust fans, etc.
4. 100% of Domestic Hot Water system
5. 25% with sampling interior lighting and associated control system.
6. Renewable Energy System
7. Building Automation System in proportion to tested systems.

3.2 COMMISSIONING MILESTONES AND PARTICIPANTS

A. The following are the Cx Milestones (Cx-specific meetings and training events) required under this Contract. Complete descriptions, including Schedule and Attendees, are provided in the Cx Plan. They are provided here as a summary for the Contractor and associated Contractors. These Milestones are in addition to regular construction progress meetings and FPTs that are scheduled as systems and equipment are ready for testing.

1. *Construction Phase Commissioning Scoping Meeting.* Required Attendees include the CxA (lead), Construction Manager (CM), and Mechanical, Electrical, and Controls Contractors. Other required attendees include Owner Representatives, EOR, and Architect.
2. *Commissioning Progress Meetings.* Required Attendees include the CxA (lead), CM, and Mechanical, Electrical, and Controls Contractors. Other required attendees include Owner Representative, and Tab Contractor.
3. *Owners Training of Cx Systems*. Required Attendees include the Construction Manager/General Contractor (CM/GC), Owner Representatives and Operators. Applicable contractors and EOR may also be required.

3.3 COMMISSIONING DOCUMENTATION

A. The Design Phase Cx Plan is written by the CxA and included in the Contract Documents. The Plan shall be updated in accordance with the Cx Plan Progression Section in the Cx Plan.

B. The Cx Issues Log shall be maintained by the CxA. It is used to track Cx-related issues or deficiencies found throughout the project. A sample Issues Log is included in the appendix of the Cx Plan. Refer to the Cx Documentation section in the Cx Plan for more information.

C. CxA shall require Submittals relating to key systems or equipment from the Contractor as specified in the Cx Plan to ensure Owner's Requirements are met and facilitate the preparation of FPTs. Review is for Cx facilitation only and does not replace the Submittal Review of the Architect or EOR.

D. The Controls Contractor (CC) is responsible for submitting a Controls Checkout Plan, in accordance with the Cx Plan, prior to beginning TAB of the building.

E. The Contractor with develop Pre-Functional Checklists. The Contractor is responsible for completing the Pre-Functional Checklists and Start-up Reports in accordance with the Cx Plan and other Contract Documents.

F. The FPT procedures shall be developed by the CxA and provided to the Contractor for review prior to the start of the FPTs. Refer to the Cx Plan for additional information.

G. The Contractor shall develop a Training Plan in accordance with the Cx Plan and other Contract Documents.

H. The Contractor shall develop the Operation and Maintenance Manuals in accordance with the Cx Plan and other Contract Documents.

3.4 DOCUMENTATION INDENTIFICATION SYSTEM

A. Give each submitted form or report a unique identification; use the following scheme:

B. Type of Document: Use the following prefixes:

1. Startup Plan: SP-
2. Startup Report: SR-
3. Prefunctional Checklist: PC-
4. Functional Test Procedure: FTP-
5. Functional Test Report: FTR-

C. System Type: Use the first 4 digits from CSI/CSC MasterFormat, that are applicable to the system; for example:

1. 2300: HVAC System as a whole.
2. 2320: HVAC Piping and Pumps.
3. 2330: HVAC Air Distribution.

D. Component Number: Assign numbers sequentially, using 1, 2, or 3 digits as required to accommodate the number of units in the system.

E. Test, Revision, or Submittal Number: Number each successive iteration sequentially, starting with 1.

F. Example: PC-2320-001.2 would be the Prefunctional Checklist for equipment item 1 in the HVAC piping system, probably a pump; this is the second, revised submittal of this checklist.

3.5 SEQUENCING AND SCHEDULING COMMISSIONING TASKS

A. Contractor shall incorporate the Cx Program into the project schedule and timelines.

B. Cx tasks to be separately indicated in the project schedule include but are not limited to:

1. Start-Up: Indicate time required to properly perform Start-Up of each system and complete Start-Up Documentation.
2. FPT: Indicate time required for FPTs, itemized as applicable for each system/area. Coordinate duration for the tasks with the CxA.

3.6 COMMISSIONING PROTOCOLS

A. Coordination responsibilities and management protocols relative to Cx are initially defined in the Cx Plan and will be refined and documented at the *Construction Phase Cx Scoping Coordination Meeting* and also by scheduled updates to the Cx Plan. Contractor

shall have input in the protocols and all Parties will commit to scheduling obligations. The CxA will record and distribute.

3.7 COMMISSIONING RESPONSIBILITIES

A. General

1. All parties involved in the design and construction of the facility bear responsibility in the Cx Program. The Cx Program does not fundamentally change the responsibilities of the team members from conventional projects carried out without a formal Cx Program. The Cx Program supplements and formalizes the responsibilities of all parties.
2. The role of the CxA is to oversee the Cx Program and to assist all other parties in achieving the goals of the project. Refer to the Cx Plan for further detail.
3. The Contractor (and associated Sub-Contractors) retains all responsibility for the installations. CxA inspections and tests will determine the adequacy and completeness of the installations to assist the Contractor in providing a sound installation. CxA testing does not alleviate the Contractor's responsibility for ensuring the systems are complete and functional throughout the Warranty Period.
4. Detailed responsibilities for the Mechanical Contractor and associated Sub-Contractors are indicated below. Refer to the Cx Plan for detailed responsibilities for other Contractors and Cx Team members. These responsibilities relate solely to the Cx Program and do not encompass all aspects of the project.
5. Some scopes or tasks indicated in the following list of responsibilities are further detailed in other subsections of the Cx Plan, including descriptions of meetings, training events, and required reports.

B. Mechanical Contractor's (MC) Responsibilities

1. Attend Cx meetings, FPTs, and Training as outlined in the specifications, the Cx Plan, and as summarized in this subsection.
2. Include requirements for submittal data, including O&M data and training materials in each purchase order or sub-contract written. Provide submittals in electronic format originating from the manufacturer to ensure the highest resolution/quality.
3. Ensure cooperation of other Sub-Contractors as necessary.
4. Ensure cooperation and participation of specialty Sub-Contractors as necessary.
5. Ensure participation of major equipment manufacturers and their representatives as needed. Note all commissioned equipment that is standalone or provided with factory mounted controls will require the support of the start-up technicians during Cx FPTs.
6. Gather O&M data on all equipment and assemble electronically. Provide electronic manuals in accordance to Sections 01770 Closeout Procedures and other related Sections. Submit to CM/GC after the equipment has been placed. O&M data shall be forwarded to CxA for use in preparing FPTs.
7. Attend Cx meetings and training events as outlined in the Cx Plan and other Contract documents.
8. Participate in and schedule vendors and Sub-Contractors to participate in the training sessions outlined in this plan and Contract Documents.

9. Conduct Maintenance Orientation and Inspection Meetings at the Equipment Placement and Distribution Completion stages. Update drawings electronically to the record condition to date, and review with the CxA prior to each Meeting.
10. Prepare necessary preliminary schedule for maintenance orientation and inspection meetings, O&M manual submission, training sessions, and equipment start-ups, TAB start and job completion for use by the CxA. Update schedule as appropriate throughout the construction period.
11. Attend and participate in all Cx FPT's per the Cx Plan.
12. Provide all training in accordance with Contract Documents. Video tape training if required in the project specifications.
13. The appropriate Contractor Representative or Manufacturer's Representative (in the case of factory testing and startup) shall provide written certification that the following work has been completed in accordance with the plans and specifications and that they are functioning as designed. Where the Work has been subcontracted, the Sub-Contractor shall be responsible for the initial certification with the primary Contractor Representative re-certifying that he has inspected the Work and that it has been completed and functioning as designed. This certification must be submitted to the CxA prior to the final verification. Certifications are required for the following systems:
    a. HVAC equipment and all associated terminal systems
    b. Central Heating and Cooling systems
    c. Domestic Water System
    d. All BAS controls associated with the above referenced systems
14. Assist the CxA in documentation and verification of equipment and system performance, including but not limited to FPTs. Schedule the Sub-Contractors (including but not limited to TAB, CC) to assist during FPTs as required. Assistance in FPTs involves performing and demonstrating system capabilities as directed by the CxA.
15. Provide all tools and equipment necessary to perform FPTs, including those necessary for simulation of false loading as required by the CxA.
16. Turn over set of record mark-ups to the Mechanical and Plumbing EORs for final incorporation into Record Documents.
17. Refer to Division 23 and other applicable specification sections for specific start-up procedures for HVAC equipment. Unless otherwise noted, these procedures are the direct responsibility of the Contractor as a basic element of validating that the installation is correct. The manufacturer start-up forms shall be completed and submitted to the CM/GC and CxA for review in accordance with the Cx Plan.

C. Electrical Contractor's (MC) Responsibilities

1. Attend Cx meetings, FPTs, and Training as outlined in the specifications, the Cx Plan, and as summarized in this subsection.
2. Include requirements for submittal data, including O&M data and training materials in each purchase order or sub-contract written. Provide submittals in electronic format originating from the manufacturer to ensure the highest resolution/quality.
3. Ensure cooperation of other Sub-Contractors as necessary.
4. Ensure cooperation and participation of specialty Sub-Contractors as necessary.
5. Ensure participation of major equipment manufacturers and their representatives as needed.

6. Gather O&M data on all equipment and assemble electronically. Provide electronic manuals in accordance to Sections 01 78 00 Closeout Submittals and other related Sections. Submit to CM/GC after equipment has been placed. O&M data shall be forwarded to CxA for use in preparing FPTs.
7. Attend Cx Milestone meetings and training events as outlined in the Cx Plan.
8. Attend and participate in all CxA FPT's per the Cx Plan.
9. Provide all training in accordance with Contract Documents. Video tape training if required in the project specifications.
10. Assist the CxA in documentation and verification of equipment and system performance, including but not limited to FPTs. Assistance in FPTs involves performing and demonstrating system capabilities as directed by the CxA.
11. Provide all tools and equipment necessary to perform FPTs, including those necessary for testing and operation of all Commissioned systems, as required by the CxA.
12. Turn over set of record mark-ups to the Electrical EOR for final incorporation into Record Documents.
13. The Electrical Contractor (EC) may be required for participation in start-ups of mechanical equipment, operation of electrical starters, breakers, etc., pre-functional checklists, and some aspects of the mechanical systems FPTs.
14. The appropriate Contractor or Manufacturer's Representative (in the case of factory testing and startup) shall provide written certification that the following work has been completed in accordance with the plans and specifications and that they are functioning as designed. Where the Work has been subcontracted, the Sub-Contractor shall be responsible for the initial certification with the primary Contractor re-certifying that he has inspected the Work and that it has been completed and functioning as designed. This certification must be submitted to the CxA prior to the final verification. Certifications are required for the following systems:
    a. Interior lighting and associated controls
    b. Renewable energy systems
15. Refer to Division 26 and other applicable specification sections for specific start-up procedures for electrical equipment. Unless otherwise noted, these procedures are the direct responsibility of the Contractor as a basic element of validating that the installation is correct. The manufacturer start-up forms shall be completed and submitted to the CM/GC and the CxA for review in accordance with the Cx Plan.

D. Controls Contractor's (CC) Responsibilities

1. All requirements of MC and EC shall apply as applicable to the CC, including requirements for Submittals, O&M manuals and data, and training data and materials.
2. The CC is a crucial member of the Cx Team and will be required to be available for most FPTs, as well as verify, demonstrate and train the Operators on the overall system operation and sequence of operation. The CM/GC shall ensure that the CC is made fully aware of his/her role and importance to a successful Cx effort.
3. Attend Cx Milestone meetings and training events as outlined in the Cx Plan and also as specified in appropriate control systems specification Section.
4. Attend and participate in all Cx FPT's per the Plan and spec. sections. The CC shall be required to demonstrate all control and system sequences of operation to

the CxA and other members of the Cx Team.

5. Provide and participate all training in accordance with Contract Documents.

E. Equipment Suppliers and Miscellaneous Specialty Contractors

1. Attend Meetings as outlined in the Cx Plan.
2. Participate in training sessions as outlined in the Cx Plan and other Contract documents.
3. Demonstrate performance of equipment as applicable.

3.8 CONTRACTOR NOTIFICATIONS

A. Contractors shall completely install, thoroughly inspect, start-up, test, adjust, and balance systems and equipment. All activities shall be documented on Start-Up Documentation forms developed by the Contractor and reviewed by the CxA. The Contractor shall notify Owner and CxA in writing that systems are complete and ready for verification and FPT. CxA shall then coordinate and schedule the FPT and notify all Cx Team members.

B. Contractor shall notify CxA at least 14 days in advance of any tests, startups, or training. CxA shall witness selected tests and startups.

3.9 START-UP AND PRE-FUNCTIONAL TESTING PROCEDURES

A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.

B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan or field checkout sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entity. Submit startup reports directly to CxA.

C. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned.

1. No sampling of identical or near-identical items is allowed.
2. These checklists do not replace manufacturer's recommended startup checklists, regardless of apparent redundancy.
3. Prefunctional Checklist forms will not be complete until after award of the contract; the following types of information will be gathered via the completed Checklist forms:
    a. Certification by installing contractor that the unit is properly installed, started up, operating, and ready for Functional Testing.
    b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.
    c. Manufacturer, model number, and relevant capacity information; list information "as specified", "as submitted", and "as installed".
    d. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer's start-up checklist items and minor testing.

e. Sensor and actuator calibration information.

D. The Contractor shall provide pre-functional checklists and start-up reports to the CxA electronically. The Contractor is responsible for completing these forms and submitting the completed forms to the CM and CxA for review in accordance with the Cx Plan.

3.10 GENERIC FUNCTIONAL PERFORMANCE TESTS (FPT)

A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.

B. Contractor shall refer to the Cx Plan for detailed information concerning the scheduling, prerequisites, and generic system/equipment testing requirements for the functional performance tests.

C. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to Owner; if a deficiency is not corrected and re-tested immediately, the CxA will document the deficiency and the Contractor's stated intentions regarding correction.

1. Deficiencies are any condition in the installation or function of a component, piece of equipment, or system that is not in compliance with the Contract Documents or does not perform properly.
2. When the deficiency has been corrected, the Contractor shall notify pertinent members of the Cx Team in writing that the item is ready to be re-tested, and the CxA shall reschedule the test with re-testing performed by the Contractor.
3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.
4. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing.
5. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process, Contractor shall bear the cost of the second and subsequent re-tests.

D. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of the timing.

E. Factory Tests: Commissioning Authority and Contractor are responsible for coordinating testing of equipment at the factory by factory personnel, to ensure compliance with commissioning requirements.

F. Field Tests By Others: Where Functional Tests are indicated as to be performed by others not subject to the Contract Documents, those tests are not subject to these

commissioning requirements.

G. Functional Performance Tests provide the final metric for CxA approval and are provided by the CxA in the Cx Plan. Contractor shall consult the most current version of the Cx Plan to determine applicable FPTs that will be used for system acceptance.

END OF SECTION

SECTION 01 91 15 – DESIGN PHASE COMMISSIONING PLAN

COMMISSIONING PLAN

FOR

Garrett College STEM Renovation and Addition

687 Mosser Rd
McHenry, MD 21541

November 30, 2016

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TABLE OF CONTENTS

I. INTRODUCTION

A. Commissioning Plan (Cx Plan)

1. This Cx Plan outlines the procedures, requirements, and responsibilities of all Cx Team members for the Garrett College STEM Renovation & Addition throughout design, construction, acceptance and occupancy phases. The Commissioning Agent (CxA) will use the Cx Plan to ensure that the Garrett College STEM project is designed, installed, started, tested, and documented to meet the needs of the Garrett College (Owner).

II. PROJECT DESCRIPTION

A. Facility Description

1. The Garrett College STEM building was constructed in 1979 as a mining technology center. Renovations were made to the facility in the 1980's, and in 2002 the building roof was replaced. The building serves as the primary location for Continuing Education and Workforce Development offices, Institutional Research office, the president's office, one conference room and nine classrooms.

B. LEED Goal

1. The Garrett College STEM Renovation & Addition is pursuing LEED New Construction under LEED BD&C v3.0.

2. The following Commissioning Credits are anticipated:

   a. EAp1 – Fundamental Commissioning

   b. EAc3 – Enhanced Commissioning

III. COMMISSIONED SYSTEMS (TABLE 3.1)

Equipment	***Description***	***% Tested[1]***	***Submittal Required***
BAS		Note 2	Yes
Air Handler / Roof-top Units		100%	Yes
HVAC Terminal Units	VRF, heat pumps, heaters, fan coil units, exhaust fans, etc.	25%	Yes
Central Heating Plant	All associated support systems	100%	Yes
Central Cooling Plant	All associated support systems	100%	Yes
Domestic Hot Water System		100%	Yes
Interior Lighting	Including Associated Controls	25%	Yes
Renewable Energy Systems		100%	Yes
Notes:			

Equipment	*Description*	*% Tested[1]*	*Submittal Required*
	1. Maximum failure rate for sampling 10% 2. The BAS will be tested for all of the applicable equipment being tested during the equipment FPTs.		

IV. COMMISSIONING OVERVIEW

A. Definitions

1. Cx is a systematic process of ensuring that building systems perform interactively according to the design intent and the owner's operational needs. For purposes of this project, the Cx process occurs during the design, construction, acceptance, and post-occupancy phases.

2. Design Phase - During this phase the Cx Agent (CxA) reviews the drawings and specifications for accuracy and completeness. The CxA shall also review the Owner's Project Requirements (OPR) and ensure that the Basis of Design (BOD) meets the intent of the OPR. During this phase the Cx Plan and Cx Specifications are developed and submitted as part of the Contract Documents for the project.

3. Construction Phase - Engineer-of-Record (EOR) and CxA shall concurrently review the Shop Drawings for all the Commissioned Systems in accordance with this Cx Plan and other Contract Documents. CxA also reviews Cx specific submittals. Equipment is installed and equipment start-ups and pre-Functional testing is performed by the Contractors. Start-up Documentation is submitted to and reviewed by the CxA. The CxA shall write the Functional Performance Testing (FPT) procedures during this phase.

4. Acceptance Phase - FPTs are performed by the Cx Team with key roles being played by the CxA and Controls Contractor. Deferred Seasonal Testing shall be coordinated if necessary. The CxA shall maintain the Cx Issues Log. The Contractors shall conduct Owner Systems Training, and the CxA shall assist in development of the training and verification of its performance. At the end of this phase the CxA shall issue the Cx Systems Manual including the Cx Plan, meeting minutes, issues log, test reports, start-up reports, pre-functional performance tests, FPT Reports, and training documents. CxA shall update relevant LEED prerequisites and credits for review by the USGBC.

5. Occupancy Phase – The Owner operates and maintains the facility per the design intent and informs the design and construction teams of any problem. Architect and EOR shall respond to design related deficiencies discovered during the warranty period. Contractors shall provide warranty service as specified in the Contract Documents. The primary role of the CxA during this phase is to conduct the 10 month post-occupancy review in accordance with LEED requirements.

B. Objectives

1. Ensure that installed systems are operable and maintainable

2. Test controls sequences to ensure that all commissioned building systems are interacting correctly with their associated control systems.

3. Document Cx Process

    a. Meeting Minutes

    b. Equipment Start-ups / Pre-functional Checklists

    c. Functional Performance Tests

4. Identify, track, record, and verify resolution of all system and equipment deficiencies in the Cx Issues Log.

5. Meet all Cx requirements for LEED BD&C v3.0 credits:

    a. EAp1 – Fundamental Commissioning

    b. EAc3 – Enhanced Commissioning

V. COMMISSIONING RESPONSIBLE PARTIES (TABLE 5.1)

TABLE WILL BE COMPLETED FOLLOWING CX SCOPING MEETING

Title and Company	Contact Information (name, e-mail, phone, fax, address)
Commissioning Agent (CxA) -	
Owner –	
Design Team	
Architect (Design) –	
MEP Design -	
Construction Team	
General Contractor (GC) –	
Mechanical Contractor (MC) -	
Electrical Contractor (EC)-	
Controls Contractor (CC) -	

VI. ROLES AND RESPONSIBILITIES

A. General

1. All parties involved in the design and construction of the facility bear responsibility in the Cx Program. The Cx Program does not fundamentally change the responsibilities of the team members from conventional projects carried out without a formal Cx Program. The Cx Program supplements and formalizes the responsibilities of all parties.

2. The role of the CxA is to oversee the Cx Program and to assist all other parties in achieving the goals of the project.

3. The Contractor (and associated Sub-Contractors) retains all responsibility for the installations. CxA inspections and tests will determine the adequacy and completeness of the installations to assist the Contractor in providing a sound installation. CxA testing does not alleviate the Contractor's responsibility for ensuring the systems are complete and functional.

4. Detailed responsibilities are indicated below. These responsibilities relate solely to the Cx Program and do not encompass all aspects of the project.

5. Some scopes or tasks indicated in the following list of responsibilities are further detailed in other subsections of the Cx Plan, including descriptions of meetings, training events, and required reports.

6. Only the responsibilities related specifically to the Cx scope are listed herein. All team members have additional responsibilities, as part of their overall contract scope, which are not included here.

B. Contractor Notification

1. Systems and equipment are considered to be complete and ready for verification and Functional Performance Testing (FPT) after Contractors have completely installed, thoroughly inspected, started up, tested, adjusted, and balanced all systems and equipment. All activities shall be documented by hand on the proper documentation forms developed by the Contractor and reviewed by the CxA. Systems and equipment shall be complete and ready for verification prior to the start of Functional Performance Testing. The Contractor shall notify Owner and CxA in writing that systems are complete and ready for verification and FPT. CxA shall then coordinate and schedule the FPT and notify all Cx Team members.

2. Functional performance testing shall not begin prior to CxA's receipt of Contractor's written notification that all systems and equipment are complete and ready for verification and FPT.

3. Contractor shall notify CxA at least 14 days in advance of any tests or start-ups.

C. CxA

1. Design

    a. Write Cx Plan and Specifications.

b. Review Design of 50% CDs, and 100% CDs.

c. Review OPR and BOD.

d. Attend other Cx Related Meetings as needed.

2. Construction

a. Coordinate and Execute Cx Program.

b. Update Cx Plan.

c. Conduct Construction Phase Commissioning Scoping Meeting.

d. Review Shop Drawings for Commissioned Systems.

e. Conduct the Controls Coordination Meeting. Meeting will be scheduled after the BAS Shop Drawing has been submitted and reviewed by the CxA and EOR.

f. Review Start-up and review Pre-Functional Checklist forms submitted prior to the start of Pre-Functional Tests and Start-up.

g. Schedule and Run Cx meetings.

h. Develop FPTs including detailed system and equipment specific test procedures and documentation.

i. Create and Maintain Issues Log.

j. Inspect installations during execution of FPTs.

k. Attend Progress Meetings as needed.

l. Review O&M Documentation.

3. Acceptance

a. Direct and Perform FPTs.

b. Maintain FPT Documentation.

c. Maintain Issues Log.

d. Issue Final Cx Report.

4. Occupancy

a. Conduct ten month review of commissioned building systems.

D. **Owner**

1. Design

a. Select a CxA.

b. Respond to Owner-specific Design Review comments.

c. Provide Owner's Project Requirements documentation.

2. Construction

a. Owner or Owner Representative shall attend Cx Meetings and Inspections at Owner's discretion.

3. Acceptance

a. Owner or an Owner's Representative shall Witness FPTs at Owner's discretion.

b. Attend and record contractor provided systems training.

4. Occupancy

a. Operate and maintain the facility per the design intent.

b. Inform the design and construction teams of any problems operating the building systems.

c. As part of the maintenance program, trend or log system parameters and document any deficiencies.

d. Inform the Design Team and/or Contractor of any changes to the systems and the reason for the change.

E. **Architect**

1. Design Phase

a. Provide OPR to CxA for review.

b. Incorporate Cx specification & Cx Plan sections into the Construction Specifications.

c. Respond to Cx Design Review Comments. Incorporate necessary revisions into the Contract Documents.

2. Construction Phase

a. Include status of the Cx Program as a discussion item in all Construction Progress Meetings.

b. Attend Cx Meetings as outlined in the Cx Plan.

c. Include CxA in the Progress Meeting Minute distribution list.

d. Inform CxA of design changes during construction.

e. Include CxA in distribution of applicable equipment submittals for concurrent EOR and Cx review. CxA will coordinate with Cx Team to identify specific submittals required for CxA review. Shop Drawings

for all Commissioned Systems including the BAS must be submitted to the CxA for review.

3. Acceptance Phase

   a. Witness FPTs as required by Contract.

   b. Resolve any Architectural Issues identified by the CxA.

   c. Attend Cx Meetings as outlined in the Cx Plan.

4. Occupancy Phase

   a. Respond to Design related deficiencies discovered during the warranty period.

F. **Engineer of Record (EOR) – Mechanical, Electrical, Plumbing**

1. Design

   a. Coordinate with CxA to include specific Cx language in specification sections of system drawings.

   b. Respond to Cx Design Review Comments. Incorporate necessary revisions into the Contract Documents.

   c. Provide Basis of Design that meets the OPR. BOD shall be reviewed by the CxA.

2. Construction Phase

   a. Review CxA comments of Shop Drawings designated for concurrent EOR and CxA review. Cx comments must be incorporated into EOR comments to make them legally binding. EOR shall coordinate with the CxA concerning any comments not incorporated.

   b. Attend Cx Meetings as outlined in the Cx Plan.

3. Acceptance Phase

   a. Resolve any Engineering Issues identified by the CxA.

4. Occupancy Phase

   a. Respond to Design related deficiencies discovered during the warranty period.

G. **General Contractor**

1. Construction Phase

   a. Include Cx requirements in price and plan for Work.

   b. Itemize Cx related tasks and milestones in the project schedule.

c. Provide copies of all Construction Progress Meeting minutes to the CxA.

d. Attend Cx Meetings as outlined in the Cx Plan

e. Include CxA in distribution of applicable equipment submittals for concurrent EOR and Cx review. CxA will coordinate with Cx Team to identify specific submittals required for CxA review. Shop Drawings for all Commissioned Systems including the BAS must be submitted to the CxA for review.

f. Schedule all Sub-Contractors and vendors for Cx-related events. Ensure that the Controls Contractor is made fully aware of the role and importance of a complete and functional controls system to a successful Cx effort.

g. Certify that systems have been installed and are operating per Contract Documents and have met all Cx Prerequisites prior to Acceptance Phase.

h. Maintain a binder of all start-up forms, pre-functional checklists, and test reports Work with Sub-contractors to complete all Start-Up Documentation and testing. Once completed, submit binder to the Owner and CxA for review. Depending on schedule of testing and start-ups multiple submissions may be required.

i. Demonstrate systems as specified.

2. Acceptance Phase

a. Assist CxA in Verification and FPTs by testing and demonstrating systems as directed.

b. Schedule all Sub-Contractors and vendors to assist with the execution of the FPTs and attend other Cx-related events. Provide all tools and equipment necessary to perform FPTs, including those necessary for testing and operation of all Commissioned systems, as required by the CxA.

c. Provide Owner Systems Training in accordance with Contract Documents.

d. Resolve any Construction Issues identified by the CxA.

H. **Sub-Contractors**

1. All Sub-Contractors

a. Attend Construction Phase Cx Scoping Meeting.

b. Attend Cx meetings, FPTs, and training events as outlined in the Cx Plan and specifications, unless told otherwise by the CxA or Owner.

c. Assist the CxA in documentation and verification of equipment and system performance, including but not limited to FPTs.

d. Provide written certification that the work is complete and operates in accordance with the contract documents.

i. In the case of factory testing and startup, the manufacturer shall provide written certification that the Work is complete and operates as designed in accordance with the contract documents.

ii. Where the Work has been subcontracted, the Subcontractor shall be responsible for the initial certification. The primary Contractor will inspect the Work and re-certify that it is complete and functions as designed. The written certification must be submitted to the CxA prior to the start of FPTs.

2. Mechanical

a. Refer to “All Sub-Contractors” section for additional requirements.

b. Sub-Contractors shall submit Start-up Documentation for review and approval. Start-up documentation and Pre-functional Checklists shall be provided to the CxA for all commissioned equipment. Pre-functional Checklists shall be utilized and populated by the Sub-Contractors during Start-up and submitted for record with the start-up documentation.

c. Submit Installation Certification Information such as Balancing Reports, Warrantees, and Duct and Pipe Test Results for CxA review.

d. Schedule Sub-Contractors including the Controls Contractor to assist during FPTs, as required. The Controls Contractors will typically be required during all Mechanical FPTs.

e. Coordinate with the major equipment manufacturers to provide representation during FPTs. All major commissioned equipment that is standalone or provided with factory mounted controls will require the support of the start-up technicians during Cx FPTs. The start-up technicians must be knowledgeable in the demonstration, testing, and troubleshooting of the commissioned equipment.

3. Electrical

a. Refer to “All Sub-Contractors” section for additional requirements.

b. Attend and participate in all Cx FPT’s per the Cx Plan, unless told otherwise by the CxA. Schedule Sub-Contractors (lighting control system representative) to assist during FPTs, as required.

c. Sub-Contractors shall submit Start-up Documentation for review and approval. Start-up documentation and Pre-functional Checklists shall be provided to the CxA for all commissioned equipment. Pre-functional Checklists shall be utilized and populated by the Sub-Contractors during Start-up and submitted for record with the start-up documentation.

d. Submit completed start-up forms and pre-functional checklists to the CxA for review.

e. Coordinate with the major equipment manufacturers to provide representation during FPTs. All commissioned systems that are standalone or provided with factory mounted controls will require the support of the start-up technicians during Cx FPTs. These systems may include lighting control or the generator. The start-up technicians must be knowledgeable in the demonstration, testing, and troubleshooting of the commissioned equipment.

f. Participate in portions of start-ups of mechanical equipment; operate electrical starters, breakers, and other electrical equipment; complete pre-functional checklists; and provide assistance in some aspects of the mechanical systems FPTs, as required.

4. Controls

a. Refer to “All Sub-Contractors” section for additional requirements.

b. Attend the Controls Coordination Meeting. Meeting will be scheduled after the BAS Shop Drawing has been submitted and reviewed by the CxA and EOR.

c. Attend and participate in all Cx FPT’s per the Cx Plan. Demonstrate all control and system sequences of operation to the CxA and other members of the Cx Team.

d. Verify, demonstrate, and train the Owner on the overall system operation and sequence of operation.

5. Manufacturer’s Representatives.

a. Refer to “All Sub-Contractors” section for additional requirements.

b. Provide representation during FPTs. All commissioned equipment that is standalone or provided with factory mounted controls will require the support of the start-up technicians during Cx FPTs. The start-up technicians must be knowledgeable in the demonstration, testing, and troubleshooting of the commissioned equipment.

VII. COORDINATION AND COMMUNICATION

A. Cx Coordination

1. CxA will document requirements for the coordination of all Cx activities throughout the construction process. CxA shall communicate the requirements of Cx for the construction phase at the Cx Scoping Meeting in which the Construction Phase Cx Plan is presented and reviewed.

2. CxA shall solicit participation of the appropriate parties and document that the tasks are being executed and that responsibilities are being met.

3. CxA shall regularly report progress of Cx to Owner and Architect.

B. **Communication Protocols Relating to Cx**

1. Communication from the CxA shall not be interpreted as a work directive. The CxA is contracted directly by Architect and has no authority to direct work by any contractors or design professionals. All channels for directing work are dictated in the agreements between the applicable parties.

2. The Cx Team email distribution list will be determined during the Cx Scoping Meetings and will be listed in the meeting minutes. Correspondence shall generally be routed directly between corresponding companies with copies going to all parties of the Cx Team. The primary exception to this is when it relates to an issuance of a directive. All directives shall be provided by the Architect or GC.

3. The CxA will communicate directly with the Owner, Architect, Engineer, and GC by phone or email to determine project status and answer general procedural questions. In the event that an email or phone conversation affects the project, a summary email of the conversation, or the email(s) in question will be forwarded to the rest of the Cx Team email distribution list.

4. Deficiencies or recommendations for improvements found during testing shall be tracked in the Issues Log. The Issues Log will be provided to the Cx Team email distribution list each time it is updated

5. Specific communications are listed in Table 7.1. Note that these procedures are intended as an initial guide:

Table 7.1 Cx Communication Protocols

Issue	Protocol
Cx Requests for information (RFI) or formal documentation:	CxA shall submit requests to the Owner and Architect. When necessary, copies shall be submitted to the EOR and Contractors.
For minor information or clarification, written or verbal:	CxA shall go directly to the applicable party.
Identifying deficiencies; Notifying contractors of deficiencies:	1. CxA shall track all identified deficiencies in the Cx Issues Log. 2. The Cx Issues Log shall be updated and issued by the CxA. 3. The CxA may discuss deficiency issues with contractors prior to notifying Owner. Copies of the Issues Log will be distributed to Architect, Owner, and Cx Team members. 4. Owner will make the final determination of how deficiencies will be addressed. 5. Recommendations may be made by the CxA or contractors based on system testing and observation.

Issue	Protocol
Making small changes in specified sequences of operations:	The CxA may suggest small sequences of operations changes to improve efficiency or control, but does not fundamentally change the sequence. The CxA shall document all changes of specified sequences and provide copies to the Owner, Architect, and applicable EOR.
Scheduling of all Cx related events:	CxA shall consult directly with the Owner, Architect, and the GC to incorporate the Cx tasks in the master project schedule.
Scheduling FPTs:	The CxA coordinates and schedules FPTs based on Owner and team input. Owner provides final schedule approval.
Scheduling Cx meetings:	The CxA coordinates and schedules Cx meetings at a time convenient for attendees. Typically at the end of each Cx meeting the next meeting is tentatively scheduled.
Scheduling training:	The CxA does not schedule or witness any training.
Making a request for significant changes:	The CxA has no authority to issue change orders.
Sub-Contractors disagreeing with requests or interpretations by the CxA shall:	Try and resolve with the CxA first. Then work through Architect or Owner who will work with CxA directly to resolve the situation.

VIII. COMMISSIONING MEETINGS

A. Overview

1. Meetings: This subsection is a descriptive list of specific Cx Meeting during the Cx process. Cx Meetings are scheduled at milestones in the project schedule. Each Cx Meeting has a specific agenda and is usually scheduled adjacent to regular design and construction progress meetings. The meetings will lead by the CxA.

2. Tasks such as witnessing pipe cleaning/flushing and system startups, conducting periodic Cx inspections, and performing FPTs are not covered in this Section of the Cx Plan.

B. Construction Phase Cx Scoping Meeting

1. Description: Introduction of the Cx Construction team. The CxA shall coordinate with the Cx team to review the complete Cx Process and to ensure the team members are familiar with their specific responsibilities during the Construction and Acceptance phases.

2. Agenda Items:

   a. Review Cx Plan

      i. Address process questions

      ii. Determine lines of reporting and communications

iii. Discuss Work Products

b. Determine tentative schedule and trigger points for follow-up meetings, deliverables, and key events.

c. Discuss distribution and review of shop drawings relating to systems to be commissioned.

d. Decide which systems will require Start-up Documentation and Functional Performance Testing.

e. Define Cx Team Roles and Responsibilities

f. Finalize communication protocols and identify points of contact for the Cx Team Email Distribution List.

g. CxA will distribute meeting minutes to all team members and attendees within seven (7) days following the meeting.

3. Cx Team Email Distribution List: Owner designated team members who are included in all major Cx communications, including site visit scheduling, Issues Logs, FPT distribution, and Cx announcements which affect the project.

4. Schedule: The Construction Phase Cx Scoping Meeting shall be scheduled by the CxA during the Construction Phase at the start of the construction phase, prior to the start of submittal review.

5. Attendees: Any Cx Team member is eligible to attend. Required attendees include:

a. CxA (lead);

b. Owner Representatives;

c. GC;

d. Architect;

e. Mechanical, Electrical, Controls Contractors, and TAB Representative

C. **Controls Coordination Meeting**

1. Description: When the Controls Contractor has prepared the Controls shop drawing for review by the EOR and CxA, the Controls Coordination Meeting will be scheduled. The EOR and CxA will have a minimum of 5 days to review the submittal prior to the meeting. During the Controls Coordination Meeting, all attendees shall review the submittal and information about associated equipment to resolve conflicts between systems and confirm design intent with the Owner.

2. Agenda:

a. Review Controls Submittal Comments from EOR and CxA.

b. Discuss the following options to produce a complete and functional system:

i. Changes to the controls system

ii. Changes to the controls design or sequences

iii. Changes to the equipment or system design

iv. Changes to the Owner's Project Requirements

c. Determine resolutions for all review comments. Final resolution must be agreed upon by the Owner.

d. Controls Contractor shall revise the submittal as required to reflect the agreed upon changes.

e. EOR shall revise the design documents as required to reflect the agreed upon changes.

f. Owner shall revise the OPR document as required to reflect the agreed upon changes.

3. Schedule:

a. The Controls Coordination Meeting shall be scheduled by the CxA between 5 and 15 days after the submission of the Controls shop drawings.

b. This meeting shall be held following a regular Cx progress meeting and Submittal Coordination Meeting.

4. Attendees: Any Cx Team member is eligible to attend. Required attendees include:

a. CxA (lead);

b. Owner Representative;

c. EOR;

d. Controls Contractor

e. Mechanical Contractor

f. Manufacturer Rep for packaged equipment that requires communications interface between the BAS and Equipment controllers.

D. **Commissioning Progress Meetings**

1. Description: Periodic meetings held throughout the Construction and Acceptance Phases to coordinate and facilitate the Cx process. Meetings will be used to address Issues, update schedules, and exchange information. Following the meetings the CxA will periodically walk the building to observe

HVAC, mechanical, and electrical equipment locations with respect to accessibility and general workmanship. When necessary the CxA will distribute a summary of information discussed to each team member within seven (7) days following the meeting.

2. Schedule: The Cx Progress Meetings shall be scheduled by the CxA during the Construction and Acceptance Phases as needed.

3. Attendees: Any Cx Team member is eligible to attend. Required attendees may vary depending on the items being discussed and will be identified in the meeting invitation.

IX. COMMISSIONING DOCUMENTATION

A. Owner's Project Requirements (OPR)

1. Definition: Document written by the owner that details the functional requirements of the project and the expectations of how it will be used and operated.

2. The OPR will include the following:

   a. Key Owner's Project Requirements

   b. General Project Description

   c. Objectives

   d. Functional Uses

   e. Occupancy Requirements

   f. Budget Considerations and Limitations

   g. Performance Criteria

   h. Project Goals

3. The CxA shall review the existing OPR at the beginning of the Cx process. The design documents shall be reviewed to ensure they are consistent with the OPR. When the design documents differ from the OPR the CxA shall coordinate with the project team to determine whether the design documents or OPR need to be revised.

B. Basis of Design (BOD)

1. Definition: Document written by the EOR documenting the major thought processes and assumptions behind the HVAC design decisions made to meet the OPR as they relate to the HVAC system.

2. The BOD will include the following:

   a. Applicable Codes and Standards

   b. Geographic and Climactic Conditions

c. Facility Use Assumptions

d. O&M Expectations

e. Performance Criteria with regard to the OPR

f. Design Methodology

g. HVAC System Narrative

C. **Commissioning Plan**

1. Definition: Document outlining the organization, team member responsibilities, allocation of resources, and documentation requirements of the Cx Process.

2. Design Phase: The Cx Plan is initially written and issued by the CxA during the Design Phase.

3. Construction Phase: At the start of the Construction Phase, the Responsible Parties List, project description, commissioned systems list, and communication protocol sections are updated. Additional changes to the plan are made where necessary.

4. Acceptance Phase: At the end of the Acceptance Phase, the Cx Plan is updated to reflect the Cx team, equipment, and procedures actually used on the job. This final version of the Cx Plan shall be included in the Systems Manual which will be submitted to the Owner.

D. **Issues Log**

1. Definition: A formal and ongoing record of issues and their resolutions. Issues may include deviations from contract requirements, equipment problems, installation issues, control issues, and/or recommendations for system improvements. These issues can be generated by any CX Team member but can only be closed by the CxA,

2. The Issues Log includes the following information:

a. ISSUE #: To help facilitate referencing and tracking issues.

b. DATE OF DISCOVERY: The Cx Event where Issue was discovered and the associated date.

c. DESCRIPTION: Description of specific Issue noted, including equipment designations and equipment settings.

d. RESPONSIBLE PARTY: Party responsible for performing corrective action or providing information for resolution.

e. RESOLUTION/ STATUS UPDATE: Initial entry will include CxA recommendation for resolution. Subsequent entries will detail actions taken to resolve the issue.

f. REINSPECTION DATE: Date resolution will be verified by the CxA. Dates will be based on project deadlines and required tasks.

g. STATUS (OPEN/CLOSED): Both Open and Closed Issues remain on the Issues Log. Issues shall be closed by CxA when resolution has been confirmed or Owner indicates current status is acceptable.

h. DATE RESOLVED: Date Issue is closed.

3. The Issues Log will be distributed as described in Section VII - Coordination and Communication. Additionally, the Issues Log shall be provided to any member of the Cx Team upon request.

4. Inclusion of an item in the Issues Log shall not be considered as direction to proceed on items not already contractually required. The CxA has no authority to direct work or authorize change orders.

5. The party responsible for performing the corrective action will be determined by the project contract requirements. Direction to proceed with the resolution can be given by the Owner, Architect, or Contractor, as allowed in the contract.

E. **Submittals:**

1. The CxA will review submittals affecting commissioned systems

a. The submittal process for the shop drawings shall be as follows:

i. The GC shall submit electronic copies of the specified MEP submittals to the Architect.

ii. The Architect forwards the specified MEP submittals (see Table 3.1 Commissioned Systems) to the EOR and the CxA.

iii. The CxA reviews the submittals. The CxA sends an electronic copy of the submittal review form to the Architect and EOR via e-mail.

iv. The EOR shall review the submittals simultaneously and incorporate the CxA's comments where applicable. Unless the Cx comments are included in the EOR comments, the Cx comments are not contractually binding. The EOR will return a copy of the reviewed submittal with all comments to the Architect.

v. A copy of the finalized submittal shall be sent from the Architect to the CxA.

b. Shop Drawings are required for all Commissioned Equipment/Systems (as listed in Table 3.1) unless otherwise specified.

c. The submittal process for Cx specific submittals shall be as follows:

i. The GC provides the Architect with an electronic copy of each specified Cx submittal.

ii. The Architect forwards the submittal to the CxA.

iii. The CxA reviews the submittals. Then, the CxA sends the review comments to the Architect.

d. The following Cx submittals are required, in addition to the Shop Drawings listed above:

i. Draft versions of equipment Start-Up Documents and Pre-functional checklists developed by the Contractor, along with the manufacturer's startup procedures (and factory tests if applicable).

ii. Completed Start-Up and Pre-functional Documents.

iii. Completed Pre-Functional Checklists.

iv. Test Reports (including duct testing, pipe testing, ground testing, etc).

v. Equipment and system warrantees.

F. **Start-Up Forms and Pre-Functional Checklists**

a. The Contractor shall submit manufacturer-specific startup procedures/checklists and/or contractor start-up checklists and pre-functional checklists for review by the CxA.

b. The CxA will review the contractor's proposed start-up documents, and note items that must be added to provide a complete Pre-Functional Checklist and Start-up Form set.

c. The updated Pre-Functional Checklists and Start-Up Forms are completed and signed by the Contractor during Start-Up. The completed Start-up Documents are then submitted to the CxA and other members of the Cx Team.

d. In the event of equipment or systems tested and started at the factory, a Certification Letter from manufacturer shall be submitted.

G. **Functional Performance Test (FPT) Documents**

a. FPTs shall be developed by the CxA during the Construction Phase after the applicable Shop Drawings have been reviewed by the CxA and approved by the EOR.

b. Once the draft FPTs have been written, the CxA will forward electronic copies of the procedures to the GC. The GC shall forward them to all applicable Sub-Contractors.

c. The applicable Contractors shall review the FPTs to understand the required testing and their roles and responsibilities.

d. The CxA shall forward FPTs to any Cx Team member upon request. Throughout the Cx process, the CxA shall maintain a current record of the testing procedures.

H. **Training Plan**

a. The Training Plan shall outline the Owner Equipment Training and Final Systems Operation Training Events as proposed by the Contractor, and shall be approved by the Architect and EOR and reviewed by the CxA. The CM will compile the individual training agendas of the Contractors and vendors and submit a comprehensive Training Plan to the CxA, Architect, and the Owner for review. Training Plan shall summarize all equipment and systems-related training events with topics to be covered and approximate training duration.

2. The Training Plan shall include at a minimum:

a. Topic and applicable specification section;

b. Scheduled date(s) for the Events(s);

c. Location and setting (classroom or field);

d. Lead Instructor and instructors qualifications;

e. Co-instructors and their qualifications;

f. Event outline or agenda;

g. Anticipated duration;

h. The attendees required for each session.

I. **Operation and Maintenance Documentation Set**

1. O&M Manual Requirements:

a. Refer to the project specifications for general requirements for the O&M Documentation Set for Work across all Divisions.

b. Other Division 22 Sections, Division 23 Sections, Division 26 Sections, and Other Sections requirements for O&M-related materials for equipment specified under individual Sections shall be as specified.

2. Responsibility: The CxA is responsible for reviewing the final O&M Documentation Set.

J. **Commissioning Report**

1. The purpose of this report is to summarize the activities and results of the Commissioning Process.

2. The Commissioning Report will include the following sections:

a. Executive summary

b. Project background and scope of the commissioning project

c. Overview of activities conducted

d. Recommendations for future projects

e. Lessons Learned

X. PRE-FUNCTIONAL CHECKLISTS, TESTS AND STARTUP

A. Pre-Functional Tests

1. Contractor shall use the approved Start-up Documents identified in the Commissioning Documentation Section of this Plan.

2. Execution of Pre-Functional Checklists

   a. Contractors are responsible for completing the Start-up Documents and all associated pre-functional testing per contract documents and the Cx Plan.

   b. Only individuals having direct knowledge of a line item being completed shall check or initial the forms.

   c. Master copies of the Start-up Documents shall be collected by the GC. Contractors and vendors shall execute each checklist and tests and fill out and sign the master copy. The master copy shall include original signatures. Once all equipment start-ups have been completed, the complete set of Start-up documents shall be submitted to the CxA for review.

3. Deficiencies and Non-Conformance

   a. The Contractor shall generate a Deficiency List with any outstanding items that were not completed upon initial testing. The Deficiency List shall be sent to the CxA within two (2) days of initial testing. Installing Contractors shall correct all areas that are deficient or incomplete.

B. Start-up Procedure

1. Mechanical start up procedure and tests are generally performed as a quality control measure to ensure manufacturer and project specifications were met during installation and start up of the equipment and/or system prior to bringing the equipment online and starting FPTs.

2. The parties responsible for each part of startup and initial checkout are identified in the contract documents.

3. Execution of Startup

a. Equipment start-up shall be conducted and documented per contract documents and the Cx Plan.

b. The Contractor designated to develop the Start-up Forms will obtain manufacturer installation, start-up, and checkout data, including original field checkout sheets completed by the field technicians.

c. The Contractors and vendors shall execute the start-ups in accordance with the manufacturer instructions and submit a signed copy of the completed start-up reports to the CxA.

4. Deficiencies and Non-Conformance

a. The Contractors shall clearly list any outstanding items of the initial start-up that were not completed. The start-up form and deficiencies list shall be provided to the CxA within two (2) days of test completion. The installing Contractors or vendors shall correct all areas that are deficient or incomplete.

C. **Controls Checkout and Operational Verification**

1. The Controls Contractor shall comply with all requirements for Coordination with the CxA and Execution of System Testing included in project specification.

2. All CxA required control pre-functional checklists and equipment start-ups shall be completed and reviewed by the CxA prior to TAB. The CC shall execute the tests and trend logs assigned to them by the CxA and remain on site for assistance for mechanical system functional tests

XI. FUNCTIONAL PERFORMANCE TESTS (FPT)

A. **Prerequisites**

1. All equipment, components and devices associated with the test must be started and startup must be documented. This includes, but is not limited to,

a. Completed Start-up Documentation;

b. Pressure testing of equipment, duct, and pipes;

c. Flushing/cleaning of applicable systems;

d. Completed labeling and identification;

e. Completed insulation of applicable systems;

2. Start-up Reports and Pre-Functional Checklists are submitted to and reviewed by the CxA.

a. CxA shall verify that all required documentation has been submitted and is per the contract requirements.

3. Trending Reports are submitted prior to the start of FPTs. (Additional trending is also required after the completion of FPTs to ensure sequences were

adjusted properly and to verify proper operation over an extended period of time).

4. Unless specifically agreed to by the Owner and CxA, all support systems shall be completed prior to the FPTs.

    a. Example: Air Handler:

        i. Electrical system serving the AHU is completed and tested.

        ii. Hydronic systems are balanced and have passed pre-functional tests.

        iii. Air side balancing is complete

        iv. Controls are fully installed and operational.

5. The CxA shall determine the sequence of testing.

B. **General**

1. The items listed in this section are general FPT requirements that apply to typical equipment, systems, sub-systems, and components.

    a. During the FPTs, submittal documentation shall be convenient to testing area.

    b. Trends shall be set up for each piece of commissioned equipment as outlined in the contract documents and per CxA request. The CxA shall provide Trending Request Forms outlining the trending data and intervals required for each system.

    c. Sensors associated with the tested equipment and systems shall be verified.

    d. All equipment and systems safeties shall be tested. All dynamic systems powered by electricity shall be tested to simulate a power outage to ensure proper sequencing upon return of power.

    e. All sequences of operation shall be tested. Sequences tested will be based on the approved BAS submittal language.

    f. Problems or discrepancies discovered during FPTs shall be noted in the test documents and added to the Issues Log.

2. The CxA shall prepare itemized testing plans and procedures that will:

a. Specify individual tests and procedures that meet the general requirements of this plan.

b. Serve to document and record the testing procedures and the results of the tests.

C. **Instrumentation**

1. Proprietary instrumentation required to verify performance of specialty equipment shall be provided by the Contractor and made available to the CxA. Generally, no testing equipment will be required beyond that necessary to perform Contractor's work under these Contract Documents.

2. All equipment used for testing and calibration shall be NIST/NBS traceable and calibrated with the preceding 6 month period. Certificates of calibration shall be submitted.

D. **Factory Startups**

1. Some systems and equipment may require factory startups. These systems will generally be reviewed and checked during the FPTs. All costs associated with the factory startups are included with the bid unless otherwise noted. The GC shall notify the witnessing parties of the factory startup schedule. Cx Team members may witness any of these startups at their discretion, or as required by the contract scope. Aspects of FPT accomplished during the factory startup may be reviewed by the members of the Cx Team to judge if they meet the intent of the FPT.

XII. PROJECT CLOSEOUT

A. **Prerequisites**

1. The project is complete when the following items are complete:

a. Issues on the Issues Log must be closed

b. All FPTs must be complete and correct

B. **Deliverables**

1. Cx Systems Manual

2. Ten month Post-Occupancy Report

SECTION 02 30 00 - SUBSURFACE DRILLING AND SAMPLING INFORMATION

PART 1 GENERAL

1.1 The following information is included in the Project Manual for bidders' use in preparing bids, but is not part of the Contract Documents, and does not relieve the bidders from doing their own investigation to determine the accuracy of the information.

A. Report of Geotechnical Exploration, Garrett College STEM Building Garrett County, Maryland, Triad Project No. 03-16-0420; dated September 27, 2016.

1.2 STATEMENT CONCERNING THE BORING DATA

A. The test borings and samples of the soils encountered were obtained by the Architect to assist the Architect and his consultants in determining the type and design of the foundation systems.

B. The test borings were made by Triad Engineering, Inc., in accordance with their system of soils classification and they, Triad Engineering, Inc., neither the Owner, the Architect, or his consultants guarantee the accuracy or consistency of the information contained within the Geotechnical Report with the actual site conditions.

C. Any radical deviation from the anticipated material, as indicated by the borings, during the excavation for the building should be reported to the Architect immediately and confirmed in writing.

1.3 CONFIRMATION OF BORING DATA

A. Bidders, Contractors, and any others who are concerned with, or are affected by the test borings should make their own borings and tests at the site.

B. No additional compensations will be allowed the Contractor for failure to fully investigate the site or for the neglect of the information contained in the Boring Logs.

1.4 ATTACHMENT

A. Report of Geotechnical Exploration, Garrett College STEM Building Garrett County, Maryland, Triad Project No. 03-16-0420; dated September 27, 2016.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

Report of
Geotechnical Exploration

Garrett College STEM Building
Garrett County, Maryland

Triad Project No. 03-16-0420

Prepared For:

Mr. Greg Overkamp, AIA, LEED AP
Grimm and Parker
11720 Beltsville Drive, Suite 600
Calverton, Maryland 20705

Prepared by:

TRIAD ENGINEERING, INC.

1075-D Sherman Avenue
Hagerstown, Maryland 21740
www.triadeng.com

September 27, 2016

September 27, 2016

Mr. Greg Overkamp, AIA, LEED AP
Grimm and Parker
11720 Beltsville Drive, Suite 600
Calverton, Maryland 20705

RE: Report of Geotechnical Exploration
Garrett College STEM Building
Garrett County, Maryland
Triad Project No. 03-16-0420

Dear Mr. Overkamp:

In accordance with your request, we have completed a geotechnical exploration for the proposed Garrett College STEM Building project in Garrett County, Maryland. Work on the project was completed in general accordance with your AIA Agreement authorized on August 1, 2016. The subsurface exploration was performed to evaluate the subsurface conditions encountered at the site for the limited purposes of preparing design and construction recommendations for geotechnical aspects of the project. It is emphasized that subsurface conditions may vary dramatically between test locations, and Triad makes no representations as to subsurface conditions other than those encountered at the specific test locations.

This report has been prepared for the exclusive use of Grimm and Parker for specific application to the design of the proposed Garrett College STEM Building in Garrett County, Maryland. Triad's responsibilities and liabilities are limited to our Client and apply only to their use of our report for the purposes described above. To observe compliance with design concepts and specifications, and to facilitate design changes in the event that subsurface conditions differ from those anticipated prior to construction, it is recommended that Triad be retained to provide continuous engineering and testing services during the earthwork and foundation construction phases of the work.

We appreciate the opportunity to assist you on this project and trust this report satisfies your needs at this time. Please feel free to contact us if you have questions concerning this report, or if we can provide further assistance.

Sincerely,

TRIAD ENGINEERING, INC.

James R. Wheeler
Geotechnical Scientist

Stephen J. Gyurisin, P.E.
Project Engineer

"Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 40821, Expiration Date: 6/16/2017."

TABLE OF CONTENTS

Report of Geotechnical Exploration
Garrett College STEM Building
Garrett County, Maryland
Triad Project No. 03-16-0420

FOREWORD

This report has been prepared for the exclusive use of Grimm and Parker for specific application to the design of the proposed Garrett College STEM Building project in Garrett County, Maryland. The work has been performed in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

This report should not be used for estimation of construction quantities and/or costs, and contractors should conduct their own exploration of site conditions for these purposes. Please note that Triad is not responsible for any claims, damages or liability associated with any other party's interpretation of the data or re-use of these data or engineering analyses without the express written authorization of Triad. Additionally, this report must be read in its entirety. Individual sections of this report may cause the reader to draw incorrect conclusions if considered in isolation from each other.

The conclusions and recommendations contained in this report are based, in part, upon our field observations and data obtained from the field exploration at the site. The nature and extent of variations may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations presented herein. Similarly, in the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained herein shall not be considered valid unless the changes are reviewed and the conclusions are modified or verified in writing by Triad.

It is recommended that we be provided the opportunity to review the final grading plan, overall foundation design, and specifications so that earthwork and foundation recommendations may be properly interpreted and implemented. If we are not afforded the privilege of making this review, we will not assume responsibility for misinterpretation of our recommendations, as our recommendations are strictly limited to conditions represented to Triad at the time this report was issued.

SITE AND PROJECT DESCRIPTION

The project site is located at the existing Garrett College campus with an address of 687 Moser Road, McHenry, Maryland. A Site Location Plan has been included as Figure A-1 in Appendix A. At the time of our exploration, the site was generally flat, grass and asphalt covered terrain.

We understand that the project will include construction of a new building addition with plan dimensions of about 40 feet by 100 feet. The proposed building will be a one story steel framed building supported by steel columns. The exterior building walls will be a combination of masonry and curtain walls. The anticipated maximum column and wall loads are as follows: interior columns 75 kips, exterior columns 50 kips and wall loads 5 kips per linear foot. Based on the provided grading plan, we estimate that cuts and fills on the order of 5 feet or less will be required to achieve final grades within the majority of the site.

GEOLOGIC SETTING

According to the Geology Map of Maryland, the project site is underlain by the Pocono Group. The Pocono Group is described as “Gray, white, tan, and brown, thin- to thick-bedded, cross-bedded sandstone, locally conglomeratic; interbedded gray and reddish-brown shale, mudstone, and siltstone; fragmentary plant fossils. Undifferentiated in Garrett and western Allegeny Counties. Includes Purslane Sandstone - White, thick-bedded, coarse-grained sandstone and conglomerate with thin coal beds and red shales, Eastern Allegany and Washington Counties. And also includes Rockwell Formation - Coarse-grained arkosic sandstone, fine-grained conglomerate, and buff shale; dark shale with thin coal beds near base, Eastern Allegany and Washington Counties.”

FIELD EXPLORATION

The scope of the field exploration included drilling 5 test borings, 4 auger probes and 1 infiltration test. The approximate test locations are shown on Figure A-2 contained in Appendix A. The test locations were selected and staked by SPECS, Inc. The ground surface elevation at each test location was provided by SPECS, Inc. All test borings included Standard Penetration Testing (SPT) and split barrel sampling (ASTM D 1586) at select intervals to boring termination depths.

Geotechnical personnel from our office were present full time during the field exploration to log all recovered soil samples and observe groundwater and rock conditions. The recovered soil samples were transported to our laboratory for further testing. Detailed descriptions of materials encountered in the borings are contained on the logs in Appendix B. Figure No. 1 contains a description of the classification system and terminology utilized.

SUBSURFACE CONDITIONS

Subsurface Strata

The materials encountered in the borings and probes are generally described below. Stratification lines indicated on the logs represent the approximate boundaries between material types.

Surface Materials: Topsoil was encountered at the ground surface in 7 of the test borings/probes. The thickness of the topsoil was approximately 3 to 7 inches. Asphalt underlain by crushed stone was encountered at the ground surface in 2 of the probes. The thickness of the asphalt ranged from 4 to 7 inches and the thickness of the crushed stone ranged from 8 to 17 inches.

Residual Soil: Residual soils were encountered below the surface materials in all of the borings/probes. The residual soils generally consisted of tan brown, gray brown, reddish brown, maroon sandy silt, clayey silt and sandy gravel. Based on SPT N-values varying from 5 blows per foot to 50 blows per 2 inches of penetration, the residual materials exhibited a loose to very dense relative density.

Groundwater Observations

Groundwater was not encountered in any of test borings/probes during or upon completion of drilling. It is important to note that fluctuations in groundwater levels may occur due to variations in environmental conditions, recent precipitation events, surface drainage and other factors which may not have been evident at the time measurements were made and reported herein.

Infiltration Testing

Infiltration testing was performed at probe location AP-1 in accordance with the Maryland SWM Manual. A summary of the infiltration testing is provided below.

TEST LOCATION	DEPTH OF TEST (FT.)	INFILTRATION RATE (IN./HR.)
AP-1	5	19.3

LABORATORY TESTING

Laboratory tests were performed to supplement the field classifications and establish design criteria. All laboratory tests were performed in accordance with appropriate ASTM standard test methods. Detailed results of the laboratory tests are contained in Appendix C. A summary of the test results is presented below.

TEST TYPE	TEST RESULTS
Natural Moisture Contents	5.0 to 21.0 %
Atterberg Limits: Liquid Limit Plasticity Index	 NP to 33 NP to 8
Percent Passing No. 200 Sieve	26.2 to 66.9 %
USCS Soil Classifications	ML and SM
Modified Proctor Maximum Dry Density: Optimum Moisture Content:	 118.0 pcf 17.0%
California Bearing Ratio (CBR)	5.9 %

Corrosivity testing was performed by our subcontractor, and the results are provided in Appendix C. The results of the testing indicated a pH of 4.9 (below neutral). However, based on the low/non-detectible levels of chloride, sulfate and sulfide, and high soil resistivity, it is our opinion that the soil sample tested is generally considered non-corrosive for structural concrete foundations. We recommend that the structural engineer for the project review the corrosivity results to determine if any modifications to concrete mix designs should be specified.

CONCLUSIONS AND RECOMMENDATIONS FOR DESIGN

The subsurface information obtained from the field exploration, our past experience with similar projects, and the noted design criteria were the basis for our assessment of the geotechnical issues currently existing at the site. Our geotechnical recommendations associated with the design and construction of foundations, slab on grade, below grade walls and pavement are presented in the following sections of this report.

Foundations

Provided that the recommendations in this report are followed, we recommend that a maximum allowable bearing pressure of 3,000 psf be utilized to proportion conventional shallow spread foundations. All foundations should be constructed to bear on approved residual soils or new controlled fill. Minimum dimensions of 3 feet and 2 feet for isolated and continuous foundations, respectively, should be considered. In addition, exterior foundations should bear at least 36 inches below the final outside grade for frost protection.

We estimate that total settlements for foundations bearing on approved residual soils and/or new controlled fill will be one (1) inch or less. Differential settlements are anticipated to be one-half of the total settlements. Differential settlements along continuous wall foundations are not expected to exceed an angular distortion of 0.0015 inch/inch.

Seismic Classification

We recommend that Site Class C be utilized for seismic evaluation. This classification is based on the International Building Code (IBC) criteria.

Floor Slabs

We understand that the structure will include a concrete slab supported on grade and bearing on new controlled, compacted fill and/or approved residual soils. We recommend that a modulus of subgrade reaction, "k," on the order of 110 pci be adopted for design of the slabs-on-grade.

The aggregate course beneath the slab-on-grade should consist of a minimum 4-inch layer of AASHTO #57 coarse aggregate. A conventional polyethylene vapor barrier is considered optional for structure areas which will include an exposed concrete slab (i.e. maintenance, receiving, etc.). However, areas upon which VCT, carpeting, quarry tile or other flooring products will be placed should be underlain by the vapor barrier.

Joints in the floor slabs should be provided in accordance with the recommendations specified by the Portland Cement Association (PCA) or American Concrete Institute (ACI). Where construction joints are required in heavy traffic areas such as storage areas, we strongly recommend the use of dowelled joints rather than keyed joints. The dowelled joints provide a positive transfer of shear forces and prevent movements.

Below Grade Walls

Below grade walls will be subject to either active or at-rest lateral earth pressures. For walls which are permitted to rotate or translate slightly at the top, such as site retaining walls, this represents an active condition with an active earth pressure. However, for rigid walls with movement restricted, this presents an at-rest condition.

For the types of soils present at the site and an assumed level backfill slope, we recommend that an active equivalent fluid pressure (γK_a) of 45 psf per foot of height be used for evaluation and design. For at-rest conditions, an equivalent fluid pressure (γK_o) of 70 psf per foot of height is recommended.

Any surcharge loads anticipated at the surface should be multiplied by 0.5 and superimposed as a uniform horizontal pressure on the recommended design lateral loading. The coefficient of friction utilized for determination of sliding resistance on the base of foundation elements bearing on the on-site soils should be 0.35.

The lateral pressure values recommended above are based on adequate drainage behind the walls without build-up of hydrostatic pressures. Consequently, a permanent backwall drainage system should be constructed along exterior retaining walls or below grade walls. The permanent backwall drainage should include a 4-inch diameter Schedule 40 PVC or HDPE perforated pipe surrounded by an 18-inch wide zone of free draining gravel, such as AASHTO #57, separated from the general site backfill by a non-woven geofabric, such as TC Mirafi 140-N or an approved equal. Backwall drains should be sloped such that water will flow by gravity to an appropriate drain and day-lighted, or to a sump pit and pump.

Pavement

Based on the results of the laboratory testing from the sample obtained during this exploration, our past experience with soils in this region and the requirement for achieving a stable subgrade, we utilized a CBR value of 5 percent for flexible pavement design. Traffic details were not provided. Therefore, the traffic volumes noted with the recommended pavement section were assumed for the pavement design.

The pavement design was completed in accordance with the AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES, 1993 Version. Based on the results of our analyses, we recommend that the light duty flexible pavement section for car parking areas (that include light truck traffic associated with snow plowing) include the following:

Light Duty 20-year Design Life (Allowable Traffic Load ESAL's = 2.0×10^4)

1.5" Asphaltic Concrete (HMA Superpave 9.5 mm Surface Asphalt)
2.5" Asphaltic Concrete (HMA Superpave 19.0 mm Base Asphalt)
6.0" Crushed Stone (MDSHA GAB Dense Graded Aggregate Base Course)

It will be very important that the light duty areas be protected from trucks and/or other heavy traffic by means of barriers, islands, etc. in order to maintain the performance life.

All asphaltic concrete mixes should be placed in accordance with Superpave 0.3 - 3 million ESAL requirements. Performance grade asphalt cement should consist of PG 64-22. All asphaltic concrete pavement should be constructed in strict accordance with current MDSHA specifications. All dense graded aggregate base course should consist of approved MDSHA materials.

SWM Facilities

We understand that SWM facilities for the project may include small gravel beds or bio-retention type facilities within or surrounding the existing parking lot. Due to the shallow refusal encountered in the probes, we do not recommend infiltration facilities be utilized at the site. Therefore, consideration should be given to utilizing underdrains within the SWM facilities.

CONSTRUCTION RECOMMENDATIONS

Site Preparation

Initial site clearing and grubbing should include removal of the topsoil, any demolition debris from existing structures, slabs, pavement, sidewalks, brush, trees and any other deleterious materials within the structure and any controlled fill slopes and extending five (5) feet beyond their perimeters. After removal of the unsuitable materials, the subgrade soils should be heavily proof-rolled with approved construction equipment to locate isolated soft spots or areas of excessive "pumping" which are too wet to accommodate compacted fill or building construction. These areas should be either scarified, air-dried to a sufficient moisture content and re-compacted prior to fill placement, mechanically stabilized or removed to the level of stable soils. The exposed subgrade should be examined and tested by Triad personnel prior to placement of compacted fill.

Excavation Areas

In general, the residual soils present can be excavated with conventional earth moving equipment such as backhoes and tracked loaders. Auger refusal on hard rock was encountered in all of the borings/probes at depths ranging from 2 to 8.5 feet below existing grade. Hard bedrock or large boulders will require hoe ram chipping for effective removal. Due to the existing structures, blasting should be prohibited for this project. We strongly recommend that the design team and owner for the project evaluate any existing structures to remain prior to rock removal by hoe-ram chipping.

During excavation operations, dry conditions should be maintained within the cut areas at all times in order to minimize the need for additional undercutting or aeration of soils. The contractor should be prepared to implement, if necessary, temporary de-watering measures in these areas during construction. These measures include sloping the cut areas to appropriate sump pit(s) and pumping accumulated surface runoff from precipitation. All cut areas should be sealed at the end of each day, to the extent which construction practicality will permit, to help prevent infiltration of precipitation and subsequent unsuitable soil conditions.

All utility trenches should be sloped and/or supported in accordance with current Occupational Safety and Health Administration (O.S.H.A.) requirements. Trenches below structure and pavement areas should be backfilled in accordance with the Controlled Fill section of this report.

Controlled Fill

Satisfactory Soils

Fill materials should not contain any debris, waste, pyrites, or frozen materials, and they should contain less than two (2) percent vegetation-organic materials by weight. Also, materials classified as OL, OH, or Pt are not suitable for use as structural fill. Maximum rock particle sizes should not exceed 3 inches. The on-site soils are generally suitable for re-use as structural fill provided that proper drainage, grading, and sloping away from the structure are maintained both during and after construction.

All proposed fill materials should be approved by a geotechnical engineer prior to placement as controlled fill, and representative samples should be submitted by the contractor one week prior to placement of that material to allow time for completion of the necessary laboratory tests.

Placement and Compaction

Before compaction, each layer should be moistened or aerated as necessary to obtain the required compaction. Each layer should be compacted to the required percentage of maximum dry density. Fill should not be placed on surfaces that are muddy or frozen, or have not been approved by testing and/or proof-rolling. Free water should be prevented from appearing on the surface during or subsequent to compaction operations.

Soil material which is removed because it is too wet to permit proper compaction can be stockpiled or spread and allowed to dry. Drying can be facilitated by discing or harrowing until the moisture content is reduced to an acceptable level. When the soil is too dry, water should be applied uniformly to the subgrade surface or to the layer to be compacted.

All fill material compacted by heavy compaction equipment should be placed in maximum 9-inch loose lifts. All fill material compacted by hand-operated tampers or light compaction equipment should be placed in maximum 4-inch loose lifts.

General site fill material should be compacted to at least 95 percent of the laboratory maximum dry density as determined by the Modified Proctor method (ASTM D 1557). The moisture content of the soils should be at or within two (2) percentage points of the optimum moisture content. Within the building pad and pavement areas, fill material should be compacted to at least 97 percent of the laboratory maximum dry density as determined by the Modified Proctor method (ASTM D 1557). The moisture content of the soils should be at or within two (2) percentage points of the optimum moisture content.

Foundation Construction

We anticipate that conventional earth excavation equipment such as a backhoe can be utilized to excavate the residual soils or controlled fill for foundation construction. Any foundation excavations which encounter hard rock will require hoe ram chipping to attain required bearing elevations. We recommend that any loose materials present at the bottom of foundation excavations as a result of excavation operations be re-compacted in order to minimize differential settlements. Any isolated soft areas that may be encountered during foundation excavations for the structures should be removed to underlying firm materials. Widening of over-excavations will also be required if soft conditions are encountered. Detailed recommendations should be provided by the on-site geotechnical engineer at the time of construction if these conditions are present.

Foundation concrete should be placed the same day that excavations are completed to reduce the potential for softening due to precipitation and/or runoff. All foundation excavations for the proposed structures should be examined by a geotechnical engineer or a qualified representative from our office prior to placing concrete to confirm that the required bearing support is available.

Pavement Construction

Drainage ditches and/or inlets should be constructed for the access roads and pavement areas to maintain drainage and divert runoff away from the pavement subgrade. It is very important that the pavement subgrade be properly sloped to help maintain adequate drainage after construction. Any wet/unstable soils present at the subgrade level during grading operations should be either scarified, aerated and re-compacted or should be removed and replaced with suitable fill materials. Unsuitable subgrade conditions should be corrected immediately prior to placement of base stone and concrete.

Both the aggregate base and asphaltic concrete be placed immediately after final soil subgrade approval has been obtained due to the potential for subgrade softening from adverse weather conditions. In addition, heavy construction traffic should be limited from traveling across approved final subgrade areas that have been subjected to adverse weather conditions in order to help maintain a stable subgrade prior to pavement construction. If hard rock is encountered above final grades in pavement area excavations, it should be over-excavated to at least the level of the bottom of the pavement section (i.e. the bottom of the aggregate base material).

SWM Permeable Media

Any permeable materials, such as planting soils, sand and/or gravel utilized within the water quality areas should not be compacted and should be placed with only very light grading equipment. In addition, heavy construction traffic in the area should be prohibited once the permeable soils have been placed. Select soil analysis on proposed materials should be conducted in accordance with the project plans and specifications prior to construction.

Construction Monitoring

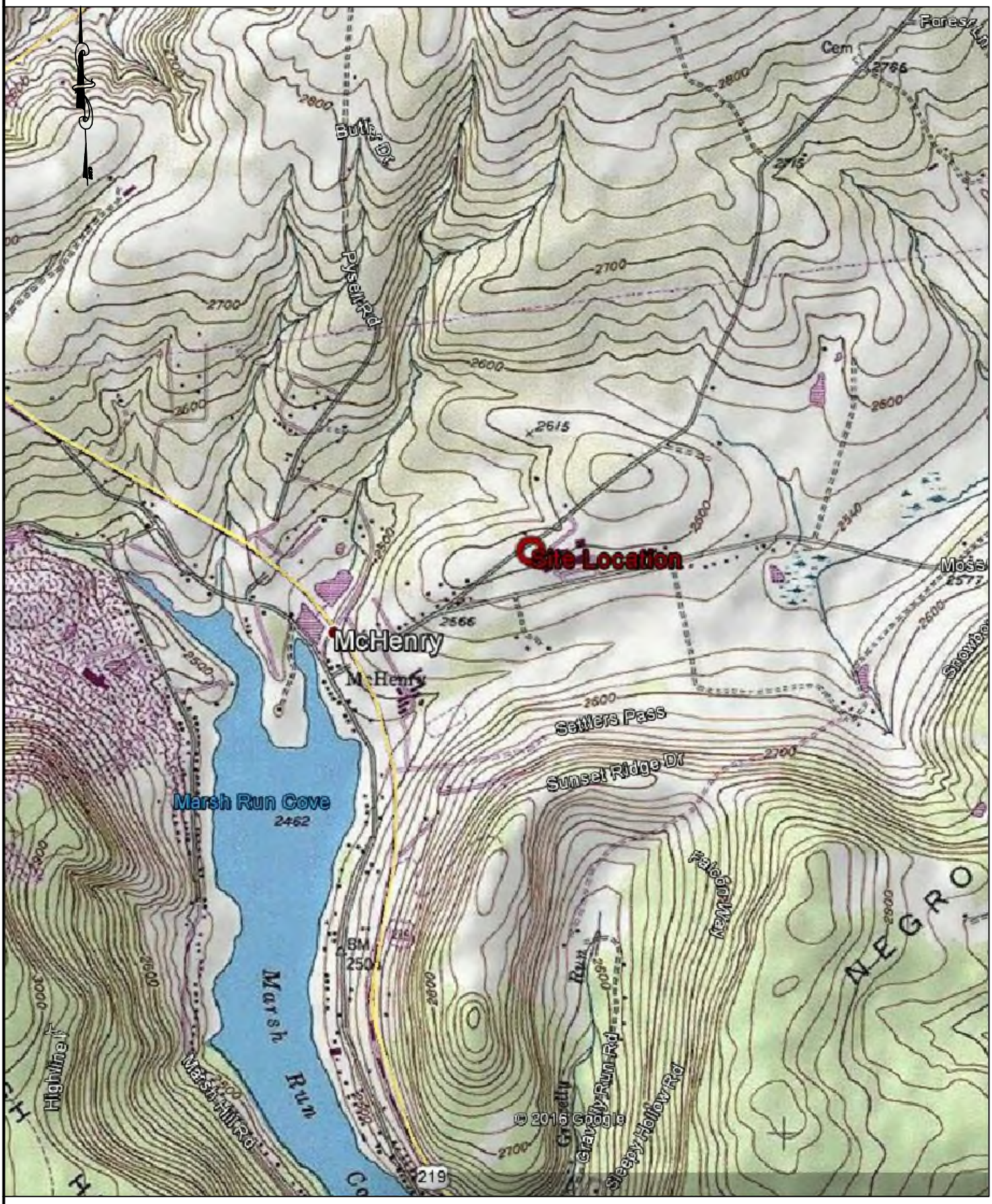
We recommend that an on-site geotechnical engineer be retained to monitor the construction activities to verify that the field conditions are consistent with the findings of our exploration. If significant variations are encountered, or if the design is altered, we should be notified.

The on-site geotechnical engineer should provide personnel as required to observe all excavations and document proof-rolling prior to fill placement. In addition, all fill material should be monitored, tested and approved during fill construction. Field density tests should be performed in accordance with ASTM D 6938 (nuclear method). A minimum of three field density tests should be performed for each lift of fill placed or a minimum of one test for every 2,500 square feet of fill placed to confirm the required soil compaction.

TRIAD ENGINEERING, INC.

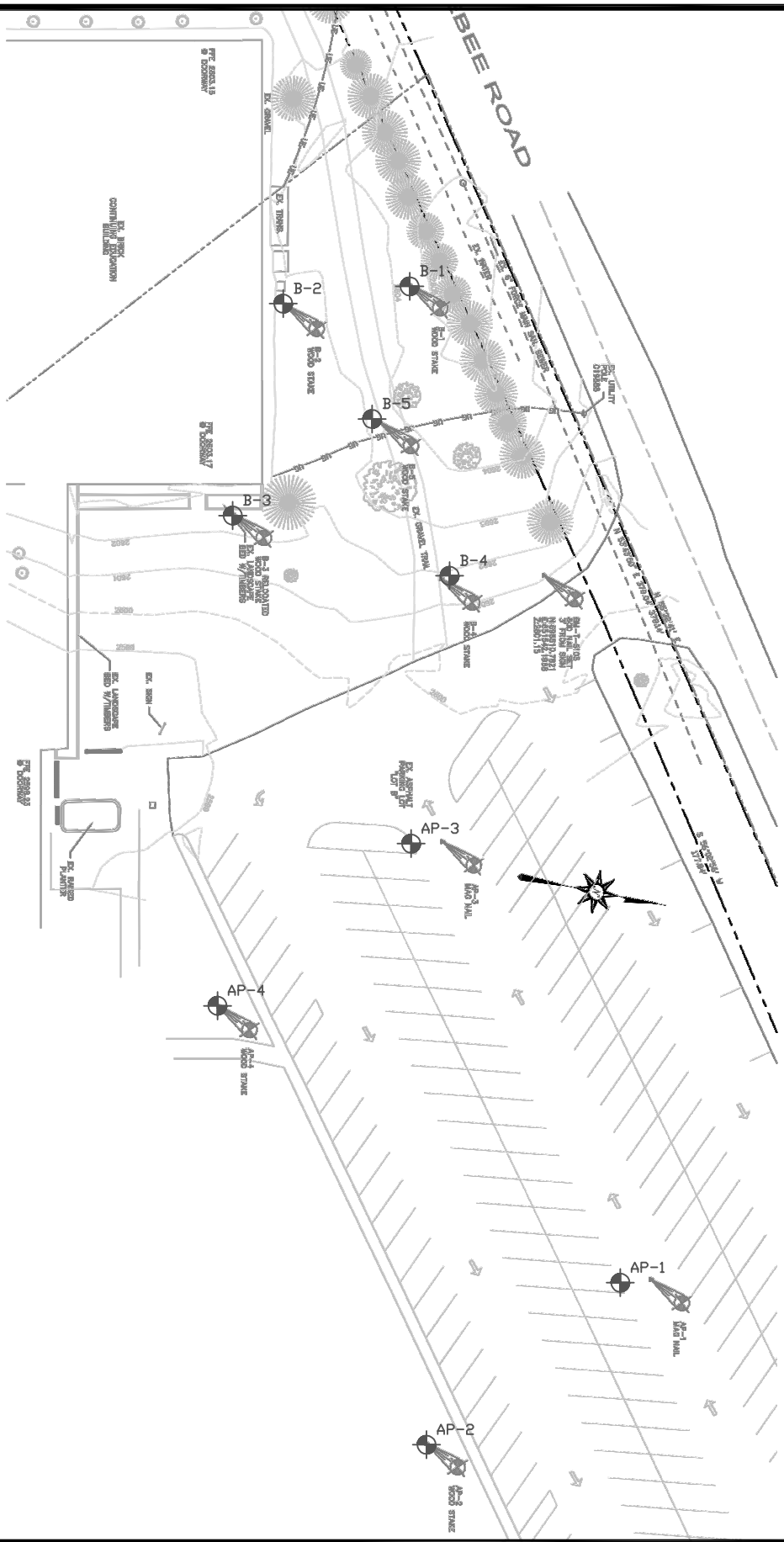
APPENDIX A

Illustrations



Garrett County Maryland		SITE LOCATION PLAN
PREPARED BY: JRW	REVIEWED BY: SJG	GARRETT COLLEGE - STEM BUILDING
DATE: 9/1/16	SCALE: N/A	PROJECT NO: 03-16-0420 Figure: A-1

TRIAD ENGINEERING, INC.
www.triadeng.com
1075-D SHERMAN AVENUE
HAGERSTOWN, MD 21740



B-# Approximate Test Location		TEST LOCATION PLAN	
PREPARED BY: JRW	REVIEWED BY: SJG	GARRETT COLLEGE - STEM BUILDING Garrett County, Maryland	TRIAD ENGINEERING, INC. www.triadeng.com 1075-D SHERMAN AVENUE HAGERSTOWN, MD 21740
DATE: 9/1/16	SCALE: N/A	PROJECT NO: 03-16-0420	Figure: A-2

TRIAD ENGINEERING, INC.

APPENDIX B

Field Exploration

FIELD EXPLORATION

The subsurface conditions at the site were explored by drilling 5 test borings with Standard Penetration Testing (SPT) and 4 auger probes. The borings and probes were drilled utilizing a drill rig equipped with hollow stem augers. The field exploration was supervised by a geotechnical engineer from our office.

SPT and sampling was performed in accordance with ASTM D 1586. The SPT's were performed to depths indicated on the attached boring logs using a split barrel sampler with an outside diameter of two (2) inches and an inside diameter of one and three-eighths (1-3/8) inches. The split barrel sampler was driven eighteen (18) inches with a hammer weighing approximately 140 pounds and falling thirty (30) inches. The number of blows required to drive the split barrel sampler at six (6) inch increments was recorded on the boring logs. The method utilized to classify the soils is defined in Figure 1.

TRIAD ENGINEERING, INC.

KEY TO IDENTIFICATION OF SOIL AND WEATHERED ROCK SAMPLES

The material descriptions on the logs indicate the visual identification of the soil and rock recovered from the exploration and are based on the following criteria. Major soil components are designated by capital letters and minor components are described by terms indicating the percentage by weight of each component. Standard Penetration Testing (SPT) and sampling was conducted in accordance with ASTM D1586. N-values in blows per foot are used to describe the *relative density* of coarse-grained soils or the *consistency* of fine-grained soils.

The MAJOR components constitute more than 50% of the sample and have the following size designation.		The MINOR components have the following percentage designation.	
COMPONENT	**PARTICLE SIZE**	**ADJECTIVE**	**PERCENTAGE**
Boulders	12 inches plus		
Cobbles	3 to 12 inches	and	35 - 50
Gravel -coarse	¾ to 3 inches		
-fine	#4 to ¾ inches	some	20 - 35
Sand -coarse	#10 to #4		
-medium	#40 to #10	little	10 - 20
-fine	#200 to #40		
Silt or Clay	Minus #200 (fine-grained soil)	trace	0 - 10

Relative Density – Coarse-grained Soils		**Consistency – Fine-grained Soils**	
Term	***N-Value***	***Term***	***N-Value***
Very Loose	#4	Very Soft	#2
Loose	5 to 10	Soft	3 to 4
Medium Dense	11 to 30	Medium Stiff	5 to 8
Dense	31 to 50	Stiff	9 to 16
Very Dense	>50	Very Stiff	>16

Soil Plasticity	**Plasticity Index (PI)**	**Rock Hardness**	
None	Nonplastic	***Term***	***N-Value***
Low	1 to 5	Very Weathered	#50/.5
Medium	5 to 20	Weathered	50/.4
High	20 to 40	Soft	50/.3
Very High	over 40	Medium hard	50/.2 to 50/.1
		Hard	Auger Refusal

Moisture Description
Dry - Dusty, dry to touch
Slightly Moist - damp
Moist - no visible free water
Wet - visible free water, saturated

FIGURE NO. 1

TRIAD ENGINEERING, INC.

BORING LOG

Project Number: **03-16-0420** Project Name: **GCC STEM Building** Boring No.: **B-1**

Inspector: JRW Boring Location: See Figure A-2

Date Started: 8/25/16 Drilling Method: 3.25 HSA

Date Completed: 8/25/16 Driller: TRIAD Ground Elev.: 2604.37

Shelby Tube | Standard Split Spoon | Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
	1		5-10-50	78%		0.4	5.0" TOPSOIL				2604.0
							Tan brown sandy **SILT**, very dense, trace gravel, moist				
	2		50/2"	100%							
							- RESIDUUM -				
5.0	3		50/2"	100%		5.0					2599.4
							Gray brown sandy **GRAVEL**, very dense, moist				
						6.0	- RESIDUUM -				2598.4
							REFUSAL AT 6.0 FEET				
10.0											
15.0											
20.0											
25.0											
30.0											

TRIAD_C - REVISED 03-16-0420 BORINGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 9/7/16

TRIAD ENGINEERING, INC.
1075 D Sherman Avenue
Hagerstown, MD 21740
P: 301-797-6400
F: 301-797-2424

Remarks: Boring dry during and upon completion of drilling.

BORING LOG

Project Number: **03-16-0420** Project Name: **GCC STEM Building** Boring No.: **B-2**

Inspector: JRW Boring Location: See Figure A-2

Date Started: 8/25/16 Drilling Method: 3.25 HSA

Date Completed: 8/25/16 Driller: TRIAD Ground Elev.: 2602.79

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
						0.4	5.0" TOPSOIL				2602.4
	1		4-3-2	100%			Maroon sandy **SILT**, loose, trace gravel, moist				
						2.5	- RESIDUUM -				2600.3
	2		7-9-25	100%			Gray sandy **GRAVEL**, dense, moist				
5.0	3		50/2"	100%			- Maroon very dense				
						7.5	- RESIDUUM -				2595.3
							REFUSAL AT 7.5 FEET				
10.0											
15.0											
20.0											
25.0											
30.0											

Shelby Tube; Standard Split Spoon; Core Sample; Auger Probe

TRIAD_C - REVISED 03-16-0420 BORINGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 9/7/16

TRIAD ENGINEERING, INC.
1075 D Sherman Avenue
Hagerstown, MD 21740
P: 301-797-6400
F: 301-797-2424

Remarks: Boring dry during and upon completion of drilling.

BORING LOG

Project Number: **03-16-0420** Project Name: **GCC STEM Building** Boring No.: **B-3**
Inspector: JRW Boring Location: See Figure A-2
Date Started: 8/24/16 Drilling Method: 3.25 HSA
Date Completed: 8/24/16 Driller: TRIAD Ground Elev.: 2602.47

Shelby Tube | Standard Split Spoon | Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
	1	X	4-6-13	100%		0.4	5.0" TOPSOIL				2602.1
							Reddish brown sandy **SILT**, medium dense, little gravel, moist				
	2	X	15-19-14	56%			- dense				
5.0						5.0	- RESIDUUM -				2597.5
	3	X	6-12-20	100%			Reddish brown clayey **SILT**, dense, little sand, moist				
						7.0	- RESIDUUM -				2595.5
							REFUSAL AT 7.0 FEET				
10.0											
15.0											
20.0											
25.0											
30.0											

TRIAD_C - REVISED 03-16-0420 BORINGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 9/7/16

TRIAD ENGINEERING, INC.
1075 D Sherman Avenue
Hagerstown, MD 21740
P: 301-797-6400
F: 301-797-2424

Remarks: Boring dry during and upon completion of drilling.

BORING LOG

Project Number: **03-16-0420** Project Name: **GCC STEM Building** Boring No.: **B-4**
Inspector: JRW Boring Location: See Figure A-2
Date Started: 8/25/16 Drilling Method: 3.25 HSA
Date Completed: 8/25/16 Driller: TRIAD Ground Elev.: 2601.98

Shelby Tube | Standard Split Spoon | Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
	1		2-5-50/5"	106%		0.6	7.0" TOPSOIL				2601.4
							Maroon sandy **SILT**, very dense, little gravel, moist				
	2		14-19-50/5"	106%		3.5	- RESIDUUM -				2598.5
							Tan sandy **GRAVEL**, very dense, little gravel, moist				
5.0						5.0	- RESIDUUM -				2597.0
	3		16-23-20	72%			Maroon sandy **SILT**, dense, little gravel, moist				
	4		50/2"	100%		8.1	- RESIDUAL -				2593.9
							- very dense				
							REFUSAL AT 8.1 FEET				
10.0											
15.0											
20.0											
25.0											
30.0											

TRIAD_C - REVISED 03-16-0420 BORINGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 9/7/16

TRIAD ENGINEERING, INC.
1075 D Sherman Avenue
Hagerstown, MD 21740
P: 301-797-6400
F: 301-797-2424

Remarks: Boring dry during and upon completion of drilling.

BORING LOG

Project Number: **03-16-0420** Project Name: **GCC STEM Building** Boring No.: **B-5**

Inspector: JRW Boring Location: See Figure A-2

Date Started: 8/25/16 Drilling Method: 3.25 HSA

Date Completed: 8/25/16 Driller: TRIAD Ground Elev.: 2603.41

Shelby Tube | Standard Split Spoon | Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
	1		3-4-6	100%		0.4	5.0" TOPSOIL				2603.0
							Maroon sandy **SILT**, loose, trace gravel, moist				
	2		7-10-12	100%			- medium dense				
5.0	3		8-10-16	100%							
	4		50/2"	100%		7.5					2595.9
						8.5	Gray sandy **GRAVEL**, very dense				2594.9
							REFUSAL AT 8.5 FEET				
10.0											
15.0											
20.0											
25.0											
30.0											

TRIAD_C - REVISED 03-16-0420 BORINGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 9/7/16

TRIAD ENGINEERING, INC.
1075 D Sherman Avenue
Hagerstown, MD 21740
P: 301-797-6400
F: 301-797-2424

Remarks: Boring dry during and upon completion of drilling.

PROBE LOG

Project Number: **03-16-0420** Project Name: **GCC STEM Building** Probe No.: **AP-1**

Inspector: JRW Probe Location: See Figure A-2

Date Started: 8/24/16 Drill/Method: 3.25 HSA

Date Completed: 8/24/16 Driller: Triad Engineering, Inc. Ground Elev.: 2598.15

Shelby Tube | Standard Split Spoon | Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
						0.3	4.0" ASPHALT				2597.8
						1.0	8.0" CRUSHED STONE				2597.2
							Reddish brown sandy **GRAVEL**, moist				
5.0						5.5	- RESIDUUM -				2592.7
							REFUSAL AT 5.5 FEET				
10.0											
15.0											
20.0											
25.0											
30.0											

TRIAD_C PROBE 03-16-0420 BORINGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 9/7/16

TRIAD ENGINEERING, INC.
1075 D Sherman Avenue
Hagerstown, MD 21740
P: 301-797-6400
F: 301-797-2424

Remarks: Probe dry during and upon completion of drilling.

PROBE LOG

Project Number: **03-16-0420** Project Name: **GCC STEM Building** Probe No.: **AP-2**

Inspector: JRW Probe Location: See Figure A-2

Date Started: 8/24/16 Drill/Method: 3.25 HSA

Date Completed: 8/24/16 Driller: Triad Engineering, Inc. Ground Elev.: 2599.35

Shelby Tube | Standard Split Spoon | Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
						0.3	4.0" TOPSOIL				2599.0
							Brown sandy **GRAVEL**, moist				
						2.5	- RESIDUUM -				2596.9
							REFUSAL AT 2.5 FEET				
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											

TRIAD_C PROBE 03-16-0420 BORINGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 9/7/16

TRIAD ENGINEERING, INC.
1075 D Sherman Avenue
Hagerstown, MD 21740
P: 301-797-6400
F: 301-797-2424

Remarks: Probe dry during and upon completion of drilling.

PROBE LOG

Project Number: **03-16-0420** Project Name: **GCC STEM Building** Probe No.: **AP-3**

Inspector: JRW Probe Location: See Figure A-2

Date Started: 8/24/16 Drill/Method: 3.25 HSA

Date Completed: 8/24/16 Driller: Triad Engineering, Inc. Ground Elev.: 2599.47

Shelby Tube | Standard Split Spoon | Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
						0.6	7.0" ASPHALT				2598.9
							17.0" CRUSHED STONE				
						2.0					2597.5
						3.0	Brown sandy **GRAVEL**, moist - RESIDUUM -				2596.5
							REFUSAL AT 3.0 FEET				
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											

TRIAD_C PROBE 03-16-0420 BORINGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 9/7/16

TRIAD ENGINEERING, INC.
1075 D Sherman Avenue
Hagerstown, MD 21740
P: 301-797-6400
F: 301-797-2424

Remarks: Probe dry during and upon completion of drilling.

PROBE LOG

Project Number: **03-16-0420** Project Name: **GCC STEM Building** Probe No.: **AP-4**

Inspector: JRW Probe Location: See Figure A-2

Date Started: 8/24/16 Drill/Method: 3.25 HSA

Date Completed: 8/24/16 Driller: Triad Engineering, Inc. Ground Elev.: 2599.97

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
						0.3	3.0" TOPSOIL				2599.7
						2.0	Brown sandy **GRAVEL**, moist - RESIDUUM -				2598.0
							REFUSAL AT 2.0 FEET				
5.0											
10.0											
15.0											
20.0											
25.0											
30.0											

Shelby Tube ☒ Standard Split Spoon ◧ Core Sample ⊠ Auger Probe

TRIAD_C PROBE 03-16-0420 BORINGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 9/7/16

TRIAD ENGINEERING, INC.
1075 D Sherman Avenue
Hagerstown, MD 21740
P: 301-797-6400
F: 301-797-2424

Remarks: Probe dry during and upon completion of drilling.

TRIAD ENGINEERING, INC.

APPENDIX C

Laboratory Testing

LABORATORY TESTING

The soil samples obtained from the test borings were visually classified in the field by a geotechnical engineer from Triad. The recovered soils were further evaluated by laboratory testing. Laboratory soil tests were conducted in accordance with applicable ASTM Standards as listed below:

1) Moisture content tests were performed in accordance with ASTM D 2216.

2) Atterberg Limits tests, consisting of the liquid limit, plastic limit, and plasticity index, were performed in accordance with ASTM D 4318.

3) Sieve analyses with washed No. 200 sieve tests were performed in accordance with ASTM D 422.

4) A Modified Proctor test was performed in accordance with ASTM D 1557.

5) A California Bearing Ratio test was performed in accordance with AASHTO T 193.

A summary and details of the laboratory tests are included on the following pages of this appendix.

TRIAD ENGINEERING, INC.

SOIL DATA SUMMARY

SAMPLE NO.	SAMPLE DEPTH (ft)	SAMPLE TYPE	NATURAL MOISTURE (%)	ATTERBERG LIMITS			GRADATION			USCS SOIL CLASS.	PROCTOR		ADDITIONAL TESTS CONDUCTED
				LL	PL	PI	% GRAVEL	% SAND	% FINES		MAX. DD (pcf)	OPT. M (%)	
B-1	2.5-4.0	SS	21.0										
B-1	5.0-5.2	SS	5.1										
B-2	2.5-6.5	SS	8.0	NP	NP	NP	27.0	46.8	26.2	SM			
B-3	1.0-5.0	Bulk	7.8	NP	NP	NP	13.4	52.1	34.5	SM	118.0	17.0	AASHTO-T193-99
B-3	2.5-5.0	SS	9.8										
B-3	5.0-6.5	SS	11.0										
B-4	2.5-4.0	SS	7.6										
B-4	5.0-6.5	SS	7.0										
B-4	7.5-10.0	SS	5.0										
B-5	2.5-6.5	SS	17.7	33	25	8	10.2	22.9	66.9	ML			

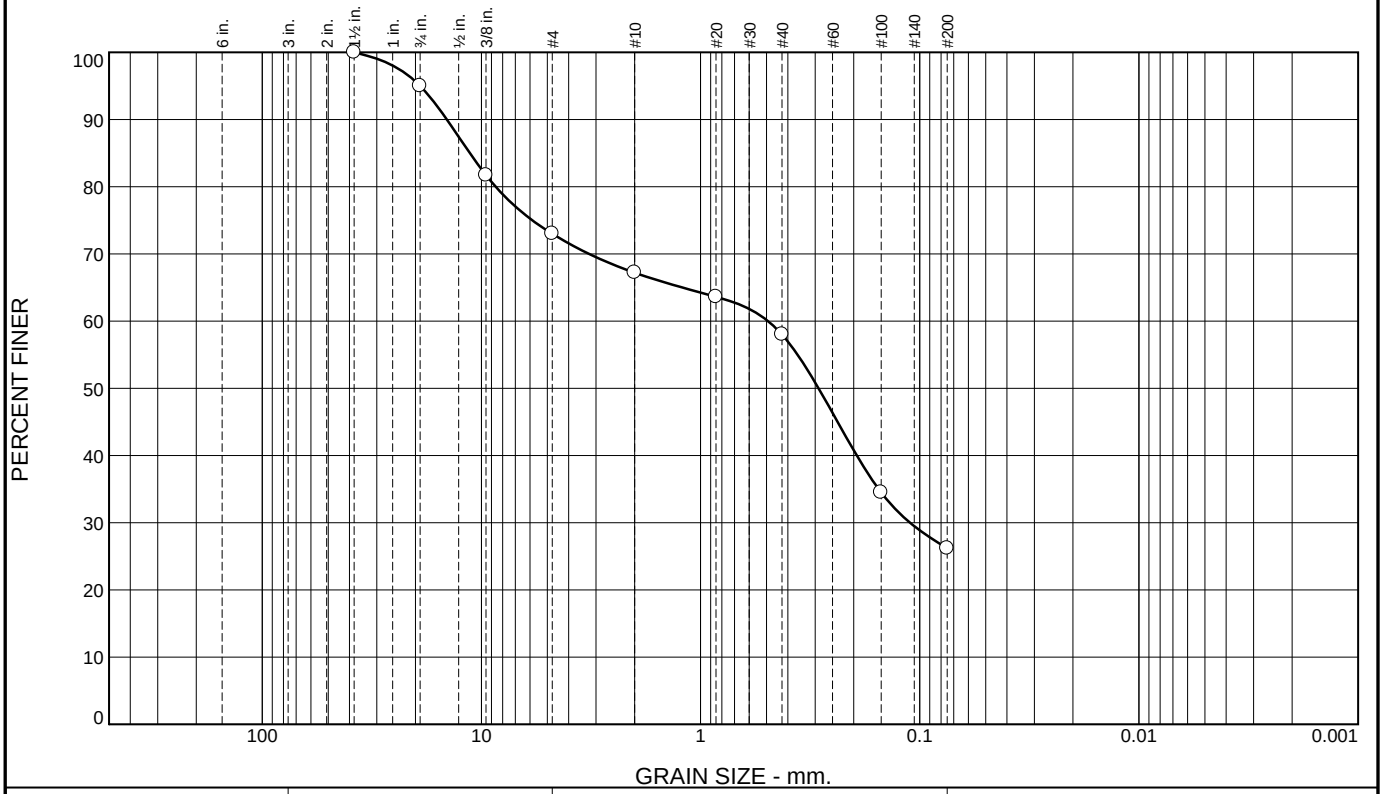
TRIAD ENGINEERING, INC.

Notes: 1) Soil tests performed in accordance with recognized ASTM testing standards.
2) SS = Split Spoon; UD = Undisturbed

Project Number: 03-16-0420
Project Name: Garrett College STEM Building
Location: McHenry, Maryland

FIGURE
C-1

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.0	22.0	5.8	9.2	31.8	26.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.50	100.0		
3/4	95.0		
3/8	81.7		
#4	73.0		
#10	67.2		
#20	63.6		
#40	58.0		
#100	34.5		
#200	26.2		

* (no specification provided)

Soil Description

Red brown silty SAND, some gravel.

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 14.3820 D_{85}= 11.2925 D_{60}= 0.4923
D_{50}= 0.2895 D_{30}= 0.1108 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: Jar **Depth:** 2.5'-6.5'
Sample Number: B-2

Date: 9/19/16

Triad Engineering, Inc.

Client: Grimm and Parker
Project: Garrett College-STEM Building
McHenry, Maryland
Project No: 03-16-0420 **Figure** C-2

Tested By: DLS

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	13.4	5.8	5.0	41.3	34.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	92.7		
#4	86.6		
#10	80.8		
#20	78.1		
#40	75.8		
#100	46.8		
#200	34.5		

* (no specification provided)

Soil Description

Red brown silty SAND, little gravel.

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 7.1356 D_{85}= 3.8436 D_{60}= 0.2320
D_{50}= 0.1686 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: B-3 **Depth:** 1.0'-5.0'
Sample Number: Bulk

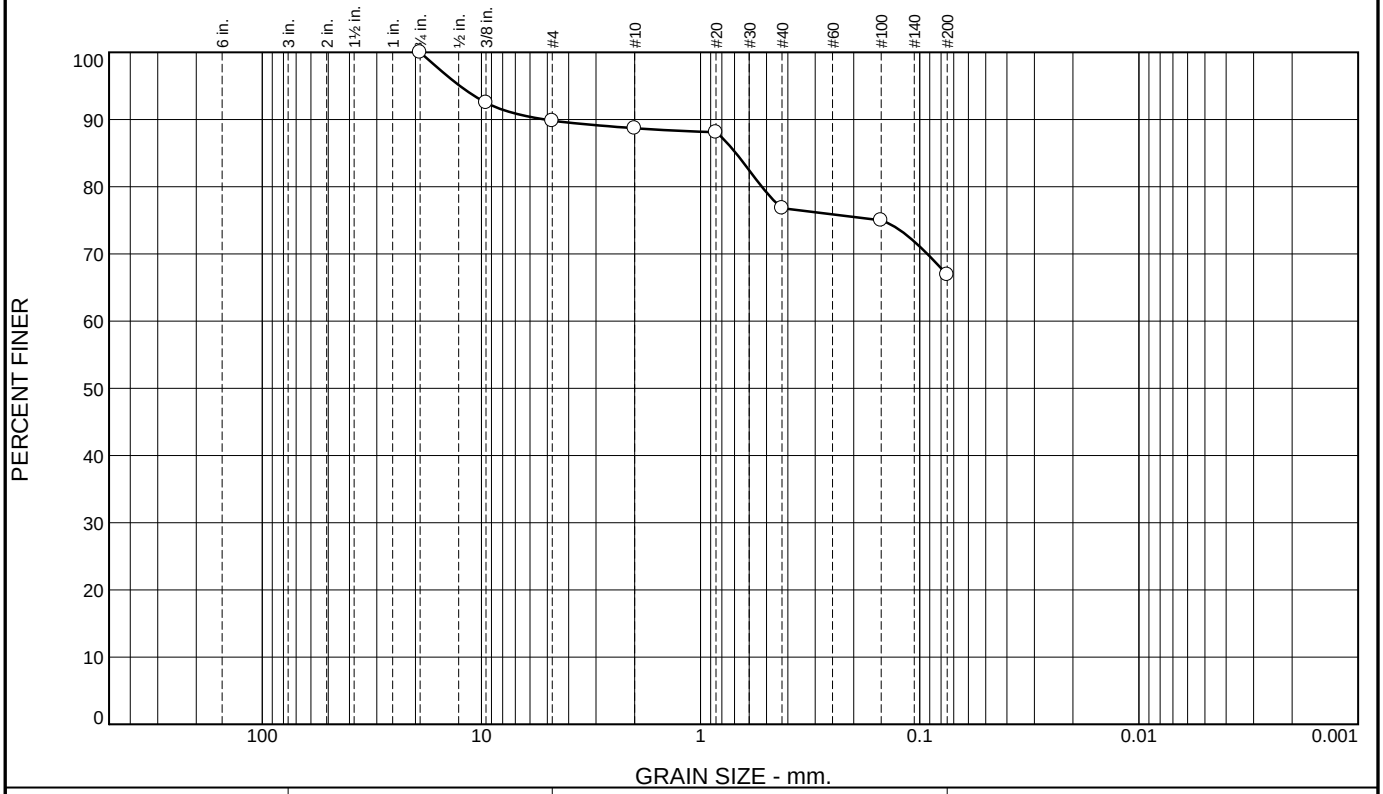
Date: 9/19/16

Triad Engineering, Inc.

Client: Grimm and Parker
Project: Garrett College-STEM Building
McHenry, Maryland
Project No: 03-16-0420 **Figure** C-3

Tested By: DLS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.2	1.1	11.9	9.9	66.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	92.5		
#4	89.8		
#10	88.7		
#20	88.1		
#40	76.8		
#100	75.0		
#200	66.9		

* (no specification provided)

Soil Description

Brown SILT, some sand, little gravel.

Atterberg Limits

PL= 25 LL= 33 PI= 8

Coefficients

D_{90}= 5.1519 D_{85}= 0.6901 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(4)

Remarks

Source of Sample: Jar **Depth:** 2.5'-6.5'
Sample Number: B-5

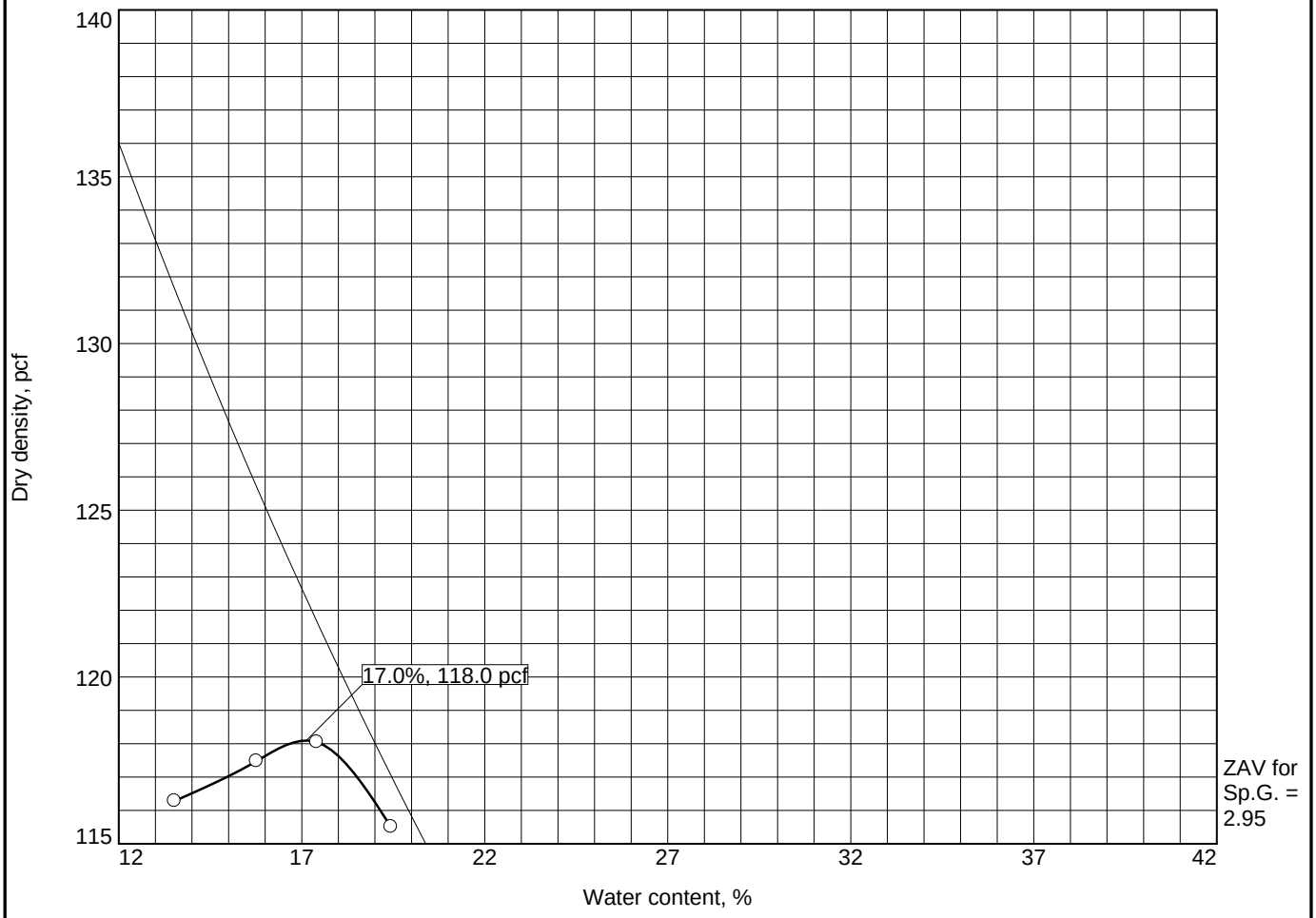
Date: 9/19/16

Triad Engineering, Inc.

Client: Grimm and Parker
Project: Garrett College-STEM Building
McHenry, Maryland
Project No: 03-16-0420 **Figure** C-4

Tested By: DLS

COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Method C Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
1.0'-5.0'	SM	A-2-4(0)	7.8		NP	NP	13.4	34.5

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 118.0 pcf Optimum moisture = 17.0 %	Red brown silty SAND, little gravel.

Project No. 03-16-0420 **Client:** Grimm and Parker
Project: Garrett College-STEM Building
McHenry, Maryland
○**Source of Sample:** B-3 **Sample Number:** Bulk

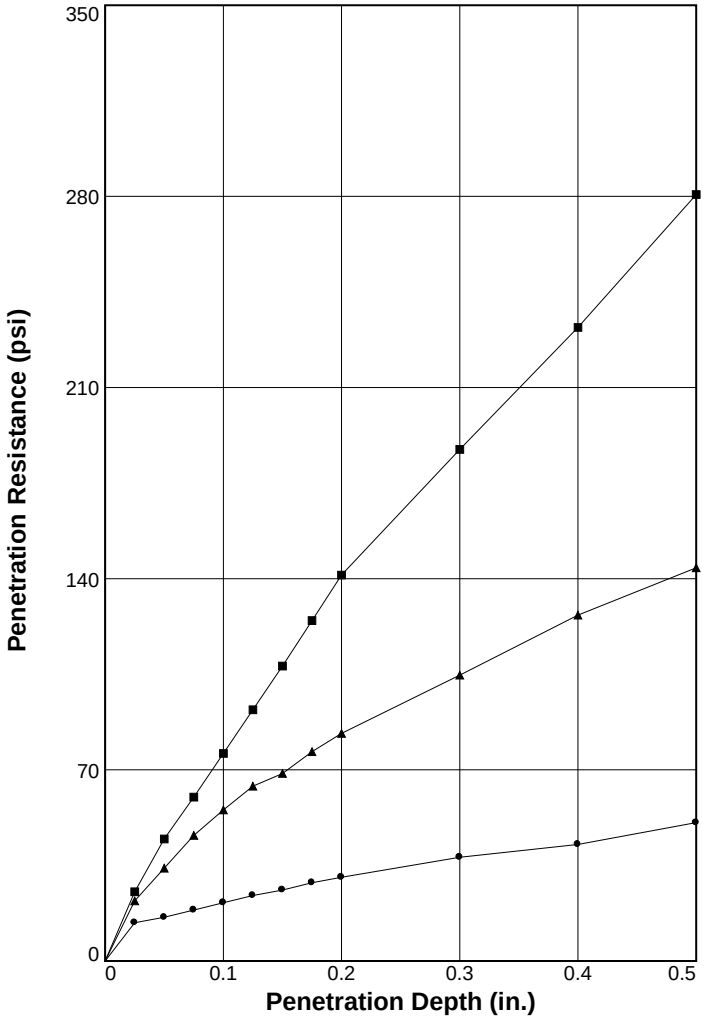
Remarks:

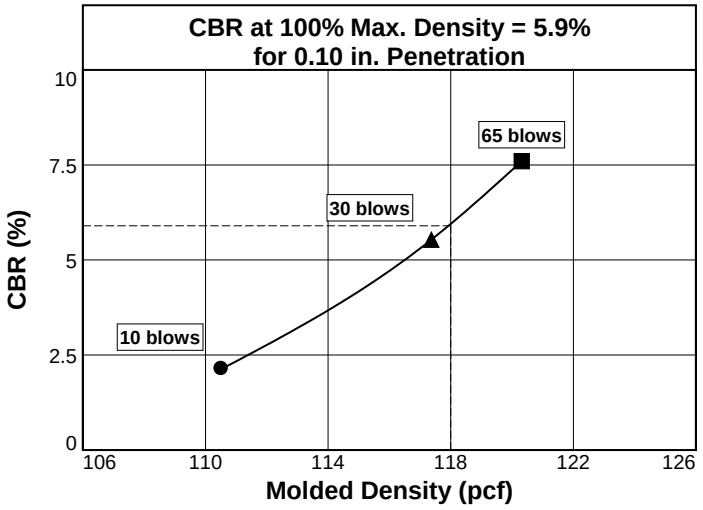
Triad Engineering, Inc.

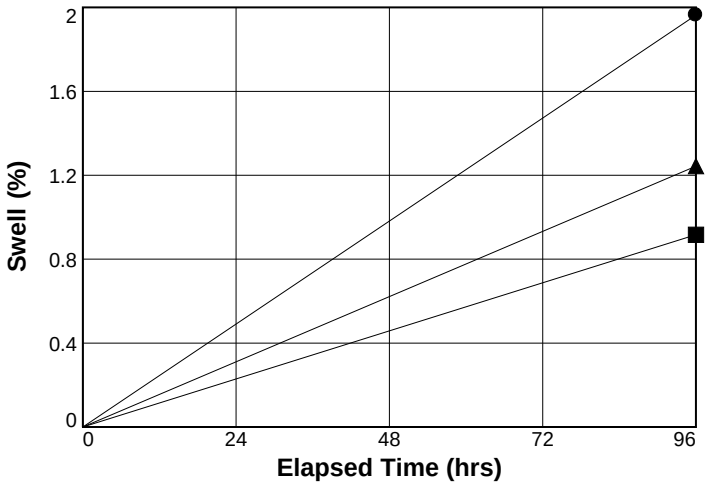
Figure C-5

Tested By: DLS

BEARING RATIO TEST REPORT
AASHTO T 193-99







	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	110.5	93.6	15.7	108.4	91.9	30.8	2.1	2.0	0.000	10	2
2 △	117.4	99.5	15.7	115.9	98.2	25.9	5.5	5.6	0.000	10	1.2
3 □	120.3	101.9	15.7	119.2	101	19.6	7.6	9.4	0.000	10	0.9

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Red brown silty SAND, little gravel.	SM	118.0	17.0	NP	NP

Project No: 03-16-0420

Project: Garrett College-STEM Building McHenry, Maryland

Source of Sample: B-3 **Depth:** 1.0'-5.0'

Sample Number: Bulk

Date: 9/19/16

Test Description/Remarks:

Modified Proctor Effort

BEARING RATIO TEST REPORT

Triad Engineering, Inc.

Figure C-6

Corrosivity Testing

Client Triad Engineering, Inc.
Client Project GCC-STEM
Project No. 37809

Lab Sample ID	Boring	Depth	Sample	Sample Received	Matrix	pH AASHTO T289			Chloride (Water Leachate) AASHTO T291			Sulfate (Water Leachate) AASHTO T-290			Sulfide AWWA C105 A21.5			Soil Resistivity AASHTO T-288			Soil ORP ASTM G-200		
						Result	Date Tested	Tested By	**Result mg/kg (ppm)**	Date Tested	Tested By	**Result mg/kg (ppm)**	Date Tested	Tested By	**Result**	Date Tested	Tested By	**Result, Ohm-cm**	Date Tested	Tested By	**Average, mV**	Date Tested	Tested By
37809001	B-4	3.0'-5.0'	NA	8/30/2016	Soil	4.9	9/6/2016	TX	45	9/2/2016	TX	<30	9/2/2016	TX	Negative	9/2/2016	TX	12000	9/6/2016	TX	316	9/6/2016	TX

Input Validation: tmp Reviewed By: tmp

SECTION 02 30 10 - HAZARDOUS MATERIAL SURVEY

PART 1 GENERAL

1.1 The following information is included in the Project Manual for bidders' information, but is not part of the Contract Documents, and does not relieve the bidders from doing their own investigation to determine the accuracy of the information.

A. Lead-Based Paint Inspection, Prepared by BOGGS Environmental Consultants, BEC Project #MD16295; dated November 29, 2016.

B. Asbestos-Containing Materilas Testing (US EPA AHERA Level) by BOGGS Environmental Consultants, BEC Project #MD16295; dated November 29, 2016.

C. PCBs & Mercury Inspection, Prepared by BOGGS Environmental Consultants, BEC Project #MD16295; dated November 28, 2016.

1.2 STATEMENT CONCERNING THE SURVEY

A. The reports and samples of hazardous materials encountered were obtained by the Owner.

B. The hazardous material samples and analysis were performed by BOGGS Environmental Consultants, in accordance with their system of analysis and sampling and they, BOGGS Environmental Consultants, neither the Owner, the Architect, or his consultants guarantee the accuracy or consistency of the information contained within the Hazardous Material Survey with the actual site conditions.

C. Any radical deviation from the anticipated material, as indicated by the reports, during demolition Work should be reported to the Construction Manager immediately and confirmed in writing.

1.3 CONFIRMATION OF HAZARDOUS MATERIAL CONTAINING MATERIALS

A. Bidders, Contractors, and any others who are concerned with, or are affected by the test results should make their own tests at the site at their own expense. Coordinate with the Construction Manager.

B. No additional compensations will be allowed the Contractor for failure to fully investigate the site or for the neglect of the information contained in the reports.

1.4 ATTACHMENT

A. Lead-Based Paint Inspection, Prepared by BOGGS Environmental Consultants, BEC Project #MD16295; dated November 29, 2016.

B. Asbestos-Containing Materilas Testing (US EPA AHERA Level) by BOGGS Environmental Consultants, BEC Project #MD16295; dated November 29, 2016.

C. PCBs & Mercury Inspection, Prepared by BOGGS Environmental Consultants, BEC Project #MD16295; dated November 28, 2016.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

LEAD-BASED PAINT INSPECTION

GARRETT COLLEGE
BUILDING 200

687 Moser Road,
McHenry, Maryland 21541

Prepared for

OFFICE OF FACILITIES MANAGEMENT

687 Moser Road,
McHenry, Maryland 21541

Attention: Ms. Kathy Farley Meagher, P.E.
Director of Facilities

BEC Project #MD16295

Fieldwork Conducted: November 10, 2016

Report Date: November 29, 2016

Prepared by

BOGGS ENVIRONMENTAL CONSULTANTS
Middletown MD ~ Morgantown, WV
Corporate Office: 200 W Main Street, Middletown, MD 21769
Tel: (301) 694-5687 ~ Fax: (301) 694-9799

LEAD-BASED PAINT INSPECTION

GARRETT COLLEGE
BUILDING 200

687 Moser Road,
McHenry, Maryland 21541

TABLE OF CONTENTS

BOGGS ENVIRONMENTAL CONSULTANTS, INC.

Lead-Based Paint Inspection Conducted By:

Andrew L. Hanson
Environmental Specialist
State of Maryland – Lead Inspector (#15627)

Final Technical Report Written By:

Derrick A. Klein
Environmental Specialist

SECTION 1.0 EXECUTIVE SUMMARY

BOGGS ENVIRONMENTAL CONSULTANTS, INC. (BEC) conducted a lead-based paint (LBP) inspection of the Garrett College Building 200 located at 687 Moser Road, McHenry, Maryland 21541 on November 10, 2016.

The subject site is a single-story higher education building located at 687 Moser Road, McHenry, Maryland 21541. BEC understands that the typical construction layout within the structure includes classrooms, offices, storage, restrooms, mechanical equipment rooms, and common spaces.

BEC received authorization from Ms. Kathy Farley Meagher, P.E., Director of Facilities with Garrett College, to conduct the LBP Inspection on November 10, 2016. Specifically, the LBP Inspection, via X-Ray Fluorescence (XRF), was limited to testing representative building components to gain a general overview on the presence of LBP and/or paint-containing lead (PCL) within the structure and determine applicability (and impact) of US EPA/US HUD/State of Maryland, Department of the Environment (MDE) environmental and US OSHA worker protection regulations potentially triggered during routine maintenance and/or planned renovation (construction) work activities, which will, or can be reasonably anticipated to, result in the disturbance of building components finished with LBP or PCL.

BEC conducted the LBP Inspection utilizing US EPA/HUD/MDE an accredited LBP inspector and all necessary sampling equipment to perform the LBP Inspection, by evaluating building construction materials. It is relevant to note, BEC refined the Limited LBP Inspection to ensure suspect PCL and/or LBP films underwent paint chip sampling and laboratory analysis.

SECTION 2.0 METHODOLOGY

BEC Staff Member Mr. Andrew L. Hanson, whom possesses valid United States Environmental Protection Agency (US EPA), US Housing and Urban Development (US HUD), MDE approved "Lead Inspector" training certification conducted the inspection for LBP and/or PCL-finished building components on November 10, 2016. (See **Appendix C** – BEC Staff Qualification). The inspection was conducted to identify lead-containing surface coatings (LBP and PCL films).

The testing was performed using a PROTEC "LPA-1" XRF manufactured by PROTEC Instrument Corporation, 38 Edge Hill Road, Waltham, Massachusetts. The PROTEC LPA-1 is a hand-held portable lead detector, designed to make accurate, non-destructive measurements of lead concentrations in paint. The LPA-1 (SN #1677) underwent resourcing of the Cobalt-57 radioactive isotope-based energy source on January 27, 2016. (See **Appendix D** - PROTEC "LPA-1" Radioactive Energy Resourcing Data).

Prior to beginning the XRF testing, BEC performed the manufacturer's recommended warm up procedures and calibrated the XRF device. BEC performed three calibration check readings using a National Institute of Standards and Technology (NIST) Standard Reference Material (SRM) paint film test strip (NIST SRM #2579), which possesses a lead level of 1.02 mg/cm^2. All measurements were within the range of the calibration check limits; 0.7 to 1.3 mg/cm^2, inclusive. The XRF instrument was deemed in calibration and testing began.

A total of **two hundred forty-eight** (248) readings were collected at randomly selected building component groupings. The XRF LBP/PCL testing was subject to the limitations described herein of this report. A total of twenty-four (24) calibration check readings were performed prior to XRF testing, at the midpoint of the survey and again at the completion of the survey. In all instances the instrument was deemed in calibration.

According to MDE, an XRF reading of greater than 0.7 milligrams of lead (Pb^{+2}) per square centimeter (mg/cm^2) is considered positive; lead-based paint (LBP). An XRF reading equal to or less than 0.7 mg/cm^2 is considered negative. It is relevant to note, the XRF testing did not result in any inconclusive readings.

SECTION 2.0 METHODOLOGY

The United States Occupational Safety and Health Administration (US OSHA) does not define lead paint based on content; paint-containing lead (PCL). Any detectable mass and/or concentration of lead in a paint makes it lead paint for purposes of complying with US OSHA regulations to determine worker exposure. (refer to "*OSHA Lead in Construction Advisor*", Office of the Assistant Secretary for Policy / Office of Compliance Assistance Policy: https://www.dol.gov/elaws/osha/lead/glossary.asp)

A **Room Equivalent** is an identifiable part of a building, such as a room, exterior sides, or an exterior area. Hallways, stairways, and exterior areas are all examples of room equivalents. Walls are identified as A, B, C and D. The "A" wall in each room corresponds with the wall on which the main entrance or street side of the building is located. The remaining walls are located in order proceeding clockwise from "A" wall. Side A faced the entrance to each apartment building. Windows and/or doors are identified as #1, #2, #3, etc. with the Window #1 and/or Door #1, located at the extreme left-hand side of a room with additional windows and/or doors encountered at the same wall, numbered in ascending order; left to right naming convention.

Each room equivalent is made up of **Components**. Components may be located inside or outside a building. For example, components in a room are the ceiling, floor, walls, a door and its casing, the window sash, and window casing. The **Substrate** is the material underneath the paint. Many substrates exist; however US HUD Final Guidelines recommend classifying substrates into one of six substrate types: brick, concrete, drywall, metal, plaster, and wood. These substrate types are intended to include a broad range of materials. If the true substrate is not one of the six types, the substrate that most closely matches the true substrate is selected. For substrates on top of substrates, such as plaster on concrete, the substrate directly beneath the paint surface is used.

A **Testing Combination** is characterized by the room equivalent, component, and substrate. The **Testing Location** is a specific area on a testing combination where the XRF instrument measures for lead-based paint.

LABORATORY ANALYSIS

Pursuant to the XRF testing, BEC collected three (3) paint chip samples of representative building construction component groupings within Building 200. Mr. Hanson collected the discrete paint chip samples by scraping all of the layers of paint film directly from the substrate in approximate area of 4 square inches (25 square centimeters) per testing site. The samples were placed into sealable centrifuge tubes for shipment to SanAir Technologies Laboratory, (SanAir) of Powhatan, Virginia. SanAir reported the analytical results in a % by weight (mass). The paint chip sample collection was conducted, as a confirmatory testing technique, to evaluate the applicability of US OSHA worker protection regulations.

SanAir is accredited by the US EPA via the National Lead Laboratory Accreditation Program (NLLAP), as administered by the American Industrial Hygiene Association (AIHA #162952), as proficient in the analysis of lead in paint. SanAir performed Atomic Absorption Spectrophotometry (AAS) analysis of the paint chip samples in accordance with the "*Standard Method to Test for Low Concentrations of Lead in Paint By Atomic Absorption Spectrophotometry*" (ASTM D3335-85A) and the "*Standard Method to Test for Low Concentrations of Lead in Soils, Sludges and Sediments By AAS*" (EPA SW846-(7420/7421) and/or the US EPA SW 846 Method 7000B "*Flame Atomic Absorption Spectrophotometry*".

SECTION 3.0 LEAD-BASED PAINT TESTING RESULTS

XRF Testing Results

The XRF testing revealed "lead-based paint" **was** detected (via XRF in situ testing) at readily-accessible interior building components**.** Moreover, BEC collected confirmatory paint chip sampling of these paint films which are listed in **Table A – Paint Chip Sample Analytical results**. A complete listing of all XRF results and can be found in **Appendix E** – PROTEC LPA-1 XRF Testing Data.

SECTION 3.0 LEAD-BASED PAINT TESTING RESULTS

Paint Chip Sampling Results

The results of laboratory analysis of the paint chip samples are presented in **Table A – Paint Chip Sample Analytical Results**.

TABLE A – PAINT CHIP SAMPLE ANALYTICAL RESULTS

Sample Number	Description and Sampling Location	Paint Film Color	Lead Conc. [% wt]
GC200PbC-1	Brown Metal Door Casing – Room #216	Brown	<0.0095
GC200PbC-2	White Concrete Block Wall – Room #201	White	<0.0097
GC200PbC-3	White Metal Structural Steel – Room #219	White	**0.1157**

Paint Containing Lead

SECTION 4.0 CONCLUSIONS & RECOMMENDATIONS

Lead-Based Paint (LBP) - US EPA/MDE Regulated

A. BEC concludes, based upon onsite visual inspection and review of the analytical data, lead-based paint" was **NOT** present at readily-accessible building components located within Building 200.

B. BEC concludes, based upon onsite visual inspection and review of the analytical data, "paint containing lead" **WAS** detected at readily-accessible interior building components located within Building 200 and are listed in **Table B – Paint-Containing Lead Films.**

TABLE B – PAINT-CONTAINING LEAD FILMS

Paint Color	Building Component	Location	Substrate	Lead (mg/cm^2)
White	Structural Steel	Above Ceiling Tile Throughout	Metal	0.1157

C. Moreover, BEC concludes, based upon the common construction (renovation) and painting histories observed within Building 200 - presumptive classification of all similar LBP/PCL paint films (of which were not individually tested during the LBP Inspection) is warranted, until testing rebuts this presumption.

D. BEC advises compliance with US OSHA "*Lead-in-General Industry*" standard (29 CFR 1910.1025) that is required for all employers whose employees perform any maintenance activities, which involve making or keeping a structure, fixture, or foundation in proper condition on a routine, scheduled, or anticipated fashion, that disturbs "lead-based paint" and/or "lead-containing paint films".

E. BEC advises the US OSHA regulation "*Lead Exposure in Construction*" (29 CFR §1926.62) applies to all construction activities, in which employees might be exposed to lead and all related construction activities, currently excluded from the general industry standard for lead (29 CFR §1910.1025).

SECTION 4.0 CONCLUSIONS & RECOMMENDATIONS

F. Additionally, BEC advises, in the State of Maryland, all work, of which an employee may be occupationally exposed to lead - falls within the authority (purview) of US OSHA. It is relevant to note, paint with any measurable lead content may, when subjected to various construction or demolition actions, yield airborne particulate levels that exceed the regulatory Permissible Exposure Limit (PEL). OSHA policy explicitly requires compliance with the applicable standard for detectable levels of lead that are below the abatement levels. OSHA policy also recognizes XRF data for establishing a positive determination only. Only those surfaces, which have been determined by an accredited laboratory to be below the detection limit for lead, are exempted from these standards.

G. BEC advises that the building owner is required to communicate (*i.e.*, specify in the contract documents) the presence of "paint-containing lead" within the phase limits of the renovation/demolition work area to the general contractor.

   Contract specifications governing renovation/demolition work, should explicitly require that the general contractor, and any subcontractor engaged in work that may involve contact with existing paint, make an initial exposure assessment and comply with all other pertinent provisions of 29 CFR 1926.62; notwithstanding the low potential for demolition workers' exposures to airborne lead concentrations, in excess of the legally-enforceable Action Limit (AL, 30 µg/m^3) and/or Permissible Exposure Limit (PEL, 50 µg/m^3).

H. In an abundance of caution and prudent risk management, BEC recommends, at a minimum, a General Contractor- whom possesses current and valid US EPA "*Renovation, Repair, and Painting (RRP)*" [40 C.F.R §745.80] training certifications and contractor registration (accreditation)- conduct any and all renovation work, of which will, or can reasonably anticipated to, result in the disturbance of these LBP/PCL films.

I. BEC recommends conducting representative sampling of the comprehensive demolition waste stream associated with any planned renovation project, to ensure bulk samples of both paint containing lead and all unpainted building components are collected to form one composite sample. Submit the composite bulk sample to a US EPA-accredited laboratory to undergo Toxic Characteristic Leachate Procedure (TCLP) analysis to reveal appropriate disposal requirement; general construction debris versus lead-containing hazardous waste.

WORK PRODUCT DISCLAIMER

XRF readings and/or samples collected during an investigation reflect the lead level of that particular area. Readings and samples are collected at random in accordance with established procedures to obtain a representative overview of lead levels within or around a building. Therefore, it should not be construed that every surface, or area in or around a building was sampled or measured for lead content. Testing included building components as directed by the client. BEC advises additional materials outside this scope of were present within the testing areas but outside this scope of work.

APPENDIX A

PROTEC LPA-1 PERFORMANCE CHARACTERISTICS SHEET

Performance Characteristic Sheet

EFFECTIVE DATE: **October 25, 2006** **EDITION NO.: 5**

MANUFACTURER AND MODEL:

Make: ***Radiation Monitoring Devices***
Model: ***LPA-1***
Source: ^{57}***Co***
Note: This sheet supersedes all previous sheets for the XRF instrument of the make, model, and source shown above ***for instruments sold or serviced after June 26, 1995. For other instruments, see prior editions.***

FIELD OPERATION GUIDANCE

OPERATING PARAMETERS:

Quick mode or 30-second equivalent standard (Time Corrected) mode readings.

XRF CALIBRATION CHECK LIMITS:

0.7 to 1.3 mg/cm^2 (inclusive)

SUBSTRATE CORRECTION:

For XRF results below 4.0 mg/cm^2, substrate correction is recommended for:

Metal using 30-second equivalent standard (Time Corrected) mode readings.
None using quick mode readings.

Substrate correction is not needed for:

Brick, Concrete, Drywall, Plaster, and Wood using 30-second equivalent standard (Time Corrected) mode readings
Brick, Concrete, Drywall, Metal, Plaster, and Wood using quick mode readings

THRESHOLDS:

30-SECOND EQUIVALENT STANDARD MODE READING DESCRIPTION	SUBSTRATE	THRESHOLD (mg/cm^2)
Results corrected for substrate bias on metal substrate only	Brick	1.0
	Concrete	1.0
	Drywall	1.0
	Metal	0.9
	Plaster	1.0
	Wood	1.0

QUICK MODE READING DESCRIPTION	SUBSTRATE	THRESHOLD (mg/cm^2)
Readings not corrected for substrate bias on any substrate	Brick	1.0
	Concrete	1.0
	Drywall	1.0
	Metal	1.0
	Plaster	1.0
	Wood	1.0

BACKGROUND INFORMATION

EVALUATION DATA SOURCE AND DATE:

This sheet is supplemental information to be used in conjunction with Chapter 7 of the HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* ("HUD Guidelines"). Performance parameters shown on this sheet are calculated from the EPA/HUD evaluation using archived building components. Testing was conducted on approximately 150 test locations in July 1995. The instrument that performed testing in September had a new source installed in June 1995 with 12 mCi initial strength.

OPERATING PARAMETERS:

Performance parameters shown in this sheet are applicable only when properly operating the instrument using the manufacturer's instructions and procedures described in Chapter 7 of the HUD Guidelines.

XRF CALIBRATION CHECK:

The calibration of the XRF instrument should be checked using the paint film nearest 1.0 mg/cm^2 in the NIST Standard Reference Material (SRM) used (e.g., for NIST SRM 2579, use the 1.02 mg/cm^2 film).

If readings are outside the acceptable calibration check range, follow the manufacturer's instructions to bring the instruments into control before XRF testing proceeds.

SUBSTRATE CORRECTION VALUE COMPUTATION:

Chapter 7 of the HUD Guidelines provides guidance on correcting XRF results for substrate bias. Supplemental guidance for using the paint film nearest 1.0 mg/cm^2 for substrate correction is provided:

XRF results are corrected for substrate bias by subtracting from each XRF result a correction value determined separately in each house for single-family housing or in each development for multifamily housing, for each substrate. The correction value is an average of XRF readings taken over the NIST SRM paint film nearest to 1.02 mg/cm^2 at test locations that have been scraped bare of their paint covering. Compute the correction values as follows:

> Using the same XRF instrument, take three readings on a bare substrate area covered with the NIST SRM paint film nearest 1 mg/cm^2. Repeat this procedure by taking three more readings on a second bare substrate area of the same substrate covered with the NIST SRM.
>
> Compute the correction value for each substrate type where XRF readings indicate substrate correction is needed by computing the average of all six readings as shown below.
>
> For each substrate type (the 1.02 mg/cm^2 NIST SRM is shown in this example; use the actual lead loading of the NIST SRM used for substrate correction):
>
> Correction value = (1^{st} + 2^{nd} + 3^{rd} + 4^{th} + 5^{th} + 6^{th} *Reading*) / 6 - 1.02 mg/cm²
>
> Repeat this procedure for each substrate requiring substrate correction in the house or housing development.

EVALUATING THE QUALITY OF XRF TESTING:

Randomly select ten testing combinations for retesting from each house or from two randomly selected units in multifamily housing. Use either the Quick Mode or 30-second equivalent standard (Time Corrected) Mode readings.

Conduct XRF re-testing at the ten testing combinations selected for retesting.

Determine if the XRF testing in the units or house passed or failed the test by applying the steps below.

Compute the Retest Tolerance Limit by the following steps:

Determine XRF results for the original and retest XRF readings. Do not correct the original or retest results for substrate bias. In single-family and multi-family housing, a result is defined as a single reading. Therefore, there will be ten original and ten retest XRF results for each house or for the two selected units.

Calculate the average of the original XRF result and retest XRF result for each testing combination.

Square the average for each testing combination.

Add the ten squared averages together. Call this quantity C.

Multiply the number C by 0.0072. Call this quantity D.

Add the number 0.032 to D. Call this quantity E.

Take the square root of E. Call this quantity F.

Multiply F by 1.645. The result is the Retest Tolerance Limit.

Compute the average of all ten original XRF results.

Compute the average of all ten re-test XRF results.

Find the absolute difference of the two averages.

If the difference is less than the Retest Tolerance Limit, the inspection has passed the retest. If the difference of the overall averages equals or exceeds the Retest Tolerance Limit, this procedure should be repeated with ten new testing combinations. If the difference of the overall averages is equal to or greater than the Retest Tolerance Limit a second time, then the inspection should be considered deficient.

Use of this procedure is estimated to produce a spurious result approximately 1% of the time. That is, results of this procedure will call for further examination when no examination is warranted in approximately 1 out of 100 dwelling units tested.

BIAS AND PRECISION:

Do not use these bias and precision data to correct for substrate bias. These bias and precision data were computed without substrate correction from samples with reported laboratory results less than 4.0 mg/cm^2 lead. The data which were used to determine the bias and precision estimates given in the table below have the following properties. During the July 1995 testing, there were 15 test locations with a laboratory-reported result equal to or greater than 4.0 mg/cm^2 lead. Of these, one 30-second standard mode reading was less than 1.0 mg/cm^2 and none of the quick mode readings were less than 1.0 mg/cm^2. The instrument that tested in July is representative of instruments sold or serviced after June 26, 1995. These data are for illustrative purposes only. Actual bias must be determined on the site. Results provided above already account for bias and precision. Bias and precision ranges are provided to show the variability found between machines of the same model.

30-SECOND STANDARD MODE READING MEASURED AT	SUBSTRATE	BIAS (mg/cm^2)	PRECISION* (mg/cm^2)
0.0 mg/cm^2	Brick	0.0	0.1
	Concrete	0.0	0.1
	Drywall	0.1	0.1
	Metal	0.3	0.1
	Plaster	0.1	0.1
	Wood	0.0	0.1
0.5 mg/cm^2	Brick	0.0	0.2
	Concrete	0.0	0.2
	Drywall	0.0	0.2
	Metal	0.2	0.2
	Plaster	0.0	0.2
	Wood	0.0	0.2
1.0 mg/cm^2	Brick	0.0	0.3
	Concrete	0.0	0.3
	Drywall	0.0	0.3
	Metal	0.2	0.3
	Plaster	0.0	0.3
	Wood	0.0	0.3
2.0 mg/cm^2	Brick	-0.1	0.4
	Concrete	-0.1	0.4
	Drywall	-0.1	0.4
	Metal	0.1	0.4
	Plaster	-0.1	0.4
	Wood	-0.1	0.4

*Precision at 1 standard deviation.

CLASSIFICATION RESULTS:

XRF results are classified as positive if they are greater than the upper boundary of the inconclusive range, and negative if they are less than the lower boundary of the inconclusive range, or inconclusive if in between. The inconclusive range includes both its upper and lower bounds. Earlier editions of this *XRF Performance Characteristics Sheet* did not include both bounds of the inconclusive range as "inconclusive." While this edition of the Performance Characteristics Sheet uses a different system, the specific XRF readings that are considered positive, negative, or inconclusive for a given XRF model and substrate remain unchanged, so previous inspection results are not affected.

DOCUMENTATION:

An EPA document titled *Methodology for XRF Performance Characteristic Sheets* provides an explanation of the statistical methodology used to construct the data in the sheets, and provides empirical results from using the recommended inconclusive ranges or thresholds for specific XRF instruments. For a copy of this document call the National Lead Information Center Clearinghouse at 1-800-424-LEAD. A HUD document titled *A Nonparametric Method for Estimating the 5th and 95th Percentile Curves of Variable-Time XRF Readings Based on Monotone Regression* provides supplemental information on the methodology for variable-time XRF instruments. A copy of this document can be obtained from the HUD lead web site, www.hud.gov/offices/lead.

This XRF Performance Characteristic Sheet was developed by QuanTech, Inc., under a contract from the U.S. Department of Housing and Urban Development (HUD). HUD has determined that the information provided here is acceptable when used as guidance in conjunction with Chapter 7, Lead-Based Paint Inspection, of HUD's *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

APPENDIX B

LBP/PCL INSPECTION TESTING LOCATIONS

BEC

Boggs Environmental Consultants, Inc.

XRF Worksheet

Address: Garrett College Building 200

Date: 11-10-16

Project #: MD16295

XRF Serial # 1677

Inspector/Risk Assessor: Andrew Hanson

Shot	Room#	Room	Side	Component	Substrate	Location	Color	Condition	Quantity	Comments
1		Calibrate	A B C D		B C M P S W O	L C R Up Lo		I F P	0.9	
2			A B C D		B C M P S W O	L C R Up Lo		I F P	0.8	
3			A B C D		B C M P S W O	L C R Up Lo		I F P	0.9	
4			A B C D		B C M P S W O	L C R Up Lo		I F P	0.1	
5			A B C D		B C M P S W O	L C R Up Lo		I F P	-0.0	
6			A B C D		B C M P S W O	L C R Up Lo		I F P	0.0	
7	1	Rm # 201	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	Gray	I F P	0.3	
8			A (B) C D		B (C) M P S W O	L C R Up Lo		I F P	0.2	
9			A B (C) D		B (C) M P S W O	L C R Up Lo		I F P	0.0	
10			A B C (D)		B (C) M P S W O	L C R Up Lo		I F P	0.2	
11			A B C (D)	Column	B C (M) P S W O	L C R Up Lo		I F P	0.1	
12			A B C (D)	Door	B C M P S (W) O	L C R Up Lo	wood	I F P	0.0	
13			A B C (D)	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.8	inc @ 0.5
14			(A) B C D	Win Casing	B C (M) P S W O	L C R Up Lo		I F P	-0.3	
15	2	Rm # 203	(A) B C D	wall	B (C) M P S W O	L C R Up Lo	White	I F P	0.3	
16			A (B) C D		B (C) M P S W O	L C R Up Lo		I F P	0.0	
17			A B (C) D		B (C) M P S W O	L C R Up Lo		I F P	0.3	
18			A B C (D)		B (C) M P S W O	L C R Up Lo		I F P	0.4	
19			(A) B C D	Door	B C M P S (W) O	L C R Up Lo	wood	I F P	0.0	
20			(A) B C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.1	
21	3	Rm # 204	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	Gray	I F P	0.1	
22			A (B) C D		B (C) M P S W O	L C R Up Lo		I F P	0.4	
23			A B (C) D		B (C) M P S W O	L C R Up Lo		I F P	0.2	
24			A B C (D)		B (C) M P S W O	L C R Up Lo		I F P	0.3	
25			A B (C) D	Door	B C M P S (W) O	L C R Up Lo	wood	I F P	-0.0	
26			A B (C) D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.3	

Substrates – B-Brick, C-Concrete, M-Metal, Plaster, Sheetrock, Wood
Location - R-Right, L-Left, C-Center, Up-Upper, Lo-Lower
Condition – I-Intact, F-Fair, P-Poor

BEC

Boggs Environmental Consultants, Inc.

Shot	Room#	Room	Side	Component	Substrate	Location	Color	Condition	Quantity	Comments
27	3	Rm # 204	A B (C) D	Conduit	B C (M) P S W O	L C R Up Lo	Gray	I F P	-0.2	
28			(A) B C D	Win Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.3	
29	4	Rm # 205	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	Gray	I F P	-0.1	
30			A (B) C D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.3	
31			A B (C) D	|	B C M P S (W) O	L C R Up Lo	|	I F P	-0.1	
32			A B C (D)	|	B C M P S (W) O	L C R Up Lo	|	I F P	-0.0	
33			(A) B C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.1	
34			(A) B C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.8	inc @ 0.4
35	5	Rm # 207	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	Gray	I F P	0.2	
36			A (B) C D	|	B C M P S (W) O	L C R Up Lo	|	I F P	-0.1	
37			A B (C) D	|	B C M P S (W) O	L C R Up Lo	|	I F P	-0.1	
38			A B C (D)	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.3	
39			(A) B C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.0	
40			(A) B C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.1	
41	6	Rm # 219	(A) B C D	Wall	B C M P S (W) O	L C R Up Lo	Gray	I F P	-0.2	
42			A (B) C D	|	B C M P S (W) O	L C R Up Lo	|	I F P	-0.1	
43			A B (C) D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.2	
44			A B C (D)	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.2	
45			A B (C) D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.1	
46			A B (C) D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.3	
47			A B C (D)	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.0	
48			A B C (D)	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.2	
49	7	Rm # 225	(A) B C D	Wall	B C M P S (W) O	L C R Up Lo	Gray	I F P	-0.2	
50			A (B) C D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.2	
51			A B (C) D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.2	
52			A B (C) D	|	B C M P S (W) O	L C R Up Lo	|	I F P	-0.2	
53			A B C (D)	|	B C M P S (W) O	L C R Up Lo	|	I F P	-0.1	
54			A (B) C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.3	
55			A (B) C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.2	
56			A B (C) D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.2	
57			A B (C) D	Casing	B C M P S (W) O	L C R Up Lo	Brown	I F P	-0.3	

Substrates – B-Brick, C-Concrete, M-Metal, Plaster, Sheetrock, Wood
Location - R-Right, L-Left, C-Center, Up-Upper, Lo-Lower
Condition – I-Intact, F-Fair, P-Poor

BEC

Boggs Environmental Consultants, Inc.

Shot	Room#	Room	Side	Component	Substrate	Location	Color	Condition	Quantity	Comments
58	8	Rm# 224	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	White	I F P	0.1	
59			A (B) C D		B (C) M P S W O	L C R Up Lo		I F P	0.2	
60			A B (C) D		B (C) M P S W O	L C R Up Lo		I F P	0.3	
61			A B C (D)		B (C) M P S W O	L C R Up Lo		I F P	-0.0	
62			A (B) C D	Door	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.0	
63			A (B) C D	Casing	B C (M) P S W O	L C R Up Lo		I F P	0.2	
64			A B C (D)	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.0	
65			A B C (D)	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.8	inc @ 0.4
66			(A) B C D	Conduit	B C (M) P S W O	L C R Up Lo	White	I F P	0.1	
67	9	Rm# 206	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo		I F P	0.3	
68			A (B) C D		B (C) M P S W O	L C R Up Lo		I F P	0.2	
69			A B (C) D		B (C) M P S W O	L C R Up Lo		I F P	0.3	
70			A B C (D)		B (C) M P S W O	L C R Up Lo		I F P	0.2	
71			A B (C) D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.1	
72			A B (C) D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.8	inc @ 0.4
73			(A) B C D	Win Casing	B C (M) P S W O	L C R Up Lo		I F P	-0.4	
74	10	Rm# 208	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	Gray	I F P	0.0	
75			A (B) C D		B (C) M P S W O	L C R Up Lo		I F P	-0.0	
76			A B (C) D		B (C) M P S W O	L C R Up Lo		I F P	0.1	
77			A B C (D)		B C M P (S) W O	L C R Up Lo		I F P	-0.0	
78			A B (C) D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.2	
79			A B (C) D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.8	inc @ 0.4
80			A B C (D)	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.3	
81			A B C (D)	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.0	
82			(A) B C D	Win Casing	B C (M) P S W O	L C R Up Lo		I F P	-0.4	
83	11	Rm# 208 A	(A) B C D	Wall	B C M P (S) W O	L C R Up Lo	Gray	I F P	0.0	
84			A (B) C D		B C M P (S) W O	L C R Up Lo		I F P	-0.1	
85			A B (C) D		B (C) M P S W O	L C R Up Lo		I F P	0.3	
86			A B C (D)		B C M P (S) W O	L C R Up Lo		I F P	0.0	
87			A B C (D)	Door Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.1	
88			A (B) C D		B C M P S W O	L C R Up Lo		I F P	-0.0	

Substrates – B-Brick, C-Concrete, M-Metal, Plaster, Sheetrock, Wood
Location - R-Right, L-Left, C-Center, Up-Upper, Lo-Lower
Condition – I-Intact, F-Fair, P-Poor

BEC

Boggs Environmental Consultants, Inc.

Shot	Room#	Room	Side	Component	Substrate	Location	Color	Condition	Quantity	Comments
89	12	Rm # 321	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	White	I F P	0.3	
90			A (B) C D		B (C) M P S W O	L C R Up Lo		I F P	0.2	
91			A B (C) D		B (C) M P S W O	L C R Up Lo		I F P	0.3	
92			A B C (D)		B (C) M P S W O	L C R Up Lo		I F P	0.2	
93			(A) B C D	Floor	B (C) M P S W O	L C R Up Lo	Grey	I F P	-0.1	
94			(A) B C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.1	
95			(A) B C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.0	
96	13	Rm # 310	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	Gray	I F P	0.3	
97			A (B) C D		B C M P (S) W O	L C R Up Lo		I F P	-0.1	
98			A B (C) D		B (C) M P S W O	L C R Up Lo		I F P	0.1	
99			A B C (D)		B (C) M P S W O	L C R Up Lo		I F P	0.0	
100			A B C (D)		B C M P (S) W O	L C R Up Lo		I F P	-0.2	
101			(A) B C D	Win Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.3	
102			A B (C) D		B C (M) P S W O	L C R Up Lo		I F P	-0.5	
103			A (B) C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.3	
104			A (B) C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.1	
105			A B (C) D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.0	
106			A B (C) D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.2	
107	14	Rm # 310A	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	Gray	I F P	0.2	
108			A (B) C D		B C M P (S) W O	L C R Up Lo		I F P	-0.1	
109			A B (C) D		B C M P (S) W O	L C R Up Lo		I F P	-0.1	
110			A B C (D)		B C M P (S) W O	L C R Up Lo		I F P	-0.1	
111			A B C (D)	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.1	
112			A B C (D)	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.1	
113			(A) B C D	Win Casing	B C (M) P S W O	L C R Up Lo		I F P	-0.3	
114	15	Rm # 310B	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	White	I F P	0.1	
115			A (B) C D		B C M P (S) W O	L C R Up Lo		I F P	-0.0	
116			A B (C) D		B C M P (S) W O	L C R Up Lo		I F P	0.1	
117			A B C (D)		B (C) M P S W O	L C R Up Lo		I F P	0.1	
118			A B (C) D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.2	
119			A B (C) D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.2	

Substrates – B-Brick, C-Concrete, M-Metal, Plaster, Sheetrock, Wood
Location - R-Right, L-Left, C-Center, Up-Upper, Lo-Lower
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BEC

Boggs Environmental Consultants, Inc.

Shot	Room#	Room	Side	Component	Substrate	Location	Color	Condition	Quantity	Comments
120	16	Rm # 215	(A) B C D	Wall	B C M P (S) W O	L C R Up Lo	Tan	I F P	-0.1	
121			A (B) C D	↓	B C M P (S) W O	L C R Up Lo	↓	I F P	-0.0	
122			A B (C) D	↓	B C M P (S) W O	L C R Up Lo	↓	I F P	-0.1	
123			A B C (D)	↓	B C M P (S) W O	L C R Up Lo	↓	I F P	-0.1	
124			A B (C) D	Chair Rail	B C M P S (W) O	L C R Up Lo	Lt. Brown	I F P	-0.2	
125			A B C (D)	Wainscott	B C M P S (W) O	L C R Up Lo	↓	I F P	-0.1	
126			A B C (D)	Baseboard	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.1	
127			A (B) C D	Crown Molding	B C M P S (W) O	L C R Up Lo	↓	I F P	-0.1	
128			A B (C) D	Door	B C M P S (W) O	L C R Up Lo	↓	I F P	-0.1	
129			A B (C) D	Casing	B C M P S (W) O	L C R Up Lo	↓	I F P	-0.0	
130			A B (C) D	Jamb	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.8	inc @ 0.4
131	17	Rm # 212	(A) B C D	Wall	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.2	
132			A (B) C D	↓	B C M P S (W) O	L C R Up Lo	↓	I F P	-0.1	
133			A B (C) D	↓	B C M P S (W) O	L C R Up Lo	↓	I F P	-0.1	
134			A B C (D)	↓	B C M P S (W) O	L C R Up Lo	↓	I F P	-0.0	
135			A B (C) D	Win Sill	B C M P S (W) O	L C R Up Lo	↓	I F P	0.3	[illegible]
136			A B (C) D	Casing	B C M P S (W) O	L C R Up Lo	↓	I F P	-0.1	
137			A (B) C D	Door	B C M P S (W) O	L C R Up Lo	↓	I F P	-0.1	
138			A (B) C D	Casing	B C M P S (W) O	L C R Up Lo	↓	I F P	-0.0	
139			A (B) C D	Jamb	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.8	inc @ 0.5
140			A B (C) D	Baseboard	B C (M) P S W O	L C R Up Lo	↓	I F P	-0.1	Heater
141	18	Rm # 213	A B (C) D	Win Sill	B C M P S (W) O	L C R Up Lo	Wood	I F P	0.3	
142			A B (C) D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-03	
143			(A) B C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.2	
144			(A) B C D	Jamb	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.8	inc @ 0.4
145			A B (C) D	Baseboard	B C (M) P S W O	L C R Up Lo	↓	I F P	-0.0	Heater
146	19	Rm # 214	(A) B C D	Wall	B C M P (S) W O	L C R Up Lo	White	I F P	-0.2	
147			A B (C) D	Win Sill	B C M P S (W) O	L C R Up Lo	Wood	I F P	0.4	
148			A B (C) D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.1	
149			A B C (D)	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.0	
150			A B C (D)	Jamb	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.1	

Substrates – B-Brick, C-Concrete, M-Metal, Plaster, Sheetrock, Wood
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Condition – I-Intact, F-Fair, P-Poor

BEC

Boggs Environmental Consultants, Inc.

Shot	Room#	Room	Side	Component	Substrate	Location	Color	Condition	Quantity	Comments
151	19	Rm # 214	A B (C) D	Baseboard	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.1	Heater
152	20	Rm # 216	(A) B C D	Wall	B C M P (S) W O	L C R Up Lo	White	I F P	-0.0	
153			A (B) C D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.2	
154			A B (C) D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.4	
155			A B C (D)	|	B C M P (S) W O	L C R Up Lo	|	I F P	0.0	
156			A B C (P)	Shelf	B C M P S (W) O	L C R Up Lo	Yellow	I F P	-0.3	
157			A B C (D)	Shelf Support	B C M P S (W) O	L C R Up Lo	White	I F P	-0.1	
158			A B C (D)	Shelf Door	B C M P S (W) O	L C R Up Lo	|	I F P	-0.1	
159			A B (C) D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.1	
160			A B (C) D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.3	
161	21	Rm # 216A	(A) B C D	Wall	B C M P (S) W O	L C R Up Lo	White	I F P	-0.1	
162			A (B) C D	|	B (C) M P (S) W O	L C R Up Lo	|	I F P	0.2	
163			A B (C) D	|	B C M P (S) W O	L C R Up Lo	|	I F P	-0.0	
164			A B C (D)	|	B C M P (S) W O	L C R Up Lo	|	I F P	0.0	
165			A (B) C D	Shelf	B C M P S (W) O	L C R Up Lo	Yellow	I F P	-0.2	
166			A (B) C D	Shelf Support	B C M P S (W) O	L C R Up Lo	White	I F P	-0.2	
167	22	Rm # 209	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	Gray	I F P	0.4	
168			A (B) C D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.2	
169			A B (C) D	|	B C M P (S) W O	L C R Up Lo	|	I F P	-0.1	
170			A B C (D)	|	B C M P (S) W O	L C R Up Lo	|	I F P	0.0	
171			(A) B C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	0.0	
172			(A) B C D	Casing	B C (M) P S W O	L C R Up Lo	[illegible]	I F P	0.8	inc @ 0.5
173	23	Rm # 222	(A) B C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.3	
174			(A) B C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.8	inc @ 0.7
175			A B (C) D	Structural Steel	B C (M) P S W O	L C R Up Lo	Red	I F P	0.0	open web
176	24	Rm # 223	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	White	I F P	0.3	
177			A (B) C D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.4	
178			A B (C) D	|	B C M P (S) W O	L C R Up Lo	|	I F P	-0.2	
179			A B C (D)	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.4	
180			A (B) C D	Conduit	B C (M) P S W O	L C R Up Lo	|	I F P	0.0	

Substrates – B-Brick, C-Concrete, M-Metal, Plaster, Sheetrock, Wood
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BEC

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Shot	Room#	Room	Side	Component	Substrate	Location	Color	Condition	Quantity	Comments
181	24	Rm # 223	(A) B C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.3	
182			(A) B C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.8	inc @ 0.6
183	25	Rm # 223A	(A) B C D	Wall	B C M P (S) W O	L C R Up Lo	White	I F P	-0.1	
184			A (B) C D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.2	
185			A B (C) D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.0	
186			A B C (D)	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.1	
187			A (B) C D	floor	B (C) M P S W O	L C R Up Lo	Gray	I F P	0.2	
188			A (B) C D	Motor Housing	B C (M) P S W O	L C R Up Lo	Red	I F P	-0.1	Pump
189	26	Rm # 217	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	White	I F P	0.2	
190			A (B) C D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.3	
191			A B (C) D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.3	
192			A B C (D)	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.3	
193			(A) B C D	floor	B (C) M P S W O	L C R Up Lo	Gray	I F P	0.0	
194			A (B) C D	Shelf	B C M P S (W) O	L C R Up Lo	White	I F P	-0.2	
195			A (B) C D	Shelf Support	B C (M) P S W O	L C R Up Lo	|	I F P	0.1	
196			(A) B C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.1	
197			(A) B C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.0	
198	27	Rm # 218	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	White	I F P	0.3	
199			A (B) C D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.3	
200			A B (C) D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.2	
201			A B C (D)	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.2	
202			A B (C) D	Wall Tile	B C M P S W (O)	L C R Up Lo	Gray	I F P	0.3	Ceramic
203			(A) B C D	|	B C M P S W (O)	L C R Up Lo	|	I F P	0.2	|
204			(A) B C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.2	
205			(A) B C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.0	
206	28	Rm # 220	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	White	I F P	0.2	
207			A (B) C D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.3	
208			A B (C) D	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.1	
209			A B C (D)	|	B (C) M P S W O	L C R Up Lo	|	I F P	0.3	
210			A (B) C D	Ceramic Wall Tile	B C M P S W (O)	L C R Up Lo	Gray	I F P	0.3	
211			(A) B C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.3	

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BEC

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212	28	Rm # 220	(A) B C D	Door Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.0	
213		Calibrate	A B C D		B C M P S W O	L C R Up Lo		I F P	0.9	
214			A B C D		B C M P S W O	L C R Up Lo		I F P	1.0	
215			A B C D		B C M P S W O	L C R Up Lo		I F P	OK	
216			A B C D		B C M P S W O	L C R Up Lo		I F P	-0.0	
217			A B C D		B C M P S W O	L C R Up Lo		I F P	-0.0	
218			A B C D		B C M P S W O	L C R Up Lo		I F P	-0.0	
219	29	Rm # 211	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	White	I F P	0.1	
220			A (B) C D		B C M P (S) W O	L C R Up Lo		I F P	-0.0	
221			A B (C) D		B C M P (S) W O	L C R Up Lo		I F P	-0.0	
222			A B C (D)		B C M P (S) W O	L C R Up Lo		I F P	-0.0	
223			(A) B C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.1	
224			(A) B C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.1	
225	30	Hall A	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	White	I F P	0.3	
226			A B (C) D		B (C) M P S W O	L C R Up Lo		I F P	0.4	
227			(A) B C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.1	Rm # 208
228			(A) B C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.8	inc @ 0.5
229			A B (C) D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.2	Rm # 207
230			A B (C) D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.1	
231			(A) B C D	Steel Column	B C (M) P S W O	L C R Up Lo	White	I F P	0.0	
232	31	Hall B	A (B) C D	Wall	B (C) M P S W O	L C R Up Lo		I F P	0.2	
233			A B C (D)		B (C) M P S W O	L C R Up Lo		I F P	0.3	
234			A (B) C D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.2	Rm # 201
235			A (B) C D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.3	
236	32	Hall C	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	White	I F P	0.2	
237			A B (C) D		B (C) M P S W O	L C R Up Lo		I F P	0.0	
238			A B (C) D	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.1	Rm # 217
239			A B (C) D	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.1	
240	33	Hall D	A (B) C D	Wall	B C M P (S) W O	L C R Up Lo	White	I F P	-0.0	
241			A B C (D)		B (C) M P S W O	L C R Up Lo		I F P	0.2	
242			A B C (D)	Door	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.4	

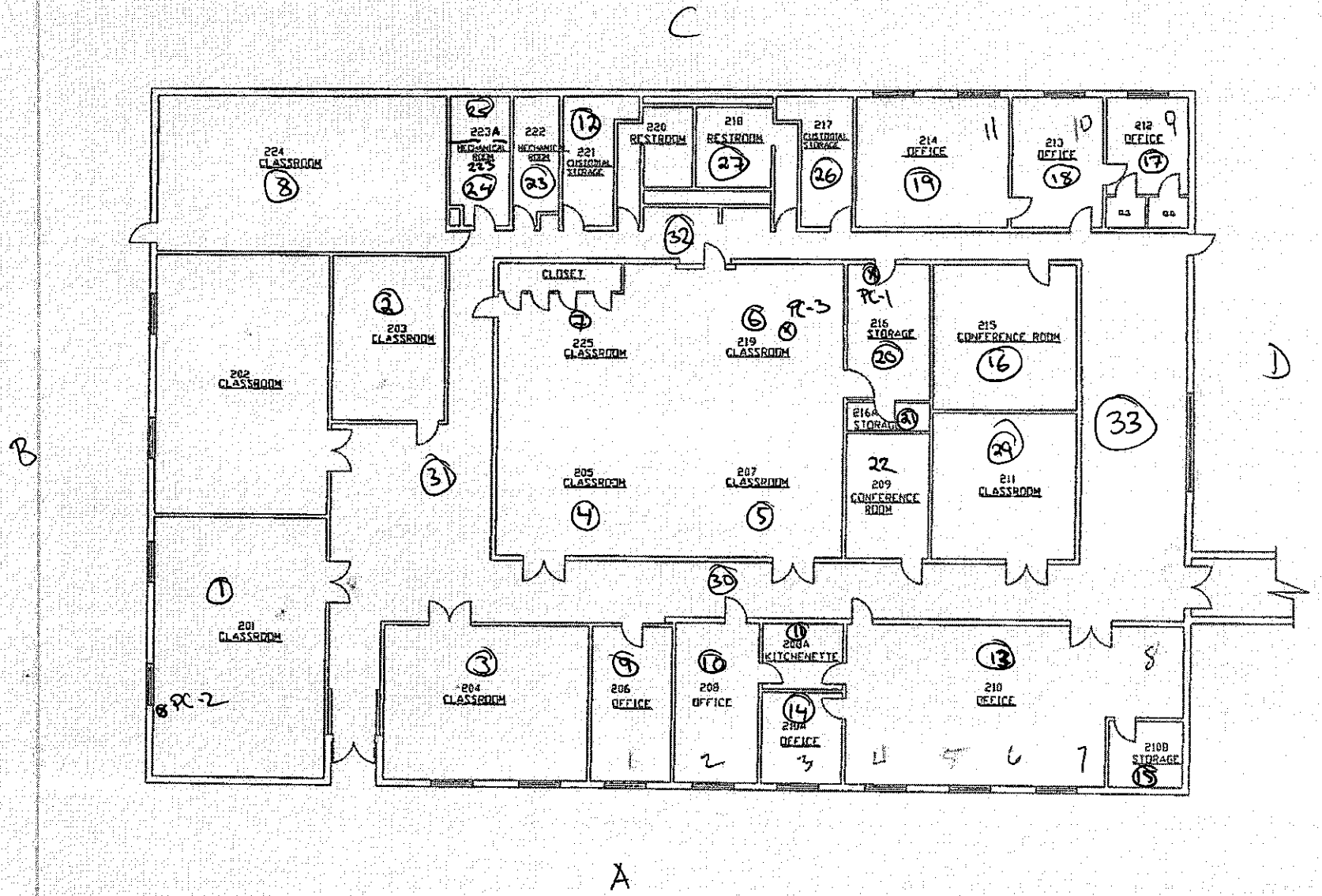
Substrates – B-Brick, C-Concrete, M-Metal, Plaster, Sheetrock, Wood
Location - R-Right, L-Left, C-Center, Up-Upper, Lo-Lower
Condition – I-Intact, F-Fair, P-Poor

BEC

Boggs Environmental Consultants, Inc.

Shot	Room#	Room	Side	Component	Substrate	Location	Color	Condition	Quantity	Comments
243	33	Hall D	A B C (D)	Door Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.6	
244			A B C (D)	Door	B C (M) P S W O	L C R Up Lo	↓	I F P	-0.1	
245			A B C (D)	Casing	B C (M) P S W O	L C R Up Lo	↓	I F P	-0.0	
246			A B C (D)	Win Casing	B C (M) P S W O	L C R Up Lo	↓	I F P	-0.3	
247	34	Rm # 202	(A) B C D	Wall	B (C) M P S W O	L C R Up Lo	Blue	I F P	0.3	
248			A (B) C D	↓	B (C) M P S W O	L C R Up Lo	↓	I F P	0.4	
249			A B (C) D		B (C) M P S W O	L C R Up Lo	↓	I F P	0.3	
250			A B C (D)		B (C) M P S W O	L C R Up Lo	↓	I F P	0.3	
251			A (B) C D	Win Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	-0.3	
252			A B C (D)	Door	B C M P S (W) O	L C R Up Lo	Wood	I F P	-0.1	
253			A B C (D)	Casing	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.8	inc @ 0.4
254			A B C (D)	Column	B C (M) P S W O	L C R Up Lo	Blue	I F P	0.0	
255	35	Plenum	A B (C) D	Structural Steel	B C (M) P S W O	L C R Up Lo	White	I F P	0.1	
256			A B (C) D	Rm decking	B C (M) P S W O	L C R Up Lo	↓	I F P	-0.1	
257		Exterior	(A) B C D	Door	B C (M) P S W O	L C R Up Lo	Black	I F P	-0.3	
258			(A) B C D	Casing	B C (M) P S W O	L C R Up Lo	↓	I F P	0.0	
259			(A) B C D	Win Casing	B C (M) P S W O	L C R Up Lo	↓	I F P	-0.0	
260			A (B) C D	↓	B C (M) P S W O	L C R Up Lo	↓	I F P	-0.4	
261			A (B) C D	Door	B C (M) P S W O	L C R Up Lo	Brown	I F P	0.1	
262			A (B) C D	Casing	B C (M) P S W O	L C R Up Lo	↓	I F P	-0.0	
263			A B (C) D	Win Casing	B C (M) P S W O	L C R Up Lo	Black	I F P	-0.3	
264			A B C (D)	Door	B C (M) P S W O	L C R Up Lo	↓	I F P	-0.3	
265			A B C (D)	Casing	B C (M) P S W O	L C R Up Lo	↓	I F P	-0.4	
266			A B C (D)	Win Casing	B C (M) P S W O	L C R Up Lo	↓	I F P	-0.4	
267		Calibrate	A B C D		B C M P S W O	L C R Up Lo		I F P	0.8	
268		↓	A B C D		B C M P S W O	L C R Up Lo		I F P	0.9	
269			A B C D		B C M P S W O	L C R Up Lo		I F P	0.8	
270			A B C D		B C M P S W O	L C R Up Lo		I F P	-0.1	
271			A B C D		B C M P S W O	L C R Up Lo		I F P	-0.0	
272		↓	A B C D		B C M P S W O	L C R Up Lo		I F P	-0.1	
273			A B C D		B C M P S W O	L C R Up Lo		I F P		

Substrates – B-Brick, C-Concrete, M-Metal, Plaster, Sheetrock, Wood
Location - R-Right, L-Left, C-Center, Up-Upper, Lo-Lower
Condition – I-Intact, F-Fair, P-Poor


C
B
D
A
224 CLASSROOM
223A MECHANICAL ROOM
223 MECHANICAL ROOM
222 MECHANICAL ROOM
221 CUSTODIAL STORAGE
220 RESTROOM
218 RESTROOM
217 CUSTODIAL STORAGE
214 OFFICE
213 OFFICE
212 OFFICE
202 CLASSROOM
203 CLASSROOM
CLOSET
225 CLASSROOM
219 CLASSROOM
216 STORAGE
215 CONFERENCE ROOM
216A STORAGE
205 CLASSROOM
207 CLASSROOM
209 CONFERENCE ROOM
211 CLASSROOM
201 CLASSROOM
204 CLASSROOM
206 OFFICE
208 OFFICE
208A KITCHENETTE
210 OFFICE
210A OFFICE
210B STORAGE
PC-1
PC-2
PC-3

APPENDIX C

BEC STAFF QUALIFICATION

THIS IS TO CERTIFY THAT

Andrew Lawrence Hanson

HAS MET THE LEAD PAINT SERVICES ACCREDITATION REQUIREMENTS FOR

Inspector Technician

02 16 2018

EXPIRATION DATE

TRAINING PROVIDER Aerosol Monitoring & Analysis, Inc.

Hilary Miller

ADMINISTRATOR, LEAD PAINT ACCREDITATION
MARYLAND DEPARTMENT OF THE ENVIRONMENT

3/7/16

DATE

12 07 2015

COURSE DATE

STATE OF MARYLAND

15627

Certificate #

Application for reaccreditation shall be submitted to MDE 60 days prior to accreditation expiration indicated on this certificate.

APPENDIX D

PROTEC "LPA-1"

RADIOACTIVE ENERGY

RESOURCING DATA

Leak Test Certificate

PROtec
INSTRUMENT CORPORATION
38 Edge Hill Road
Waltham, MA 02451

Leak Test Number: 1677-2016

Customer: **Boggs Environmental Consultant**

System:	LPA-1	**Instrument Serial Number:**	1677
Source Manufacturer:	Isotope Products	**Source Model:**	A3901-2
Active Material:	Co57	**Source Activity:**	444MBq (12mCi)
Source Serial Number:	N1-279	**Assay Date**	27 Jan 16
Source Enclosure:	Stainless Steel in Tungsten Holder		

Description of Area Wiped: **Front and Sides of Bezel**

Comments

Leak Test Results: <0.005 µCi

Mike Fowler

Individual Performing Test (please print)

Signature of Individual Performing Test

01/27/16

Date :

APPENDIX E

PROTEC "LPA-1" XRF TESTING DATA

THE PROTEC LPA-1 XRF LEAD PAINT SPECTRUM ANALYZER

SEQUENTIAL REPORT OF LEAD PAINT INSPECTION FOR: Garrett College Building 200

SEQUENTIAL REPORT OF LEAD PAINT INSPECTION FOR:

Inspection Date: 11/10/16
Report Date: 11/22/2016
Abatement Level: 0.8
Report No. S#01677 - 11/10/16 09:14
Total Readings: 272
Job Started: 11/10/16 09:14
Job Finished: 11/10/16 15:27

Read No.	Rm	Room Name	Wall	Structure	Location	Member	Paint Cond	Substrate	Paint Color	Lead (mg/cm²)	Mode
1		CALIBRATION								0.9	TC
2		CALIBRATION								0.8	TC
3		CALIBRATION								0.9	TC
4		CALIBRATION								0.1	TC
5		CALIBRATION								0.0	TC
6		CALIBRATION								0.0	TC
7	001	Rm #201	A	Wall	L Ctr		I	Concrete	Grey	0.3	QM
8	001	Rm #201	B	Wall	L Ctr		I	Concrete	Grey	0.2	QM
9	001	Rm #201	C	Wall	L Ctr		I	Concrete	Grey	0.0	QM
10	001	Rm #201	D	Wall	L Ctr		I	Concrete	Grey	0.2	QM
11	001	Rm #201	D	Column	Ctr	L column	I	Metal	Grey	0.1	QM
12	001	Rm #201	D	Column	Ctr	L column	I	Wood	Wood	0.0	QM
13	001	Rm #201	D	Door	Ctr	Rgt casing	I	Metal	Brown	0.8	QM
14	001	Rm #201	B	Window	Ctr	Lft casing	I	Metal	Brown	-0.3	QM
15	002	Rm #203	A	Wall	L Ctr		I	Concrete	White	0.3	QM
16	002	Rm #203	B	Wall	L Ctr		I	Concrete	White	0.0	QM
17	002	Rm #203	C	Wall	L Ctr		I	Concrete	White	0.3	QM
18	002	Rm #203	D	Wall	L Ctr		I	Concrete	White	0.4	QM
19	002	Rm #203	A	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM
20	002	Rm #203	A	Door	Ctr	Lft casing	I	Metal	Brown	-0.1	QM
21	003	Rm #204	A	Wall	L Ctr		I	Concrete	Grey	0.1	QM
22	003	Rm #204	B	Wall	L Ctr		I	Concrete	Grey	0.4	QM
23	003	Rm #204	C	Wall	L Ctr		I	Concrete	Grey	0.2	QM
24	003	Rm #204	D	Wall	L Ctr		I	Concrete	Grey	0.3	QM
25	003	Rm #204	C	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM
26	003	Rm #204	C	Door	Ctr	Lft casing	I	Metal	Brown	0.3	QM
27	003	Rm #204	C	Conduit	Ctr		I	Metal	Grey	-0.2	QM
28	003	Rm #204	A	Window	Ctr	Lft casing	I	Metal	Brown	-0.3	QM
29	004	Rm #205	A	Wall	L Ctr		I	Concrete	Grey	-0.1	QM
30	004	Rm #205	B	Wall	L Ctr		I	Concrete	Grey	0.3	QM
31	004	Rm #205	C	Wall	L Ctr		I	Wood	Grey	-0.1	QM
32	004	Rm #205	D	Wall	L Ctr		I	Wood	Grey	0.0	QM
33	004	Rm #205	A	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
34	004	Rm #205	A	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
35	005	Rm #207	A	Wall	L Ctr		I	Concrete	Grey	0.2	QM

36	005 Rm #207	B	Wall	L Ctr		I	Wood	Grey	-0.1	QM
37	005 Rm #207	C	Wall	L Ctr		I	Wood	Grey	-0.1	QM
38	005 Rm #207	D	Wall	L Ctr		I	Concrete	Grey	0.3	QM
39	005 Rm #207	A	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM
40	005 Rm #207	A	Door	Ctr	Lft casing	I	Metal	Brown	-0.1	QM
41	006 Rm #219	A	Wall	L Ctr		I	Wood	Grey	-0.2	QM
42	006 Rm #219	B	Wall	L Ctr		I	Wood	Grey	-0.1	QM
43	006 Rm #219	C	Wall	L Ctr		I	Concrete	Grey	0.2	QM
44	006 Rm #219	D	Wall	L Ctr		I	Concrete	Grey	0.2	QM
45	006 Rm #219	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
46	006 Rm #219	C	Door	Ctr	Lft casing	I	Metal	Brown	0.3	QM
47	006 Rm #219	D	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM
48	006 Rm #219	D	Door	Ctr	Lft casing	I	Metal	Brown	0.2	QM
49	007 Rm #225	A	Wall	L Ctr		I	Wood	Grey	-0.2	QM
50	007 Rm #225	B	Wall	L Ctr		I	Concrete	Grey	0.2	QM
51	007 Rm #225	C	Wall	L Ctr		I	Concrete	Grey	0.2	QM
52	007 Rm #225	C	Wall	L Ctr		I	Wood	Grey	-0.2	QM
53	007 Rm #225	D	Wall	L Ctr		I	Wood	Grey	-0.1	QM
54	007 Rm #225	B	Door	Ctr	L Ctr	I	Wood	Wood	-0.3	QM
55	007 Rm #225	B	Door	Ctr	Lft casing	I	Metal	Brown	0.2	QM
56	007 Rm #225	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.2	QM
57	007 Rm #225	C	Door	Ctr	Lft casing	I	Wood	Wood	-0.3	QM
58	007 Rm #225	A	Wall	L Ctr		I	Concrete	White	0.1	QM
59	007 Rm #225	B	Wall	L Ctr		I	Concrete	White	0.2	QM
60	007 Rm #225	C	Wall	L Ctr		I	Concrete	White	0.3	QM
61	007 Rm #225	D	Wall	L Ctr		I	Concrete	White	0.0	QM
62	007 Rm #225	B	Door	Ctr	L Ctr	I	Metal	Brown	0.0	QM
63	007 Rm #225	B	Door	Ctr	Lft casing	I	Metal	Brown	0.2	QM
64	007 Rm #225	D	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM
65	007 Rm #225	D	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
66	007 Rm #225	A	Conduit	Ctr		I	Metal	White	0.1	QM
67	009 Rm #206	A	Wall	L Ctr		I	Concrete	White	0.3	QM
68	009 Rm #206	B	Wall	L Ctr		I	Concrete	White	0.2	QM
69	009 Rm #206	C	Wall	L Ctr		I	Concrete	White	0.3	QM
70	009 Rm #206	D	Wall	L Ctr		I	Concrete	White	0.2	QM
71	009 Rm #206	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
72	009 Rm #206	C	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
73	009 Rm #206	A	Window	Ctr	Lft casing	I	Metal	Brown	-0.4	QM
74	010 Rm #208	A	Wall	L Ctr		I	Concrete	Grey	0.0	QM
75	010 Rm #208	B	Wall	L Ctr		I	Concrete	Grey	0.0	QM
76	010 Rm #208	C	Wall	L Ctr		I	Concrete	Grey	0.1	QM
77	010 Rm #208	D	Wall	L Ctr		I	Sheetrtock	Grey	0.0	QM
78	010 Rm #208	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.2	QM
79	010 Rm #208	C	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
80	010 Rm #208	D	Door	Ctr	L Ctr	I	Wood	Wood	-0.3	QM
81	010 Rm #208	D	Door	Ctr	Lft casing	I	Metal	Brown	0.0	QM
82	010 Rm #208	A	Window	Ctr	Lft casing	I	Metal	Brown	-0.4	QM
83	011 Rm #208A	A	Wall	L Ctr		I	Sheetrtock	Grey	0.0	QM
84	011 Rm #208A	B	Wall	L Ctr		I	Sheetrtock	Grey	-0.1	QM
85	011 Rm #208A	C	Wall	L Ctr		I	Concrete	Grey	0.3	QM
86	011 Rm #208A	D	Wall	L Ctr		I	Sheetrtock	Grey	0.0	QM
87	011 Rm #208A	D	Door	Ctr	Lft casing	I	Metal	Brown	-0.1	QM
88	011 Rm #208A	B	Door	Ctr	Lft casing	I	Metal	Brown	0.0	QM
89	012 Rm #221	A	Wall	L Ctr		I	Concrete	White	0.3	QM
90	012 Rm #221	B	Wall	L Ctr		I	Concrete	White	0.2	QM
91	012 Rm #221	C	Wall	L Ctr		I	Concrete	White	0.3	QM
92	012 Rm #221	D	Wall	L Ctr		I	Concrete	White	0.2	QM
93	012 Rm #221	A	Floor			I	Concrete	Grey	-0.1	QM
94	012 Rm #221	A	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
95	012 Rm #221	A	Door	Ctr	Lft casing	I	Metal	Brown	0.0	QM
96	013 Rm #210	A	Wall	L Ctr		I	Concrete	Grey	0.3	QM

97	013	Rm #210	B	Wall	L	Ctr		I	Sheetrtock	Grey	-0.1	QM
98	013	Rm #210	C	Wall	L	Ctr		I	Concrete	Grey	0.1	QM
99	013	Rm #210	D	Wall	L	Ctr		I	Concrete	Grey	0.0	QM
100	013	Rm #210	D	Wall	L	Ctr		I	Sheetrtock	Grey	-0.2	QM
101	013	Rm #210	A	Window		Ctr	Lft casing	I	Metal	Brown	-0.3	QM
102	013	Rm #210	C	Window		Ctr	Lft casing	I	Metal	Brown	-0.5	QM
103	013	Rm #210	B	Door		Ctr	L Ctr	I	Wood	Wood	-0.3	QM
104	013	Rm #210	B	Door		Ctr	Lft casing	I	Metal	Brown	-0.1	QM
105	013	Rm #210	C	Door		Ctr	L Ctr	I	Wood	Wood	0.0	QM
106	013	Rm #210	C	Door		Ctr	Lft casing	I	Metal	Brown	0.2	QM
107	014	Rm #210A	A	Wall	L	Ctr		I	Concrete	Grey	0.2	QM
108	014	Rm #210A	B	Wall	L	Ctr		I	Sheetrtock	Grey	-0.1	QM
109	014	Rm #210A	C	Wall	L	Ctr		I	Sheetrtock	Grey	-0.1	QM
110	014	Rm #210A	D	Wall	L	Ctr		I	Sheetrtock	Grey	-0.1	QM
111	014	Rm #210A	D	Door		Ctr	L Ctr	I	Wood	Wood	-0.1	QM
112	014	Rm #210A	D	Door		Ctr	Lft casing	I	Metal	Brown	-0.1	QM
113	014	Rm #210A	A	Window		Ctr	Lft casing	I	Metal	Brown	-0.3	QM
114	015	Rm #210B	A	Wall	L	Ctr		I	Concrete	White	0.1	QM
115	015	Rm #210B	B	Wall	L	Ctr		I	Sheetrtock	White	0.0	QM
116	015	Rm #210B	C	Wall	L	Ctr		I	Sheetrtock	White	0.1	QM
117	015	Rm #210B	D	Wall	L	Ctr		I	Concrete	White	0.1	QM
118	015	Rm #210B	C	Door		Ctr	L Ctr	I	Wood	Wood	-0.2	QM
119	015	Rm #210B	C	Door		Ctr	Lft casing	I	Metal	Brown	-0.2	QM
120	016	Rm #215	A	Wall	L	Ctr		I	Sheetrtock	Tan	-0.1	QM
121	016	Rm #215	B	Wall	L	Ctr		I	Sheetrtock	Tan	0.0	QM
122	016	Rm #215	C	Wall	L	Ctr		I	Sheetrtock	Tan	-0.1	QM
123	016	Rm #215	D	Wall	L	Ctr		I	Sheetrtock	Tan	-0.1	QM
124	016	Rm #215	C	Chair Rail		Ctr		I	Wood	Lt Brown	-0.2	QM
125	016	Rm #215	D	Wanescott		Ctr		I	Wood	Lt Brown	-0.1	QM
126	016	Rm #215	D	Baseboard		Ctr		I	Wood	Wood	-0.1	QM
127	016	Rm #215	B	Crown Mldg		Ctr		I	Wood	Wood	-0.1	QM
128	016	Rm #215	C	Door		Ctr	L Ctr	I	Wood	Wood	-0.1	QM
129	016	Rm #215	C	Door		Ctr	Lft casing	I	Wood	Wood	0.0	QM
130	016	Rm #215	C	Door		Ctr	Lft jamb	I	Wood	Brown	0.8	QM
131	017	Rm #212	A	Wall	L	Ctr		I	Wood	Wood	-0.2	QM
132	017	Rm #212	B	Wall	L	Ctr		I	Wood	Wood	-0.1	QM
133	017	Rm #212	C	Wall	L	Ctr		I	Wood	Wood	-0.1	QM
134	017	Rm #212	D	Wall	L	Ctr		I	Wood	Wood	0.0	QM
135	017	Rm #212	C	Window		Ctr	Sill	I	Wood	Wood	0.3	QM
136	017	Rm #212	C	Window		Ctr	Lft casing	I	Wood	Wood	-0.1	QM
137	017	Rm #212	B	Door		Ctr	L Ctr	I	Wood	Wood	-0.1	QM
138	017	Rm #212	B	Door		Ctr	Lft casing	I	Wood	Wood	0.0	QM
139	017	Rm #212	B	Door		Ctr	Lft jamb	I	Metal	Brown	0.8	QM
140	017	Rm #212	C	Baseboard		Ctr		I	Metal	Brown	-0.1	QM
141	018	Rm #213	C	Window		Ctr	Sill	I	Wood	Wood	0.3	QM
142	018	Rm #213	C	Window		Ctr	Lft casing	I	Metal	Brown	-0.3	QM
143	018	Rm #213	A	Door		Ctr	L Ctr	I	Wood	Wood	-0.2	QM
144	018	Rm #213	A	Door		Ctr	Lft jamb	I	Metal	Brown	0.8	QM
145	018	Rm #213	C	Baseboard		Ctr		I	Metal	Brown	0.0	QM
146	019	Rm #214	A	Wall	L	Ctr		I	Sheetrtock	White	-0.2	QM
147	019	Rm #214	C	Window		Ctr	Sill	I	Wood	Wood	0.4	QM
148	019	Rm #214	C	Window		Ctr	Lft casing	I	Metal	Brown	-0.1	QM
149	019	Rm #214	D	Door		Ctr	L Ctr	I	Wood	Wood	0.0	QM
150	019	Rm #214	D	Door		Ctr	Lft jamb	I	Metal	Brown	-0.1	QM
151	019	Rm #214	C	Baseboard		Ctr		I	Metal	Brown	-0.1	QM
152	020	Rm #216	A	Wall	L	Ctr		I	Sheetrtock	White	0.0	QM
153	020	Rm #216	B	Wall	L	Ctr		I	Concrete	White	0.2	QM
154	020	Rm #216	C	Wall	L	Ctr		I	Concrete	White	0.4	QM
155	020	Rm #216	D	Wall	L	Ctr		I	Sheetrtock	White	0.0	QM
156	020	Rm #216	D	Closet		Ctr	Shelf	I	Wood	Yellow	-0.3	QM
157	020	Rm #216	D	Closet		Ctr	Shelf Sup.	I	Wood	White	-0.1	QM

158	020	Rm #216	D	Closet		Ctr	Door	I	Wood	White	-0.1	QM
159	020	Rm #216	C	Door		Ctr	L Ctr	I	Wood	Wood	-0.1	QM
160	020	Rm #216	C	Door		Ctr	Lft casing	I	Metal	Brown	0.3	QM
161	021	Rm #216A	A	Wall	L	Ctr		I	Sheetrtock	White	-0.1	QM
162	021	Rm #216A	B	Wall	L	Ctr		I	Concrete	White	0.2	QM
163	021	Rm #216A	C	Wall	L	Ctr		I	Sheetrtock	White	0.0	QM
164	021	Rm #216A	D	Wall	L	Ctr		I	Sheetrtock	White	0.0	QM
165	021	Rm #216A	D	Closet		Ctr	Shelf	I	Wood	Yellow	-0.2	QM
166	021	Rm #216A	D	Closet		Ctr	Shelf Sup.	I	Wood	White	-0.2	QM
167	022	Rm #209	A	Wall	L	Ctr		I	Concrete	Grey	0.4	QM
168	022	Rm #209	B	Wall	L	Ctr		I	Concrete	Grey	0.2	QM
169	022	Rm #209	C	Wall	L	Ctr		I	Sheetrtock	Grey	-0.1	QM
170	022	Rm #209	D	Wall	L	Ctr		I	Sheetrtock	Grey	0.0	QM
171	022	Rm #209	A	Door		Ctr	L Ctr	I	Wood	Wood	0.0	QM
172	022	Rm #209	A	Door		Ctr	Lft casing	I	Metal	Brown	0.8	QM
173	023	Rm #222	A	Door		Ctr	L Ctr	I	Wood	Wood	-0.3	QM
174	023	Rm #222	A	Door		Ctr	Lft casing	I	Metal	Brown	0.8	QM
175	023	Rm #222	C	Steel Beam		Ctr		I	Metal	Red	0.0	QM
176	024	Rm #223	A	Wall	L	Ctr		I	Concrete	White	0.3	QM
177	024	Rm #223	B	Wall	L	Ctr		I	Concrete	White	0.4	QM
178	024	Rm #223	C	Wall	L	Ctr		I	Sheetrtock	White	-0.2	QM
179	024	Rm #223	D	Wall	L	Ctr		I	Concrete	White	0.4	QM
180	024	Rm #223	B	Conduit		Ctr		I	Metal	White	0.0	QM
181	024	Rm #223	A	Door		Ctr	L Ctr	I	Wood	Wood	-0.3	QM
182	024	Rm #223	A	Door		Ctr	Lft casing	I	Metal	Brown	0.8	QM
183	025	Rm #223A	A	Wall	L	Ctr		I	Sheetrtock	White	-0.1	QM
184	025	Rm #223A	B	Wall	L	Ctr		I	Concrete	White	0.2	QM
185	025	Rm #223A	C	Wall	L	Ctr		I	Concrete	White	0.0	QM
186	025	Rm #223A	D	Wall	L	Ctr		I	Concrete	White	0.1	QM
187	025	Rm #223A	B	Floor				I	Concrete	Grey	0.2	QM
188	025	Rm #223A	B	Motor House		Ctr		I	Metal	Red	-0.1	QM
189	026	Rm #217	A	Wall	L	Ctr		I	Concrete	White	0.2	QM
190	026	Rm #217	B	Wall	L	Ctr		I	Concrete	White	0.3	QM
191	026	Rm #217	C	Wall	L	Ctr		I	Concrete	White	0.3	QM
192	026	Rm #217	D	Wall	L	Ctr		I	Concrete	White	0.3	QM
193	026	Rm #217	A	Floor				I	Concrete	Grey	0.0	QM
194	026	Rm #217	B	Closet		Ctr	Shelf	I	Wood	White	-0.2	QM
195	026	Rm #217	B	Closet		Ctr	Shelf Sup.	I	Metal	White	0.1	QM
196	026	Rm #217	A	Door		Ctr	L Ctr	I	Wood	Wood	-0.1	QM
197	026	Rm #217	A	Door		Ctr	Lft casing	I	Metal	Brown	0.0	QM
198	027	Rm #218	A	Wall	L	Ctr		I	Concrete	White	0.3	QM
199	027	Rm #218	B	Wall	L	Ctr		I	Concrete	White	0.3	QM
200	027	Rm #218	C	Wall	L	Ctr		I	Concrete	White	0.2	QM
201	027	Rm #218	D	Wall	L	Ctr		I	Concrete	White	0.2	QM
202	027	Rm #218	C	Wall Tile		Ctr		I	Ceramic	Grey	0.3	QM
203	027	Rm #218	A	Wall Tile		Ctr		I	Ceramic	Grey	0.2	QM
204	027	Rm #218	A	Door		Ctr	L Ctr	I	Wood	Wood	-0.2	QM
205	027	Rm #218	A	Door		Ctr	Lft casing	I	Metal	Brown	0.0	QM
206	028	Rm #220	A	Wall	L	Ctr		I	Concrete	White	0.2	QM
207	028	Rm #220	B	Wall	L	Ctr		I	Concrete	White	0.3	QM
208	028	Rm #220	C	Wall	L	Ctr		I	Concrete	White	0.1	QM
209	028	Rm #220	D	Wall	L	Ctr		I	Concrete	White	0.3	QM
210	028	Rm #220	B	Wall Tile		Ctr		I	Ceramic	Grey	0.3	QM
211	028	Rm #220	A	Door		Ctr	L Ctr	I	Wood	Wood	-0.3	QM
212	028	Rm #220	A	Door		Ctr	Lft casing	I	Metal	Brown	0.0	QM
213		CALIBRATION									0.9	TC
214		CALIBRATION									1.0	TC
215		CALIBRATION									0.8	TC
216		CALIBRATION									0.0	TC
217		CALIBRATION									0.0	TC
218		CALIBRATION									0.0	TC

219	029	Rm #211	A	Wall	L	Ctr		I	Concrete	White	0.1	QM
220	029	Rm #211	B	Wall	L	Ctr		I	Sheetrtock	White	0.0	QM
221	029	Rm #211	C	Wall	L	Ctr		I	Sheetrtock	White	0.0	QM
222	029	Rm #211	D	Wall	L	Ctr		I	Sheetrtock	White	0.0	QM
223	029	Rm #211	A	Door		Ctr	L Ctr	I	Wood	Wood	-0.1	QM
224	029	Rm #211	A	Door		Ctr	Lft casing	I	Metal	Brown	-0.1	QM
225	030	Hall A	A	Wall	L	Ctr		I	Concrete	White	0.3	QM
226	030	Hall A	C	Wall	L	Ctr		I	Concrete	White	0.4	QM
227	030	Hall A	A	Door		Ctr	L Ctr	I	Wood	Wood	-0.1	QM
228	030	Hall A	A	Door		Ctr	Lft casing	I	Metal	Brown	0.8	QM
229	030	Hall A	C	Door		Ctr	L Ctr	I	Wood	Wood	-0.2	QM
230	030	Hall A	C	Door		Ctr	Lft casing	I	Metal	Brown	-0.1	QM
231	030	Hall A	A	SteelColumn		Ctr		I	Metal	White	0.0	QM
232	031	Hall B	B	Wall	L	Ctr		I	Concrete	White	0.2	QM
233	031	Hall B	D	Wall	L	Ctr		I	Concrete	White	0.3	QM
234	031	Hall B	B	Door		Ctr	L Ctr	I	Wood	Wood	-0.2	QM
235	031	Hall B	B	Door		Ctr	Lft casing	I	Metal	Brown	0.3	QM
236	032	Hall C	A	Wall	L	Ctr		I	Concrete	White	0.2	QM
237	032	Hall C	C	Wall	L	Ctr		I	Concrete	White	0.0	QM
238	032	Hall C	C	Door		Ctr	L Ctr	I	Wood	Wood	-0.1	QM
239	032	Hall C	C	Door		Ctr	Lft casing	I	Metal	Brown	-0.1	QM
240	033	Hall D	B	Wall	L	Ctr		I	Sheetrtock	White	0.0	QM
241	033	Hall D	D	Wall	L	Ctr		I	Concrete	White	0.2	QM
242	033	Hall D	D	Door		Ctr	L Ctr	I	Metal	Brown	-0.4	QM
243	033	Hall D	D	Door		Ctr	Lft casing	I	Metal	Brown	-0.6	QM
244	033	Hall D	D	Door		Ctr	L Ctr	I	Metal	Brown	-0.1	QM
245	033	Hall D	D	Door		Ctr	Lft casing	I	Metal	Brown	0.0	QM
246	033	Hall D	D	Window		Ctr	Lft casing	I	Metal	Brown	-0.3	QM
247	034	Rm #202	A	Wall	L	Ctr		I	Concrete	Blue	0.3	QM
248	034	Rm #202	B	Wall	L	Ctr		I	Concrete	Blue	0.4	QM
249	034	Rm #202	C	Wall	L	Ctr		I	Concrete	Blue	0.3	QM
250	034	Rm #202	D	Wall	L	Ctr		I	Concrete	Blue	0.3	QM
251	034	Rm #202	B	Window		Ctr	Lft casing	I	Metal	Brown	-0.3	QM
252	034	Rm #202	D	Door		Ctr	L Ctr	I	Wood	Wood	-0.1	QM
253	034	Rm #202	D	Door		Ctr	Lft casing	I	Metal	Brown	0.8	QM
254	034	Rm #202	D	Column		Ctr	L column	I	Metal	Blue	0.0	QM
255	035	Plenum	C	Steel Beam		Ctr		I	Metal	White	0.1	QM
256	035	Plenum	C	Pan Decking		Ctr		I	Metal	White	-0.1	QM
257	001	Number Only	A	Door		Ctr	L Ctr	I	Metal	Black	-0.3	QM
258	001	Number Only	A	Door		Ctr	Lft casing	I	Metal	Black	0.0	QM
259	001	Number Only	A	Window		Ctr	Lft casing	I	Metal	Black	0.0	QM
260	001	Number Only	B	Window		Ctr	Lft casing	I	Metal	Black	-0.4	QM
261	001	Number Only	B	Door		Ctr	L Ctr	I	Metal	Brown	0.1	QM
262	001	Number Only	B	Door		Ctr	Lft casing	I	Metal	Brown	0.0	QM
263	001	Number Only	C	Window		Ctr	Lft casing	I	Metal	Black	-0.3	QM
264	001	Number Only	D	Door		Ctr	L Ctr	I	Metal	Black	-0.3	QM
265	001	Number Only	D	Door		Ctr	Lft casing	I	Metal	Black	-0.4	QM
266	001	Number Only	D	Window		Ctr	Lft casing	I	Metal	Black	-0.4	QM
267		CALIBRATION									0.8	TC
268		CALIBRATION									0.9	TC
269		CALIBRATION									0.8	TC
270		CALIBRATION									-0.1	TC
271		CALIBRATION									0.0	TC
272		CALIBRATION									-0.1	TC

---- End of Readings ----

THE PROTEC LPA-1 XRF LEAD PAINT SPECTRUM ANALYZER

SEQUENTIAL REPORT OF LEAD PAINT INSPECTION FOR: Garrett College Building 200

SUMMARY REPORT OF LEAD PAINT INSPECTION FOR:

Inspection Date: 11/10/16
Report Date: 11/22/2016
Abatement Level: 0.8
Report No. S#01677 - 11/10/16 09:14
Total Readings: 272 Actionable: 13
Job Started: 11/10/16 09:14
Job Finished: 11/10/16 15:27

Read No.	Wall	Structure	Location	Member	Paint Cond	Substrate	Paint Color	Lead (mg/cm²)	Mode
Interior Room 001 Rm #201									
013	D	Door	Ctr	Rgt casing	I	Metal	Brown	0.8	QM
Interior Room 004 Rm #205									
034	A	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
Interior Room 007 Rm #225									
065	D	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
Interior Room 009 Rm #206									
072	C	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
Interior Room 010 Rm #208									
079	C	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
Interior Room 016 Rm #215									
130	C	Door	Ctr	Lft jamb	I	Wood	Brown	0.8	QM
Interior Room 017 Rm #212									
139	B	Door	Ctr	Lft jamb	I	Metal	Brown	0.8	QM
Interior Room 018 Rm #213									
144	A	Door	Ctr	Lft jamb	I	Metal	Brown	0.8	QM
Interior Room 022 Rm #209									
172	A	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
Interior Room 023 Rm #222									
174	A	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
Interior Room 024 Rm #223									
182	A	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
Interior Room 030 Hall A									
228	A	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
Interior Room 034 Rm #202									
253	D	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM

Calibration Readings

---- End of Readings ----

THE PROTEC LPA-1 XRF LEAD PAINT SPECTRUM ANALYZER

SEQUENTIAL REPORT OF LEAD PAINT INSPECTION FOR: Garrett College Building 200

DETAILED REPORT OF LEAD PAINT INSPECTION FOR:

Inspection Date: 11/10/16
Report Date: 11/22/2016
Abatement Level: 0.8
Report No. S#01677 - 11/10/16 09:14
Total Readings: 272
Job Started: 11/10/16 09:14
Job Finished: 11/10/16 15:27

Read No.	Wall	Structure	Location	Member	Paint Cond	Substrate	Paint Color	Lead (mg/cm²)	Mode
Exterior Room 001 Number Only									
259	A	Window	Ctr	Lft casing	I	Metal	Black	0.0	QM
258	A	Door	Ctr	Lft casing	I	Metal	Black	0.0	QM
257	A	Door	Ctr	L Ctr	I	Metal	Black	-0.3	QM
260	B	Window	Ctr	Lft casing	I	Metal	Black	-0.4	QM
262	B	Door	Ctr	Lft casing	I	Metal	Brown	0.0	QM
261	B	Door	Ctr	L Ctr	I	Metal	Brown	0.1	QM
263	C	Window	Ctr	Lft casing	I	Metal	Black	-0.3	QM
266	D	Window	Ctr	Lft casing	I	Metal	Black	-0.4	QM
265	D	Door	Ctr	Lft casing	I	Metal	Black	-0.4	QM
264	D	Door	Ctr	L Ctr	I	Metal	Black	-0.3	QM
Interior Room 001 Rm #201									
007	A	Wall	L Ctr		I	Concrete	Grey	0.3	QM
008	B	Wall	L Ctr		I	Concrete	Grey	0.2	QM
014	B	Window	Ctr	Lft casing	I	Metal	Brown	-0.3	QM
009	C	Wall	L Ctr		I	Concrete	Grey	0.0	QM
010	D	Wall	L Ctr		I	Concrete	Grey	0.2	QM
013	D	Door	Ctr	Rgt casing	I	Metal	Brown	0.8	QM
011	D	Column	Ctr	L column	I	Metal	Grey	0.1	QM
012	D	Column	Ctr	L column	I	Wood	Wood	0.0	QM
Interior Room 002 Rm #203									
015	A	Wall	L Ctr		I	Concrete	White	0.3	QM
020	A	Door	Ctr	Lft casing	I	Metal	Brown	-0.1	QM
019	A	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM
016	B	Wall	L Ctr		I	Concrete	White	0.0	QM
017	C	Wall	L Ctr		I	Concrete	White	0.3	QM
018	D	Wall	L Ctr		I	Concrete	White	0.4	QM
Interior Room 003 Rm #204									
021	A	Wall	L Ctr		I	Concrete	Grey	0.1	QM
028	A	Window	Ctr	Lft casing	I	Metal	Brown	-0.3	QM
022	B	Wall	L Ctr		I	Concrete	Grey	0.4	QM
023	C	Wall	L Ctr		I	Concrete	Grey	0.2	QM
026	C	Door	Ctr	Lft casing	I	Metal	Brown	0.3	QM
025	C	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM
027	C	Conduit	Ctr		I	Metal	Grey	-0.2	QM
024	D	Wall	L Ctr		I	Concrete	Grey	0.3	QM
Interior Room 004 Rm #205									
029	A	Wall	L Ctr		I	Concrete	Grey	-0.1	QM

034	A	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
033	A	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
030	B	Wall	L Ctr		I	Concrete	Grey	0.3	QM
031	C	Wall	L Ctr		I	Wood	Grey	-0.1	QM
032	D	Wall	L Ctr		I	Wood	Grey	0.0	QM

Interior Room 005 Rm #207

035	A	Wall	L Ctr		I	Concrete	Grey	0.2	QM
040	A	Door	Ctr	Lft casing	I	Metal	Brown	-0.1	QM
039	A	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM
036	B	Wall	L Ctr		I	Wood	Grey	-0.1	QM
037	C	Wall	L Ctr		I	Wood	Grey	-0.1	QM
038	D	Wall	L Ctr		I	Concrete	Grey	0.3	QM

Interior Room 006 Rm #219

041	A	Wall	L Ctr		I	Wood	Grey	-0.2	QM
042	B	Wall	L Ctr		I	Wood	Grey	-0.1	QM
043	C	Wall	L Ctr		I	Concrete	Grey	0.2	QM
046	C	Door	Ctr	Lft casing	I	Metal	Brown	0.3	QM
045	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
044	D	Wall	L Ctr		I	Concrete	Grey	0.2	QM
048	D	Door	Ctr	Lft casing	I	Metal	Brown	0.2	QM
047	D	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM

Interior Room 007 Rm #225

049	A	Wall	L Ctr		I	Wood	Grey	-0.2	QM
058	A	Wall	L Ctr		I	Concrete	White	0.1	QM
066	A	Conduit	Ctr		I	Metal	White	0.1	QM
050	B	Wall	L Ctr		I	Concrete	Grey	0.2	QM
059	B	Wall	L Ctr		I	Concrete	White	0.2	QM
055	B	Door	Ctr	Lft casing	I	Metal	Brown	0.2	QM
063	B	Door	Ctr	Lft casing	I	Metal	Brown	0.2	QM
054	B	Door	Ctr	L Ctr	I	Wood	Wood	-0.3	QM
062	B	Door	Ctr	L Ctr	I	Metal	Brown	0.0	QM
051	C	Wall	L Ctr		I	Concrete	Grey	0.2	QM
052	C	Wall	L Ctr		I	Wood	Grey	-0.2	QM
060	C	Wall	L Ctr		I	Concrete	White	0.3	QM
057	C	Door	Ctr	Lft casing	I	Wood	Wood	-0.3	QM
056	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.2	QM
053	D	Wall	L Ctr		I	Wood	Grey	-0.1	QM
061	D	Wall	L Ctr		I	Concrete	White	0.0	QM
065	D	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
064	D	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM

Interior Room 009 Rm #206

067	A	Wall	L Ctr		I	Concrete	White	0.3	QM
073	A	Window	Ctr	Lft casing	I	Metal	Brown	-0.4	QM
068	B	Wall	L Ctr		I	Concrete	White	0.2	QM
069	C	Wall	L Ctr		I	Concrete	White	0.3	QM
072	C	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
071	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
070	D	Wall	L Ctr		I	Concrete	White	0.2	QM

Interior Room 010 Rm #208

074	A	Wall	L Ctr		I	Concrete	Grey	0.0	QM
082	A	Window	Ctr	Lft casing	I	Metal	Brown	-0.4	QM
075	B	Wall	L Ctr		I	Concrete	Grey	0.0	QM
076	C	Wall	L Ctr		I	Concrete	Grey	0.1	QM
079	C	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
078	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.2	QM
077	D	Wall	L Ctr		I	Sheetrtock	Grey	0.0	QM

081	D	Door	Ctr	Lft casing	I	Metal	Brown	0.0	QM
080	D	Door	Ctr	L Ctr	I	Wood	Wood	-0.3	QM

Interior Room 011 Rm #208A

083	A	Wall	L Ctr		I	Sheetrtock	Grey	0.0	QM
084	B	Wall	L Ctr		I	Sheetrtock	Grey	-0.1	QM
088	B	Door	Ctr	Lft casing	I	Metal	Brown	0.0	QM
085	C	Wall	L Ctr		I	Concrete	Grey	0.3	QM
086	D	Wall	L Ctr		I	Sheetrtock	Grey	0.0	QM
087	D	Door	Ctr	Lft casing	I	Metal	Brown	-0.1	QM

Interior Room 012 Rm #221

089	A	Wall	L Ctr		I	Concrete	White	0.3	QM
093	A	Floor			I	Concrete	Grey	-0.1	QM
095	A	Door	Ctr	Lft casing	I	Metal	Brown	0.0	QM
094	A	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
090	B	Wall	L Ctr		I	Concrete	White	0.2	QM
091	C	Wall	L Ctr		I	Concrete	White	0.3	QM
092	D	Wall	L Ctr		I	Concrete	White	0.2	QM

Interior Room 013 Rm #210

096	A	Wall	L Ctr		I	Concrete	Grey	0.3	QM
101	A	Window	Ctr	Lft casing	I	Metal	Brown	-0.3	QM
097	B	Wall	L Ctr		I	Sheetrtock	Grey	-0.1	QM
104	B	Door	Ctr	Lft casing	I	Metal	Brown	-0.1	QM
103	B	Door	Ctr	L Ctr	I	Wood	Wood	-0.3	QM
098	C	Wall	L Ctr		I	Concrete	Grey	0.1	QM
102	C	Window	Ctr	Lft casing	I	Metal	Brown	-0.5	QM
106	C	Door	Ctr	Lft casing	I	Metal	Brown	0.2	QM
105	C	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM
099	D	Wall	L Ctr		I	Concrete	Grey	0.0	QM
100	D	Wall	L Ctr		I	Sheetrtock	Grey	-0.2	QM

Interior Room 014 Rm #210A

107	A	Wall	L Ctr		I	Concrete	Grey	0.2	QM
113	A	Window	Ctr	Lft casing	I	Metal	Brown	-0.3	QM
108	B	Wall	L Ctr		I	Sheetrtock	Grey	-0.1	QM
109	C	Wall	L Ctr		I	Sheetrtock	Grey	-0.1	QM
110	D	Wall	L Ctr		I	Sheetrtock	Grey	-0.1	QM
112	D	Door	Ctr	Lft casing	I	Metal	Brown	-0.1	QM
111	D	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM

Interior Room 015 Rm #210B

114	A	Wall	L Ctr		I	Concrete	White	0.1	QM
115	B	Wall	L Ctr		I	Sheetrtock	White	0.0	QM
116	C	Wall	L Ctr		I	Sheetrtock	White	0.1	QM
119	C	Door	Ctr	Lft casing	I	Metal	Brown	-0.2	QM
118	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.2	QM
117	D	Wall	L Ctr		I	Concrete	White	0.1	QM

Interior Room 016 Rm #215

120	A	Wall	L Ctr		I	Sheetrtock	Tan	-0.1	QM
121	B	Wall	L Ctr		I	Sheetrtock	Tan	0.0	QM
127	B	Crown Mldg	Ctr		I	Wood	Wood	-0.1	QM
122	C	Wall	L Ctr		I	Sheetrtock	Tan	-0.1	QM
129	C	Door	Ctr	Lft casing	I	Wood	Wood	0.0	QM
130	C	Door	Ctr	Lft jamb	I	Wood	Brown	0.8	QM
128	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
124	C	Chair Rail	Ctr		I	Wood	Lt Brown	-0.2	QM
123	D	Wall	L Ctr		I	Sheetrtock	Tan	-0.1	QM
125	D	Wanescott	Ctr		I	Wood	Lt Brown	-0.1	QM

126	D	Baseboard	Ctr		I	Wood	Wood	-0.1	QM
Interior Room 017 Rm #212									
131	A	Wall	L Ctr		I	Wood	Wood	-0.2	QM
132	B	Wall	L Ctr		I	Wood	Wood	-0.1	QM
138	B	Door	Ctr	Lft casing	I	Wood	Wood	0.0	QM
139	B	Door	Ctr	Lft jamb	I	Metal	Brown	0.8	QM
137	B	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
133	C	Wall	L Ctr		I	Wood	Wood	-0.1	QM
135	C	Window	Ctr	Sill	I	Wood	Wood	0.3	QM
136	C	Window	Ctr	Lft casing	I	Wood	Wood	-0.1	QM
140	C	Baseboard	Ctr		I	Metal	Brown	-0.1	QM
134	D	Wall	L Ctr		I	Wood	Wood	0.0	QM
Interior Room 018 Rm #213									
144	A	Door	Ctr	Lft jamb	I	Metal	Brown	0.8	QM
143	A	Door	Ctr	L Ctr	I	Wood	Wood	-0.2	QM
141	C	Window	Ctr	Sill	I	Wood	Wood	0.3	QM
142	C	Window	Ctr	Lft casing	I	Metal	Brown	-0.3	QM
145	C	Baseboard	Ctr		I	Metal	Brown	0.0	QM
Interior Room 019 Rm #214									
146	A	Wall	L Ctr		I	Sheetrtock	White	-0.2	QM
147	C	Window	Ctr	Sill	I	Wood	Wood	0.4	QM
148	C	Window	Ctr	Lft casing	I	Metal	Brown	-0.1	QM
151	C	Baseboard	Ctr		I	Metal	Brown	-0.1	QM
150	D	Door	Ctr	Lft jamb	I	Metal	Brown	-0.1	QM
149	D	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM
Interior Room 020 Rm #216									
152	A	Wall	L Ctr		I	Sheetrtock	White	0.0	QM
153	B	Wall	L Ctr		I	Concrete	White	0.2	QM
154	C	Wall	L Ctr		I	Concrete	White	0.4	QM
160	C	Door	Ctr	Lft casing	I	Metal	Brown	0.3	QM
159	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
155	D	Wall	L Ctr		I	Sheetrtock	White	0.0	QM
158	D	Closet	Ctr	Door	I	Wood	White	-0.1	QM
157	D	Closet	Ctr	Shelf Sup.	I	Wood	White	-0.1	QM
156	D	Closet	Ctr	Shelf	I	Wood	Yellow	-0.3	QM
Interior Room 021 Rm #216A									
161	A	Wall	L Ctr		I	Sheetrtock	White	-0.1	QM
162	B	Wall	L Ctr		I	Concrete	White	0.2	QM
163	C	Wall	L Ctr		I	Sheetrtock	White	0.0	QM
164	D	Wall	L Ctr		I	Sheetrtock	White	0.0	QM
166	D	Closet	Ctr	Shelf Sup.	I	Wood	White	-0.2	QM
165	D	Closet	Ctr	Shelf	I	Wood	Yellow	-0.2	QM
Interior Room 022 Rm #209									
167	A	Wall	L Ctr		I	Concrete	Grey	0.4	QM
172	A	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
171	A	Door	Ctr	L Ctr	I	Wood	Wood	0.0	QM
168	B	Wall	L Ctr		I	Concrete	Grey	0.2	QM
169	C	Wall	L Ctr		I	Sheetrtock	Grey	-0.1	QM
170	D	Wall	L Ctr		I	Sheetrtock	Grey	0.0	QM
Interior Room 023 Rm #222									
174	A	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
173	A	Door	Ctr	L Ctr	I	Wood	Wood	-0.3	QM
175	C	Steel Beam	Ctr		I	Metal	Red	0.0	QM

Interior Room 024 Rm #223									
176	A	Wall	L Ctr		I	Concrete	White	0.3	QM
182	A	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
181	A	Door	Ctr	L Ctr	I	Wood	Wood	-0.3	QM
177	B	Wall	L Ctr		I	Concrete	White	0.4	QM
180	B	Conduit	Ctr		I	Metal	White	0.0	QM
178	C	Wall	L Ctr		I	Sheetrtock	White	-0.2	QM
179	D	Wall	L Ctr		I	Concrete	White	0.4	QM
Interior Room 025 Rm #223A									
183	A	Wall	L Ctr		I	Sheetrtock	White	-0.1	QM
184	B	Wall	L Ctr		I	Concrete	White	0.2	QM
187	B	Floor			I	Concrete	Grey	0.2	QM
188	B	Motor House	Ctr		I	Metal	Red	-0.1	QM
185	C	Wall	L Ctr		I	Concrete	White	0.0	QM
186	D	Wall	L Ctr		I	Concrete	White	0.1	QM
Interior Room 026 Rm #217									
189	A	Wall	L Ctr		I	Concrete	White	0.2	QM
193	A	Floor			I	Concrete	Grey	0.0	QM
197	A	Door	Ctr	Lft casing	I	Metal	Brown	0.0	QM
196	A	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
190	B	Wall	L Ctr		I	Concrete	White	0.3	QM
195	B	Closet	Ctr	Shelf Sup.	I	Metal	White	0.1	QM
194	B	Closet	Ctr	Shelf	I	Wood	White	-0.2	QM
191	C	Wall	L Ctr		I	Concrete	White	0.3	QM
192	D	Wall	L Ctr		I	Concrete	White	0.3	QM
Interior Room 027 Rm #218									
198	A	Wall	L Ctr		I	Concrete	White	0.3	QM
205	A	Door	Ctr	Lft casing	I	Metal	Brown	0.0	QM
204	A	Door	Ctr	L Ctr	I	Wood	Wood	-0.2	QM
203	A	Wall Tile	Ctr		I	Ceramic	Grey	0.2	QM
199	B	Wall	L Ctr		I	Concrete	White	0.3	QM
200	C	Wall	L Ctr		I	Concrete	White	0.2	QM
202	C	Wall Tile	Ctr		I	Ceramic	Grey	0.3	QM
201	D	Wall	L Ctr		I	Concrete	White	0.2	QM
Interior Room 028 Rm #220									
206	A	Wall	L Ctr		I	Concrete	White	0.2	QM
212	A	Door	Ctr	Lft casing	I	Metal	Brown	0.0	QM
211	A	Door	Ctr	L Ctr	I	Wood	Wood	-0.3	QM
207	B	Wall	L Ctr		I	Concrete	White	0.3	QM
210	B	Wall Tile	Ctr		I	Ceramic	Grey	0.3	QM
208	C	Wall	L Ctr		I	Concrete	White	0.1	QM
209	D	Wall	L Ctr		I	Concrete	White	0.3	QM
Interior Room 029 Rm #211									
219	A	Wall	L Ctr		I	Concrete	White	0.1	QM
224	A	Door	Ctr	Lft casing	I	Metal	Brown	-0.1	QM
223	A	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
220	B	Wall	L Ctr		I	Sheetrtock	White	0.0	QM
221	C	Wall	L Ctr		I	Sheetrtock	White	0.0	QM
222	D	Wall	L Ctr		I	Sheetrtock	White	0.0	QM
Interior Room 030 Hall A									
225	A	Wall	L Ctr		I	Concrete	White	0.3	QM
228	A	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
227	A	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
231	A	SteelColumn	Ctr		I	Metal	White	0.0	QM
226	C	Wall	L Ctr		I	Concrete	White	0.4	QM

230	C	Door	Ctr	Lft casing	I	Metal	Brown	-0.1	QM
229	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.2	QM
Interior Room 031 Hall B									
232	B	Wall	L Ctr		I	Concrete	White	0.2	QM
235	B	Door	Ctr	Lft casing	I	Metal	Brown	0.3	QM
234	B	Door	Ctr	L Ctr	I	Wood	Wood	-0.2	QM
233	D	Wall	L Ctr		I	Concrete	White	0.3	QM
Interior Room 032 Hall C									
236	A	Wall	L Ctr		I	Concrete	White	0.2	QM
237	C	Wall	L Ctr		I	Concrete	White	0.0	QM
239	C	Door	Ctr	Lft casing	I	Metal	Brown	-0.1	QM
238	C	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
Interior Room 033 Hall D									
240	B	Wall	L Ctr		I	Sheetrtock	White	0.0	QM
241	D	Wall	L Ctr		I	Concrete	White	0.2	QM
246	D	Window	Ctr	Lft casing	I	Metal	Brown	-0.3	QM
243	D	Door	Ctr	Lft casing	I	Metal	Brown	-0.6	QM
245	D	Door	Ctr	Lft casing	I	Metal	Brown	0.0	QM
242	D	Door	Ctr	L Ctr	I	Metal	Brown	-0.4	QM
244	D	Door	Ctr	L Ctr	I	Metal	Brown	-0.1	QM
Interior Room 034 Rm #202									
247	A	Wall	L Ctr		I	Concrete	Blue	0.3	QM
248	B	Wall	L Ctr		I	Concrete	Blue	0.4	QM
251	B	Window	Ctr	Lft casing	I	Metal	Brown	-0.3	QM
249	C	Wall	L Ctr		I	Concrete	Blue	0.3	QM
250	D	Wall	L Ctr		I	Concrete	Blue	0.3	QM
253	D	Door	Ctr	Lft casing	I	Metal	Brown	0.8	QM
252	D	Door	Ctr	L Ctr	I	Wood	Wood	-0.1	QM
254	D	Column	Ctr	L column	I	Metal	Blue	0.0	QM
Interior Room 035 Plenum									
255	C	Steel Beam	Ctr		I	Metal	White	0.1	QM
256	C	Pan Decking	Ctr		I	Metal	White	-0.1	QM
Calibration Readings									
001								0.9	TC
002								0.8	TC
003								0.9	TC
004								0.1	TC
005								0.0	TC
006								0.0	TC
213								0.9	TC
214								1.0	TC
215								0.8	TC
216								0.0	TC
217								0.0	TC
218								0.0	TC
267								0.8	TC
268								0.9	TC
269								0.8	TC
270								-0.1	TC
271								0.0	TC
272								-0.1	TC

---- End of Readings ----

THE PROTEC LPA-1 XRF LEAD PAINT SPECTRUM ANALYZER

SEQUENTIAL REPORT OF LEAD PAINT INSPECTION FOR: Garrett College Building 200

DISTRIBUTION REPORT OF LEAD PAINT INSPECTION FOR:

Inspection Date: 11/10/16
Report Date: 11/22/2016
Abatement Level: 0.8
Report No. S#01677 - 11/10/16 09:14
Total Reading Sets: 254
Job Started: 11/10/16 09:14
Job Finished: 11/10/16 15:27

Structure	Total	Structure Distribution Positive		Negative		Inconclusive	
Baseboard	4	0	<0%>	4	<100%>	0	<0%>
Chair Rail	1	0	<0%>	1	<100%>	0	<0%>
Closet Door	1	0	<0%>	1	<100%>	0	<0%>
Closet Shelf	3	0	<0%>	3	<100%>	0	<0%>
Closet Shelf Sup.	3	0	<0%>	3	<100%>	0	<0%>
Column L column	3	0	<0%>	3	<100%>	0	<0%>
Conduit	3	0	<0%>	3	<100%>	0	<0%>
Crown Mldg	1	0	<0%>	1	<100%>	0	<0%>
Door L Ctr	40	0	<0%>	40	<100%>	0	<0%>
Door Lft casing	40	9	<23%>	31	<78%>	0	<0%>
Door Lft jamb	4	3	<75%>	1	<25%>	0	<0%>
Door Rgt casing	1	1	<100%>	0	<0%>	0	<0%>
Floor	3	0	<0%>	3	<100%>	0	<0%>
Motor House	1	0	<0%>	1	<100%>	0	<0%>
Pan Decking	1	0	<0%>	1	<100%>	0	<0%>
Steel Beam	2	0	<0%>	2	<100%>	0	<0%>
SteelColumn	1	0	<0%>	1	<100%>	0	<0%>
Wall	119	0	<0%>	119	<100%>	0	<0%>
Wall Tile	3	0	<0%>	3	<100%>	0	<0%>
Wanescott	1	0	<0%>	1	<100%>	0	<0%>
Window Lft casing	16	0	<0%>	16	<100%>	0	<0%>
Window Sill	3	0	<0%>	3	<100%>	0	<0%>
Inspection Totals:	254	13	<5%>	241	<95%>	0	<0%>

APPENDIX F

SANAIR PAINT CHIP SAMPLING LABORATORY DATA

&

CHAIN OF CUSTODY

SanAir Technologies Laboratory

Analysis Report

prepared for

Boggs Environmental Consultants, Inc

Report Date: 11/18/2016
Project Name: Garrett Col.
Project #: MD16295
SanAir ID#: 16041625

NVLAP LAB CODE 200870-0

AIHA LAP, LLC ACCREDITED LABORATORY ENVIRONMENTAL LEAD ENVIRONMENTAL MICROBIOLOGY ISO/IEC 17025:2005 LAB # 162952

Virginia SBE Certification # 652931

Texas Licensed Mold Analysis Laboratory License # LAB0166

SanAir Technologies Laboratory

804.897.1177 www.sanair.com

SanAir Technologies Laboratory, Inc.
1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

Boggs Environmental Consultants, Inc
200 West Main Street
Middletown, MD 21769

November 18, 2016

SanAir ID # 16041625
Project Name: Garrett Col.
Project Number: MD16295

Dear BEC,

We at SanAir would like to thank you for the work you recently submitted. The 3 sample(s) were received on Tuesday, November 15, 2016 via FedEx. The final report(s) is enclosed for the following sample(s): GC200PbC-1, GC200PbC-2, GC200PbC-3.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

SanAir Technologies Laboratory

Final Report Includes:
- Cover Letter
- Analysis Pages
- Disclaimers and Additional Information

sample conditions:
3 sample(s) in Good condition

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

SanAir ID Number

16041625

FINAL REPORT

Name: Boggs Environmental Consultants, Inc
Address: 200 West Main Street
Middletown, MD 21769

Project Number: MD16295
P.O. Number:
Project Name: Garrett Col.

Collected Date: 11/11/2016
Received Date: 11/15/2016 10:40:00 AM
Report Date: 11/18/2016 8:14:01 AM
Analyst: Peterson, Chelsea

Lead Paint Analysis

Test Method: SW846/3050B/7000B
NOTE: µg/g=ppm

Sample	Description	µg Pb in Sample	Sample Size (grams)	Calculated RL	Sample Result	Sample Result
16041625-001	GC200PbC-1 / Rm #216 Brown Door Casing Metal	< 10	0.1055	94.8	<94.8 µg/g (ppm)	<0.0095 % By Weight

Test Method: SW846/3050B/7000B
NOTE: µg/g=ppm

Sample	Description	µg Pb in Sample	Sample Size (grams)	Calculated RL	Sample Result	Sample Result
16041625-002	GC200PbC-2 / Rm #201 White CMU Block Wall Concrete	< 10	0.1028	97.3	<97.3 µg/g (ppm)	<0.0097 % By Weight

Test Method: SW846/3050B/7000B
NOTE: µg/g=ppm

Sample	Description	µg Pb in Sample	Sample Size (grams)	Calculated RL	Sample Result	Sample Result
16041625-003	GC200PbC-3 / Rm #219 White Structural Steel Metal	129	0.1116	89.6	1156.6 µg/g (ppm)	0.1157 % By Weight

Method Reporting Limit <10 µg/0.1 g paint
SanAir Technologies Laboratory, Inc participates in the AIHA ELPAT for environmental Lead.
AIHA Lab Id: 162952

Certification

Signature: C. Peterson Reviewed: S. Thomas

Date: 11/15/2016 Date: 11/16/2016

SanAir Technologies Laboratory, Inc.

1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

SanAir ID Number

16041625

FINAL REPORT

Name: Boggs Environmental Consultants, Inc
Address: 200 West Main Street
Middletown, MD 21769

Project Number: MD16295
P.O. Number:
Project Name: Garrett Col.

Collected Date: 11/11/2016
Received Date: 11/15/2016 10:40:00 AM
Report Date: 11/18/2016 8:14:01 AM
Peterson, Chelsea

ORGANISM DESCRIPTIONS

The descriptions of the organisms presented are derived from various reference materials. The laboratory report is based on the data derived from the samples submitted and no interpretation of the data, as to potential, or actual, health effects resulting from exposure to the numbers of organisms found, can be made by laboratory personnel. Any interpretation of the potential health effects of the presence of this organism must be made by qualified professional personnel with first hand knowledge of the sample site, and the problems associated with that site.

SanAir Technologies Laboratory
1551 Oakbridge Dr STE B
Powhatan, VA 23139
804.897.1177 / 888.895.1177
Fax 804.897.0070
sanair.com

Boggs Environmental Consultants, Inc

Metals & Lead Chain of Custody

SanAir ID Number: 16041625

Company: Boggs Environmental Consultants	Project #: MD16295	Phone #:
Address: 200 West Main Street	Project Name: Garrett Col.	Phone #: 301-694-5687
City, St., Zip: Middletown, MD 21769	Date Collected: November 11, 2016	Fax #:
Samples Collected By: Andy Hanson	P.O. Number:	Email: 301-694-9799
Account #:	U.S. State Collected in:	Email: allhands@boggsenvironmental.com

Matrix Types

Metals Analysis Types

☐ Air (ug/m^3)	Total Concentration of Lead ☐	☐ ICP-total concentration of metals (please list metals):
☐ Wipe (ug/ft^2)	Total Concentration of RCRA 8 Metals ☐	
☐ Paint ☐ Soil ☐ Bulk (ug/g or ppm)	TCLP for Lead ☐	
☐ Other:	TCLP for RCRA 8 Metals ☐	

Turn Around Time	Same Day ☐	1 Day ☐	2 days ☐	3 Days ☐
	☐ Standard (5 day)	☐ Full TCLP (10d)		

Sample #	Collection Date & Time	Sample Identification/Location	Flow Rate	Start Time	Stop Time	Volume (L) Area (Sq ft)
		Please attached BEC Sampling Sheet				

Special Instructions

Relinquished by	Date	Time	Received by	Date	Time
	11/14/16	1400	MC	NOV 15 2016	10:40AM

Unless scheduled, the turnaround time for all samples received after 3 pm will begin at 8 am the next business morning. Weekend or Holiday work must be scheduled ahead of time and is charged at 150% of the Rush TAT rate. There is a minimum charge of $100 for weekend work. A courier charge will be applied for same day and one-day turnaround times for offsite work.

SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

Page ___ of ____

1604 1625

BOGGS
ENVIRONMENTAL CONSULTANTS
Middletown, MD ~ Morgantown, WV
Corporate Office: 200 W Main Street, Middletown, MD 21769
Tel: (301) 694-5687 ~ Fax: (301) 694-9799

LEAD PAINT CHIP SAMPLING LOG

Date: 11-10-16 BEC Project No: MD16285

Project Manager: RR

Lead Inspector/Risk Assessor: Andrew Hearse

Project Location: Garrett College Bldg 200

Sample Number	Room #/Name	Color/Description	Building Component
GC200P6C-1	Rm # 216	Brown Door Casing	Metal
GC200P6C-2	Rm # 201	White CMU Block Wall	Concrete
GC200P6C-3	Rm # 219	white Structural Steel	Metal

Lead Inspector/Risk Assessor

11-10-16
Date

ENVIRONMENTAL SCIENCE, ENGINEERING & INDUSTRIAL HYGIENE SERVICES

MC NOV 15 2016 10:40AM

ASBESTOS-CONTAINING MATERIALS TESTING
(US EPA AHERA Level)

GARRETT COLLEGE
BUILDING 200

687 Moser Road,
McHenry, Maryland 21541

Prepared for

OFFICE OF FACILITIES MANAGEMENT

687 Moser Road,
McHenry, Maryland 21541

Attention: Ms. Kathy Farley Meagher, P.E.
Director of Facilities

BEC Project #MD16295

Fieldwork Conducted: November 10, 2016

Report Date: November 29, 2016

Prepared by

BOGGS ENVIRONMENTAL CONSULTANTS
Middletown MD ~ Morgantown, WV
Corporate Office: 200 W Main Street, Middletown, MD 21769
Tel: (301) 694-5687 ~ Fax: (301) 694-9799

ENVIRONMENTAL SCIENCE, ENGINEERING & INDUSTRIAL HYGIENE SERVICES

ASBESTOS-CONTAINING MATERIALS SURVEY
(US EPA AHERA Level)

GARRETT COLLEGE
BUILDING 200

687 Moser Road,
McHenry, Maryland 21541

TABLE OF CONTENTS

BOGGS ENVIRONMENTAL CONSULTANTS, INC.

Fieldwork Conducted and Report Prepared By:

Derrick A. Klein
Environmental Specialist
State of Maryland Asbestos Inspector (#16006101)

SECTION I: SITE DESCRIPTION

Project Site:	**Garrett College Building 200** McHenry, Maryland 21541
Requester Name:	Ms. Kathy Farley Meagher, P.E.
Requester Address:	**Office of Facilities Management** 687 Moser Road McHenry, Maryland 21541

Subject Site Description & Scope of Work:

The subject site is located at 687 Moser Road, McHenry, Maryland 21541, and is single story building comprised of a typical layout. The structure consists of office spaces, classrooms, bathrooms, and common areas.

BEC received authorization from M. Kathy Farley Meagher, P.E. of Garrett College, to provide support services to determine the presence of asbestos containing building materials prior to renovation activities. Ms. Kathy Farley Meagher requested the asbestos inspection to ensure in compliance with United States Environmental Protection Agency's (US EPA) and State of Maryland, regulations, prior to disturbance of building construction materials anticipated (scheduled) to occur during renovation activities.

SECTION II: ASBESTOS-CONTAINING MATERIALS SURVEY

BOGGS ENVIRONMENTAL CONSULTANTS, INC. (BEC) conducted an asbestos-containing building construction materials (ACBMs) survey at the subject site. The asbestos inspection was conducted in accordance with the US EPA "Asbestos Hazard Emergency Response Act (AHERA) of 1986" (40 CFR Part 763) and the "Asbestos School Hazard Abatement Reauthorization Act (ASHARA) of 1992" (40 CFR Part 763, Appendix C-E, Model Accreditation Plan).

BEC staff member, Derrick A. Klein, conducted preliminary field walk inspections for the purpose of developing an inventory of suspect ACBMs. Subsequently, Mr. Klein randomly collected multiple bulk samples of suspect ACBMs observed at the subject sites, on November 10, 2016.

FIELD SAMPLING

BEC advises, based upon current US EPA asbestos hazard control regulations, the minimum number of samples necessary to definitively determine the presence (or absence) of ACBMs is dependent on the nature and quantity of the suspect building construction material. Additionally, the US EPA has established a standardized schedule for bulk sample collection of suspect ACBMs based upon homogeneous areas. Homogeneous areas are defined as "…building construction materials that are similar in color, consistency, texture, and appearance of similar application/installation time period".

BEC advises, based upon the November 10, 2016 onsite visual inspection and bulk sampling activities, fifty (50) samples of the suspect ACBMs were collected, which upon laboratory analysis, revealed a total of seventy-eight (78) individual PLM/DS analyses were required due to multiple layered bulk samples.

BEC advises, based upon US EPA asbestos analytical regulations, the laboratory analyst has the sole discretion/responsibility in determining whether the bulk sample is composed of one or multiple layers.

SECTION II: ASBESTOS-CONTAINING MATERIALS TESTING

MATERIAL CLASSIFICATION

Asbestos-containing materials (ACMs) are any building construction materials containing greater than one percent (>1%) asbestos. Friable ACM is any material, which can be broken, crumbled, pulverized, or reduced to powder under hand pressure; conversely, non-friable ACMs are materials incapable of reduction to powder via hand pressure.

In accordance with Federal asbestos hazard control regulations, bulk sampling is not required to designate (i.e., presume and treat) a construction material suspected to contain asbestos as ACM, should a duly trained and accredited asbestos inspector suspect the material is an asbestos-containing material (ACM).

However, for a suspect material to be classified as non-ACM, a minimum number of samples must be collected and analyzed. The following table summarizes the minimum number of samples for collection and analysis required to rebut designation of the material as ACM. As a reminder, a homogeneous material is a material that appears to be uniform when properties such as age, color, and texture are compared.

US EPA MINIMUM NUMBER OF BULK SAMPLES (COLLECTION & ANALYSIS) TO REBUT ACM DESIGNATION		
Thermal System Insulation (TSI): Thermal System Insulation includes materials such as boiler insulation, pipe insulation, pipe fittings, and duct work insulation.		
At least three (3) samples from each homogeneous material of TSI.	At least one (1) sample from patched TSI that is less than six square feet.	For pipe fittings, in a manner sufficient to determine if the material is asbestos-containing.
Surfacing Material: Surfacing material includes materials such as spray-applied fireproofing, troweled-on plasters or ceiling textures.		
At least three samples from homogeneous materials of 1000 square feet or less;	At least five samples from homogeneous materials of greater than 1000 square feet but less than 5000 square feet;	At least seven samples from homogeneous materials of greater than 5000 square feet.
Miscellaneous Material and Non-friable Suspect ACM: Miscellaneous materials include all materials that are not *TSI* or *Surfacing Materials*, such as vinyl floor tile, acoustical ceiling tile, vinyl sheet goods (linoleum), roofing materials, *et cetera*.		
For each homogeneous material, a sufficient number of samples are required to be collected and analyzed to determine if the material is ACM.	Samples are not required to be collected from homogeneous materials, of which the trained accredited asbestos inspector has determined to be non-asbestos-containing material, such as fiberglass or rubber.	

LABORATORY ANALYSIS

Pursuant to the field screen and bulk sample collection, BEC submitted the bulk samples to SanAir Technologies Laboratory, (SanAir) of Powhatan, Virginia for asbestos content analysis. SanAir is accredited by the American Industrial Hygiene Association and the National Institute of Standards and Technology (NIST)-National Voluntary Laboratory Accreditation Program as proficient in the analysis of asbestos in bulk samples.

SanAir performed Polarized Light Microscopy with Dispersion Staining (PLM/DS) of the bulk samples in accordance with the "***Method for the Determination of Asbestos in Bulk Building Materials***" (U.S.E.P.A. Method 600/R-93/116, July 1993).

Asbestos-containing materials are any building construction materials containing greater than one percent (>1%) asbestos. Friable asbestos is asbestos-containing material, which can be broken, crumbled, pulverized, or reduced to powder under hand pressure.

SECTION II: ASBESTOS-CONTAINING MATERIALS TESTING

BEC advises PLM/DS analysis revealed asbestos was **NOT** detected in any of the suspect ACBM bulk samples collected and submitted to SanAir. BEC provides the results of the PLM/DS analyses in **Table A - Asbestos Testing Results.**

TABLE A - ASBESTOS SURVEY TESTING RESULTS

HA #	BEC Sample #	Material	Sampling Location	Building Construction Material	Asbestos (%)
1	GC200-1	M	Room 216 South Wall	Gypsum Board Sheeting	None Detected
1	GC200-2	M	Room 210B North Wall	Gypsum Board Sheeting	None Detected
				White Texture	None Detected
1	GC200-3	M	Room 208 East Wall	Gypsum Board Sheeting	None Detected
				White Texture	None Detected
2	GC200-4	M	Room 216 South Wall	Joint Finishing Compound	None Detected
2	GC200-5	M	Room 210B North Wall	Joint Finishing Compound	None Detected
2	GC200-6	M	Room 208 East Wall	Joint Finishing Compound	None Detected
3	GC200-7	M	Room 216 North Wall	4” Gray Vinyl Cove Base	None Detected
				Associated Tan Mastic	None Detected
3	GC200-8	M	North Hallway	4” Gray Vinyl Cove Base	None Detected
				Associated Tan Mastic	None Detected
5	GC200-9	M	Room 201 East Wall	4” Brown Vinyl Cove Base	None Detected
				Associated Brown Mastic	None Detected
5	GC200-10	M	Room 202 East Wall	4” Brown Vinyl Cove Base	None Detected
				Associated Brown Mastic	None Detected
7	GC200-11	M	Room 222 Ceiling	2’ x 4’ Fissure & Pinhole Acoustical Ceiling Tile	None Detected
7	GC200-12	M	Room 216 Ceiling	2’ x 4’ Fissure & Pinhole Acoustical Ceiling Tile	None Detected
7	GC200-13	M	South Hallway Ceiling	2’ x 4’ Fissure & Pinhole Acoustical Ceiling Tile	None Detected
8	GC200-14	M	West Hallway – North	12” x 12” Beige w/Tan & Gray Specks Vinyl Floor Tile	None Detected
				Associated Yellow Mastic	None Detected
8	GC200-15	M	West Hallway - South	12” x 12” Beige w/Tan & Gray Specks Vinyl Floor Tile	None Detected
				Associated Yellow Mastic	None Detected
9	GC200-16	M	Room 224 East Floor	12” x 12” Off-White w/Tan & Gray Specks Vinyl Floor Tile	None Detected
				Associated Yellow Mastic	None Detected
9	GC200-17	M	Room 201 South Floor	12” x 12” Off-White w/Tan & Gray Specks Vinyl Floor Tile	None Detected
				Associated Yellow Mastic	None Detected
10	GC200-18	M	North Hallway West Floor	12” x 12” Tan w/Brown Streaks Vinyl Floor Tile	None Detected
				Associated Yellow Mastic	None Detected
10	GC200-19	M	North Hallway East Floor	12” x 12” Tan w/Brown Streaks Vinyl Floor Tile	None Detected
				Associated Yellow Mastic	None Detected
11	GC200-20	M	South Hallway East Floor	12” x 12” Gray w/Gray & Green Specks Vinyl Floor Tile	None Detected
				Associated Yellow Mastic	None Detected

TABLE A - ASBESTOS SURVEY TESTING RESULTS

HA #	BEC Sample #	Material	Sampling Location	Building Construction Material	Asbestos (%)
11	GC200-21	M	South Hallway West Floor	12” x 12” Gray w/Gray & Green Specks Vinyl Floor Tile	None Detected
12	GC200-22	M	Room 205 South Floor	12” x 12” Off-White w/Brown Streaks Vinyl Floor Tile	None Detected
12	GC200-23	M	Room 219 North Floor	12” x 12” Off-White w/Brown Streaks Vinyl Floor Tile	None Detected
				Associated Yellow Mastic	None Detected
13	GC200-24	M	Room 216 North Floor	Yellow Carpet Mastic	None Detected
13	GC200-25	M	Room 203 South Floor	Yellow Carpet Mastic	None Detected
14	GC200-26	M	Room 222 South Door	Brown Masonry Door Joint Sealant	None Detected
14	GC200-27	M	Room 224 West Door	Brown Masonry Door Joint Sealant	None Detected
15	GC200-28	M	Room 204 South Window	Black Window Masonry Joint Sealant	None Detected
15	GC200-29	M	Room 201 West Window	Black Window Masonry Joint Sealant	None Detected
16	GC200-30	M	Room 203 South Wall	Blue Vinyl Cove Base	None Detected
				Associated Yellow Mastic	None Detected
16	GC200-31	M	Room 208 East Wall	Blue Vinyl Cove Base	None Detected
				Associated Yellow Mastic	None Detected
17	GC200-32	M	Room 224 East Floor	Brown Stair Tread	None Detected
				Associated Brown Mastic	None Detected
17	GC200-33	M	Room 224 West Floor	Brown Stair Tread	None Detected
				Associated Brown Mastic	None Detected
18	GC200-34	M	Room 224 East Wall	6” Brown Vinyl Cove Base	None Detected
				Associated Brown Mastic	None Detected
18	GC200-35	M	Room 224 West Wall	6” Brown Vinyl Cove Base	None Detected
				Associated Brown Mastic	None Detected
19	GC200-36	M	North Hallway East Floor	Gray Leveling Compound	None Detected
19	GC200-37	M	North Hallway West Floor	Gray Leveling Compound	None Detected
20	GC200-38	M	East Hallway North Floor	12” x 12” Light Blue w/Blue Specks Vinyl Floor Tile	None Detected
				Associated Gray Leveling Compound	None Detected
20	GC200-39	M	East Hallway South Floor	12” x 12” Light Blue w/Blue Specks Vinyl Floor Tile	None Detected
				Associated Floor Tile Mastic	None Detected
21	GC200-40	M	Room 223 South Wall	4” White Vinyl Cove Base	None Detected
				Associated Yellow Mastic	None Detected
22	GC200-41	M	Room 224 Above Drop Ceiling	Gray Duct Seam Tape	None Detected
22	GC200-42	M	Room 201 Above Drop Ceiling	Gray Duct Seam Tape	None Detected

TABLE A - ASBESTOS SURVEY TESTING RESULTS

HA #	BEC Sample #	Material	Sampling Location	Building Construction Material	Asbestos (%)
23	GC200-43	M	Room 221 North Floor	Blue Ceramic Floor Tile	None Detected
				Associated Gray Tile Grout	None Detected
				Associated Tan Tile Mastic	None Detected
24	GC200-44	M	Room 218 North Floor	Purple Ceramic Floor Tile	None Detected
				Associated Gray Tile Grout	None Detected
				Associated Yellow Tile Mastic	None Detected
25	GC200-45	M	North East Hallway East Entrance	White Ceramic Floor Tile	None Detected
				Associated Gray Tile Grout	None Detected
26	GC200-46	M	Room 218 North Wall	Gray Ceramic Wall Tile	None Detected
27	GC200-47	M	Room 224 South Room	Black Floor Tile Mastic	None Detected
29	GC200-48	M	Exterior South Window	Black Window Glazing	None Detected
30	GC200-49	M	Exterior South Window	Black Exterior Window Masonry Joint Sealant	None Detected
31	GC200-50	M	Exterior South Door	Black Exterior Door Masonry Joint Sealant	None Detected

ASBESTOS SURVEY LIMITATIONS

The above inspection was characterized by close visual inspection of all building areas in accordance with US EPA regulations and generally accepted engineering work practices associated with the conduct of an asbestos survey. It is relevant to note, BEC did NOT conduct exploratory demolition to gain access to enclosed building conditions (e.g., wall cavities, pipe chases, HVAC ductwork shafts, ceiling plenums, etc.) BEC collected random bulk samples of suspect ACBMs. BEC has made every effort to identify all locations and types of asbestos-containing construction materials. BECs asbestos survey sampling strategy included multiple samples of the same materials chosen at random. However, BEC advises, due to the inconsistencies of manufacturer processes and contractor installation methods, materials of similar construction may have varied quantities of asbestos. Furthermore, BEC advises locating all asbestos materials can only be definitively achieved by conducting exploratory demolition and sampling every section of pipe insulation, every fitting or valve covering, every square yard of fireproofing, and every square foot of other surface coating materials. Therefore, BEC makes no warranty, expressed or implied, that all asbestos has been found. Additionally, BEC recommends bulk sampling and analysis of all suspect ACBMs (not otherwise evaluated during this survey) encountered within a building area, prior to renovation or demolition. Additionally, BEC advises due to intact watertight conditions at the roofline, BEC conducted no roofline sampling. Therefore, BEC makes no reference to any materials that may exist within the roofline of the structure.

SECTION III: CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. BEC concludes, based upon onsite visual inspection and review of analytical data; ACBMs are **NOT** present within building 200 located at 687 Moser Road, McHenry, Maryland 21541.
2. BEC concludes, based upon onsite visual inspection and direction from the client the following materials are presumed asbestos containing materials (PACM), as listed in **Table B – Presumed Asbestos Containing Materials**

TABLE B: PERSUMED ASBESTOS CONTAINING MATERIALS

Building Construction Material	Location	EPA Regulated	OSHA Regulated	Total Estimated Quantity
Chalkboard Mastic	Room 201, 202, 203, 204, 205, 207, 209, 219, 224, 225,	**YES**	**YES**	~19 Each

3. BEC concludes, based upon review of US EPA and State of Maryland law, specific regulations governing the disturbance, removal, and disposal of asbestos, **DO APPLY** to any work, of which is planned and/or can be reasonably anticipated to, result in the disturbance of the identified PACMs present at the subject site.
4. BEC concludes, based upon review of United States Occupational, Safety and Health Administration (Construction Industry-29 CFR 1926.1101 and General Industry-29 CFR 1910.1001) regulations governing non-occupational and occupational exposure to asbestos, **DO APPLY** to **ANY** renovation/demolition, housekeeping, maintenance and repair activities directly and/or indirectly impacting (disturbance/damage) the presumed asbestos containing materials.

RECOMMENDATIONS

1. BEC recommends prior to the renovation activities collecting bulk samples of the presumed chalkboard mastic to determine the presence or absence of asbestos.
2. BEC recommends should the renovation activities result in the discovery of additional suspect ACBMs, halting all work activities with subsequent bulk sample collection and analysis of discovered ACBMs, to determine asbestos content.
3. PLM/DS Limitations

   BEC advises all bulk samples were analyzed by Polarized Light Microscopy with Dispersion Staining (PLM/DS). This is a standard method of analysis in optical mineralogy and a suspect material is immersed in a solution of known refractive index and subjected to illumination by polarized light. The resultant characteristic color display enables mineral identification.

   Although PLM/DS analysis is the primary technique used for asbestos determination, it can show significant bias leading to false negatives and false positives for certain types of materials. PLM is limited by the visibility of the asbestos fibers. In some samples the fibers may be reduced to a diameter so small or masked by coatings to such an extent that they cannot be reliably observed or identified using PLM.

   As such, BEC recommends further evaluation via gravimetric reduction sample preparation technique and PLM/DS analysis with subsequent TEM analysis (10,000-20,000x magnification), should inconclusive PLM results persist, prior to designation as “non asbestos-containing”.

   Additionally, BEC advises bulk samples, which PLM/DS analysis revealed trace asbestos content should be further evaluated via PLM - "Point Count Protocol" method (40CFR Part 763, Appendix E, Subpart E).

Asbestos-Containing Materials Disclosure:

BEC advises, based upon United States Occupational, Safety and Health Administration (Construction Industry-29 CFR 1926.1101 and General Industry-29 CFR 1926.1001) regulations, the Building Owner is required to disclose the location of the asbestos-containing materials to employees and Contractors, whom conduct work activities within building areas, at which asbestos-containing materials are present.

APPENDIX A

SANAIR SAMPLE RESULTS

&

CHAIN OF CUSTODY

SanAir Technologies Laboratory

Analysis Report

prepared for

Boggs Environmental Consultants, Inc

Report Date: 11/18/2016
Project Name: Garrett College Building 200
Project #: MD16295
SanAir ID#: 16041623

NVLAP LAB CODE 200870-0

Virginia SBE Certification # 652931

Texas Licensed Mold Analysis Laboratory License # LA80166

SanAir Technologies Laboratory

804.897.1177 www.sanair.com

SanAir Technologies Laboratory, Inc.
1551 Oakbridge Drive, Suite B, Powhatan, VA 23139
804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

Boggs Environmental Consultants, Inc
200 West Main Street
Middletown, MD 21769

November 18, 2016

SanAir ID # 16041623
Project Name: Garrett College Building 200
Project Number: MD16295

Dear Derrick Klein,

We at SanAir would like to thank you for the work you recently submitted. The 50 sample(s) were received on Tuesday, November 15, 2016 via FedEx. The final report(s) is enclosed for the following sample(s): GC200-1, GC200-2, GC200-3, GC200-4, GC200-5, GC200-6, GC200-7, GC200-8, GC200-9, GC200-10, GC200-11, GC200-12, GC200-13, GC200-14, GC200-15, GC200-16, GC200-17, GC200-18, GC200-19, GC200-20, GC200-21, GC200-22, GC200-23, GC200-24, GC200-25, GC200-26, GC200-27, GC200-28, GC200-29, GC200-30, GC200-31, GC200-32, GC200-33, GC200-34, GC200-35, GC200-36, GC200-37, GC200-38, GC200-39, GC200-40, GC200-41, GC200-42, GC200-43, GC200-44, GC200-45, GC200-46, GC200-47, GC200-48, GC200-49, GC200-50.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

Sandra Sobrino

Sandra Sobrino
Asbestos & Materials Laboratory Manager
SanAir Technologies Laboratory

Final Report Includes:
- Cover Letter
- Analysis Pages
- Disclaimers and Additional Information

sample conditions:
50 sample(s) in Good condition

SanAir Technologies Laboratory, Inc.

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804.897.1177 Toll Free: 888.895.1177 Fax: 804.897.0070
Web: http://www.sanair.com E-mail: iaq@sanair.com

SanAir ID Number

16041623

FINAL REPORT

Name: Boggs Environmental Consultants, Inc
Address: 200 West Main Street
Middletown, MD 21769

Project Number: MD16295
P.O. Number:
Project Name: Garrett College Building 200

Collected Date: 11/10/2016
Received Date: 11/15/2016 10:40:00 AM
Report Date: 11/18/2016 4:57:34 PM
Analyst: Fleming, Christopher
Toth, Elizabeth
Robertson, Erin
Tallert, Jonathan
Vaughan, Nathaniel

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-1 / 16041623-001 Room 216 South Wall Gypsum Board Sheeting	White Non-Fibrous Heterogeneous	20% Cellulose	80% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-2 / 16041623-002 Room 210B North Wall Gypsum Board Sheeting, Sheetrock	White Non-Fibrous Heterogeneous	10% Cellulose	90% Other	None Detected
GC200-2 / 16041623-002 Room 210B North Wall Gypsum Board Sheeting, Texture	White Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-3 / 16041623-003 Room 208 East Wall Gypsum Board Sheeting, Sheetrock	White Non-Fibrous Heterogeneous	10% Cellulose	90% Other	None Detected
GC200-3 / 16041623-003 Room 208 East Wall Gypsum Board Sheeting, Texture	White Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-4 / 16041623-004 Room 216 South Wall Joint Finishing Compound	White Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-5 / 16041623-005 Room 210B North Wall Joint Finishing Compound	White Non-Fibrous Heterogeneous		100% Other	None Detected

Certification

Analyst: Nathaniel Vaughan
Analysis Date: 11/18/2016

Approved Signatory:
Date: 11/18/2016

SanAir Technologies Laboratory, Inc.

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Toth, Elizabeth
Robertson, Erin
Tallert, Jonathan
Vaughan, Nathaniel

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-6 / 16041623-006 Room 208 East Wall Joint Finishing Compound	White Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-7 / 16041623-007 Room 216 North Wall 4" Vinyl Cove Base, Cove Base	Grey Non-Fibrous Heterogeneous		100% Other	None Detected
GC200-7 / 16041623-007 Room 216 North Wall 4" Vinyl Cove Base, Mastic	Yellow Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-8 / 16041623-008 North Hallway 4" Vinyl Cove Base, Cove Base	Grey Non-Fibrous Heterogeneous		100% Other	None Detected
GC200-8 / 16041623-008 North Hallway 4" Vinyl Cove Base, Mastic	Yellow Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-9 / 16041623-009 Room 201 East Wall 4" Vinyl Cove Base, Cove Base	Brown Non-Fibrous Heterogeneous		100% Other	None Detected
GC200-9 / 16041623-009 Room 201 East Wall 4" Vinyl Cove Base, Mastic	Yellow Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-10 / 16041623-010 Room 202 East Wall 4" Vinyl Cove Base, Cove Base	Brown Non-Fibrous Heterogeneous		100% Other	None Detected
GC200-10 / 16041623-010 Room 202 East Wall 4" Vinyl Cove Base, Mastic	Yellow Non-Fibrous Heterogeneous		100% Other	None Detected

Certification

Analyst: Nathan Vaughan
Analysis Date: 11/18/2016

Approved Signatory:
Date: 11/18/2016

SanAir Technologies Laboratory, Inc.

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Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-11 / 16041623-011 Room 222 Ceiling 2'x4' ACT	White Fibrous Heterogeneous	85% Cellulose	15% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-12 / 16041623-012 Room 216 Ceiling 2'x4' ACT	White Fibrous Heterogeneous	85% Cellulose	15% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-13 / 16041623-013 South Hallway - Center Ceiling 2'x4' ACT	White Fibrous Heterogeneous	85% Cellulose	15% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-14 / 16041623-014 West Hallway - North 12"x12" VFT, Floor Tile	Beige Non-Fibrous Heterogeneous		100% Other	None Detected
GC200-14 / 16041623-014 West Hallway - North 12"x12" VFT, Mastic	Yellow Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-15 / 16041623-015 West Hallway - South 12"x12" VFT, Floor Tile	Beige Non-Fibrous Heterogeneous		100% Other	None Detected
GC200-15 / 16041623-015 West Hallway - South 12"x12" VFT, Mastic	Yellow Non-Fibrous Heterogeneous		100% Other	None Detected

Certification

Analyst: Nathan Vaughan
Analysis Date: 11/18/2016

Approved Signatory:
Date: 11/18/2016

SanAir Technologies Laboratory, Inc.

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Toth, Elizabeth
Robertson, Erin
Tallert, Jonathan
Vaughan, Nathaniel

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-16 / 16041623-016 Room 224 East Floor 12"x12" VFT, Floor Tile	Off-White Non-Fibrous Heterogeneous		100% Other	None Detected
GC200-16 / 16041623-016 Room 224 East Floor 12"x12" VFT, Mastic	Black Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-17 / 16041623-017 Room 201 South Floor 12"x12" VFT, Floor Tile	Off-White Non-Fibrous Heterogeneous		100% Other	None Detected
GC200-17 / 16041623-017 Room 201 South Floor 12"x12" VFT, Mastic	Yellow Non-Fibrous Heterogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-18 / 16041623-018 North Hallway - East Floor 12"x12" VFT, Floor Tile	Tan Non-Fibrous Homogeneous		100% Other	None Detected
GC200-18 / 16041623-018 North Hallway - East Floor 12"x12" VFT, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-19 / 16041623-019 North Hallway - West Floor 12"x12" VFT, Floor Tile	Tan Non-Fibrous Homogeneous		100% Other	None Detected
GC200-19 / 16041623-019 North Hallway - West Floor 12"x12" VFT, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

Certification

Analyst: Nathan Vaughan
Analysis Date: 11/18/2016

Approved Signatory:
Date: 11/18/2016

SanAir Technologies Laboratory, Inc.

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SanAir ID Number

16041623

FINAL REPORT

Name: Boggs Environmental Consultants, Inc
Address: 200 West Main Street
Middletown, MD 21769

Project Number: MD16295
P.O. Number:
Project Name: Garrett College Building 200

Collected Date: 11/10/2016
Received Date: 11/15/2016 10:40:00 AM
Report Date: 11/18/2016 4:57:34 PM
Analyst: Fleming, Christopher
Toth, Elizabeth
Robertson, Erin
Tallert, Jonathan
Vaughan, Nathaniel

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-20 / 16041623-020 South Hallway - East Floor 12"x12" VFT, Floor Tile	White Non-Fibrous Homogeneous		100% Other	None Detected
GC200-20 / 16041623-020 South Hallway - East Floor 12"x12" VFT, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-21 / 16041623-021 South Hallway - West Floor 12"x12" VFT	White Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-22 / 16041623-022 Room 205 South Floor 12"x12" VFT	Off-White Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-23 / 16041623-023 Room 219 North Floor 12"x12" VFT, Floor Tile	Off-White Non-Fibrous Homogeneous		100% Other	None Detected
GC200-23 / 16041623-023 Room 219 North Floor 12"x12" VFT, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-24 / 16041623-024 Room 216 North Floor Carpet Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

Certification

Analyst: Nathan Vaughan
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Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-25 / 16041623-025 Room 203 South Floor Carpet Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-26 / 16041623-026 Room 222 South Door Masonry Door Joint Sealant	Brown Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-27 / 16041623-027 Room 224 West Door Masonry Door Joint Sealant	Brown Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-28 / 16041623-028 Room 204 South Window Window Masonry Joint Sealant	Black Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-29 / 16041623-029 Room 201 West Window Window Masonry Joint Sealant	Black Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-30 / 16041623-030 Room 203 South Wall Vinyl Cove Base, Cove Base	Blue Non-Fibrous Homogeneous		100% Other	None Detected
GC200-30 / 16041623-030 Room 203 South Wall Vinyl Cove Base, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

Certification

Analyst: Nathan Vaughan
Analysis Date: 11/18/2016

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Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-31 / 16041623-031 Room 208 East Wall Vinyl Cove Base, Cove Base	Blue Non-Fibrous Homogeneous		100% Other	None Detected
GC200-31 / 16041623-031 Room 208 East Wall Vinyl Cove Base, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-32 / 16041623-032 Room 224 East Floor Stair Tread, Stair Tread	Brown Non-Fibrous Homogeneous		100% Other	None Detected
GC200-32 / 16041623-032 Room 224 East Floor Stair Tread, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-33 / 16041623-033 Room 224 West Floor Stair Tread, Stair Tread	Brown Non-Fibrous Homogeneous		100% Other	None Detected
GC200-33 / 16041623-033 Room 224 West Floor Stair Tread, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-34 / 16041623-034 Room 224 East Wall 6" Vinyl Cove Base, Cove Base	Brown Non-Fibrous Homogeneous		100% Other	None Detected
GC200-34 / 16041623-034 Room 224 East Wall 6" Vinyl Cove Base, Mastic	Brown Non-Fibrous Homogeneous		100% Other	None Detected

Certification

Analyst: Nathan Vaughan
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Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-35 / 16041623-035 Room 224 West Wall 6" Vinyl Cove Base, Cove Base	Brown Non-Fibrous Homogeneous		100% Other	None Detected
GC200-35 / 16041623-035 Room 224 West Wall 6" Vinyl Cove Base, Mastic	Brown Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-36 / 16041623-036 North Hallway - East Floor Leveling Compound	Grey Non-Fibrous Homogeneous	15% Cellulose	85% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-37 / 16041623-037 North Hallway - West Floor Leveling Compound	Grey Non-Fibrous Homogeneous	15% Cellulose	85% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-38 / 16041623-038 East Hallway - North Floor 12"x12" VFT, Floor Tile	Blue Non-Fibrous Homogeneous		100% Other	None Detected
GC200-38 / 16041623-038 East Hallway - North Floor 12"x12" VFT, Leveling Compound	Grey Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-39 / 16041623-039 East Hallway - South Floor 12"x12" VFT, Floor Tile	Blue Non-Fibrous Homogeneous		100% Other	None Detected
GC200-39 / 16041623-039 East Hallway - South Floor 12"x12" VFT, Mastic/Leveling Compound	Various Non-Fibrous Homogeneous		100% Other	None Detected

Certification

Analyst: Nathan Vaughan
Analysis Date: 11/18/2016

Approved Signatory:
Date: 11/18/2016

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Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-40 / 16041623-040 Room 223 South Wall 4" Vinyl Cove Base, Cove Base	White Non-Fibrous Homogeneous		100% Other	None Detected
GC200-40 / 16041623-040 Room 223 South Wall 4" Vinyl Cove Base, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-41 / 16041623-041 Room 224 Above ACT Duct Seam Tape	Grey Non-Fibrous Heterogeneous	5% Glass	95% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-42 / 16041623-042 Room 201 Above ACT Duct Seam Tape	Grey Non-Fibrous Heterogeneous	5% Glass	95% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-43 / 16041623-043 Room 221 North Floor Ceramic Floor Tile, Ceramic Tile	Blue Non-Fibrous Homogeneous		100% Other	None Detected
GC200-43 / 16041623-043 Room 221 North Floor Ceramic Floor Tile, Grout	Grey Non-Fibrous Homogeneous		100% Other	None Detected
GC200-43 / 16041623-043 Room 221 North Floor Ceramic Floor Tile, Adhesive	Tan Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	Components % Non-Fibrous	Asbestos Fibers
GC200-44 / 16041623-044 Room 218 North Floor Ceramic Floor Tile, Floor Tile	Purple Non-Fibrous Homogeneous		100% Other	None Detected
GC200-44 / 16041623-044 Room 218 North Floor Ceramic Floor Tile, Grout	Grey Non-Fibrous Homogeneous		100% Other	None Detected
GC200-44 / 16041623-044 Room 218 North Floor Ceramic Floor Tile, Adhesive	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

Certification

Analyst: Nathan Vaughan
Analysis Date: 11/18/2016

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Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-45 / 16041623-045 NE Hallway - East Entrance Ceramic Floor Tile, Floor Tile	White Non-Fibrous Homogeneous		100% Other	None Detected
GC200-45 / 16041623-045 NE Hallway - East Entrance Ceramic Floor Tile, Grout	Grey Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-46 / 16041623-046 Room 218 - North Wall Ceramic Wall Tile	White Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-47 / 16041623-047 Room 224 South Room Floor Tile Mastic	Black Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-48 / 16041623-048 Exterior South Window Window Glazing	Brown Non-Fibrous Homogeneous		100% Other	None Detected

SanAir ID / Description	Stereoscopic Appearance	Components % Fibrous	% Non-Fibrous	Asbestos Fibers
GC200-49 / 16041623-049 Exterior South Window Exterior Window Masonry Joint Sealant	Various Non-Fibrous Heterogeneous		100% Other	None Detected

Certification

Analyst: Nathan Vaughan
Analysis Date: 11/18/2016

Approved Signatory:
Date: 11/18/2016

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Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic Appearance	Components		Asbestos Fibers
		% Fibrous	% Non-Fibrous	
GC200-50 / 16041623-050 Exterior South Door Exterior Door Masonry Joint Sealant	Black Non-Fibrous Homogeneous		100% Other	None Detected

Certification

Analyst: Nathan Vaughan
Analysis Date: 11/18/2016

Approved Signatory:
Date: 11/18/2016

Disclaimer

The final report cannot be reproduced, except in full, without written authorization from SanAir. Fibers smaller than 5 microns cannot be seen with this method due to scope limitations. The accuracy of the results is dependent upon the client's sampling procedure and information provided to the laboratory by the client. SanAir assumes no responsibility for the sampling procedure and will provide evaluation reports based solely on the sample and information provided by the client. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. government.

For NY state samples, method EPA 600/M4-82-020 is performed.

Polarized- light microscopy is not consistently reliable in detecting asbestos in floor covering and similar non-friable organically bound materials. Quantitative transmission electron microscopy is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing.

NY ELAP lab ID 11983

SanAir Technologies Laboratory

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Asbestos Chain of Custody

SanAir ID Number: 160 41623

Company: Boggs Environmental Consultants	Project #: MD16295	Collected by: Derrick Klein
Address: 200 West Main Street	Project Name: Garrett College Building 200	Phone #: 301-694-5687
City, St., Zip: Middletown, MD 21769	Date Collected: 11/10/16	Fax #: 301-694-9799
State of Collection: MD Account#:	P.O. Number:	Email: allhands@boggsenvironmental.com

Bulk

ABB	PLM EPA 600/R-93/116	☑
	Positive Stop ☐	
ABEPA	PLM EPA 400 Point Count	☐
ABB1K	PLM EPA 1000 Point Count	☐
ABBEN	PLM EPA NOB	☐
ABBCH	TEM Chatfield	☐
ABBTM	TEM EPA NOB	☐

Water

ABHE	EPA 100.2	☐

Air

ABA	PCM NIOSH 7400	☐
ABA-2	OSHA w/ TWA*	☐
ABTEM	TEM AHERA	☐
ABATN	TEM NIOSH 7402	☐
ABT2	TEM Level II	☐

New York ELAP

PLM NY	PLM EPA 600/M4-82-020	☐
ABEPA2	NY ELAP 198.1	☐
ABENY	NY ELAP 198.6 PLM NOB	☐
ABBNY	NY ELAP 198.4 TEM NOB	☐

Soil/Vermiculite

ABSE	PLM EPA 600/R-93/116 (Qual.)	☐
ABSP	PLM CARB 435 (LOD <1%)	☐
ABSP1	PLM CARB 435 (LOD 0.25%)	☐
ABSP2	PLM CARB 435 (LOD 0.1%)	☐

Dust

ABWA	TEM Wipe ASTM D-6480	☐
ABDMV	TEM Microvac ASTM D-5755	☐

Matrix	Other	
		☐

Turn Around Times				
	3 HR (4 HR TEM) ☐	6 HR (8HR TEM) ☐	12 HR ☐	24 HR ☐
	2 Days ☐	3 Days ■	4 Days ☐	5 Days ☐

Special Instructions

Sample #	Sample Identification/Location	Volume or Area	Sample Type	Flow Rate*	Time* Start – Stop	
	Please See BEC Sample Logsheet					

Relinquished by	Date	Time	Received by	Date	Time
Derrick Klein	11/14/16	1700	MC	NOV 15 2016	10:40AM

Unless scheduled, the turn around time for all samples received after 3 pm EST Friday will begin at 8 am Monday morning. Weekend or Holiday work must be scheduled ahead of time and is charged for rush turn around time. Work with standard turn around time sent Priority Overnight and Billed to Recipient will be charged a $10 shipping fee.

Page 1 of 1

16041623

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ENVIRONMENTAL CONSULTANTS

ASBESTOS INSPECTION BULK SAMPLING LOGSHEET

Project #: MD16295
Project Name: Garrett College Building 200
Project Address: 687 Moser Rd, McHenry MD

Inspector: Derrick Klein

Date: 11/10/16

Page: 1 of 3

Sample #	HA #	Location	Description	Quantity (sf, lf, yd³)	Condition	Friable/ CHECK F	Friable/ CHECK NF
GC200 - 1	1	Room 216 South wall	Gypsum Board Sheeting		Good		✓
-2	1	Room 210B North wall	↓		↓		✓
-3	1	Room 208 East wall	↓		↓		✓
-4	2	Room 216 South Wall	Joint Finishing Compound		↓		✓
-5	2	Room 210B North Wall	↓		↓		✓
-6	2	Room 208 East wall	↓		↓		✓
-7	3	Room 216 North wall	4" Gray Vinyl Cove base		↓		✓
-8	3	North Hallway	↓		↓		✓
-9	5	Room 201 East Wall	4" Brown Vinyl Cove base		↓		✓
-10	5	Room 202 East wall	↓		↓		✓
-11	7	Room 222 Ceiling	2'x4' Fissured + Pinhole ACT		↓	✓	
-12	7	Room 216 Ceiling	↓		↓	✓	
-13	7	South Hallway - Center Ceiling	↓		↓	✓	
-14	8	West Hallway - North	12"x12" Beige w/ Tan + Gray Specks VFT		↓		✓
-15	8	West Hallway - South	↓		↓		✓
-16	9	Room 224 East Floor	12"x12" Off-white w/ Tan + Gray Specks VFT		↓		✓
-17	9	Room 201 South Floor	↓		↓		✓
-18	10	North Hallway - East Floor	12"x12" Tan w/ Brown Streaks VFT		↓		✓
-19	10	North Hallway - West Floor	↓		↓		✓
-20	11	South Hallway - East Floor	12"x12" White w/ Gray + Green Specks VFT		↓		✓

MC NOV 15 2016 10:40AM

16041623

BOGGS
ENVIRONMENTAL CONSULTANTS

ASBESTOS INSPECTION BULK SAMPLING LOGSHEET

Project #: MD16295
Project Name: Garrett College Building 200
Project Address: 687 Moser Rd, McHenry MD

Inspector: Derrick Klein

Date: 11/10/16

Page: 2 of 3

Sample #	HA #	Location	Description	Quantity (sf, lf, yd³)	Condition	Friable/ CHECK F	Friable/ CHECK NF
GC200-21	11	South Hallway - West Floor	12"x12" Wht w/ Gray + Green Specks VFT		Good		✓
-22	12	Room 205 South Floor	12"x12" Off-Wht w/ Brown Streaks VFT				✓
-23	12	Room 219 North Floor	⊥				✓
-24	13	Room 216 North Floor	Yellow Carpet Mastic				✓
-25	13	Room 203 South Floor	⊥				✓
-26	14	Room 222 South Door	Brown Masonry Door Joint Sealant				✓
-27	14	Room 224 West Door	⊥				✓
-28	15	Room 204 South Window	Black Window Masonry Joint Sealant				✓
-29	15	Room 201 West Window	⊥				✓
-30	16	Room 203 South Wall	Blue Vinyl Covebase				✓
-31	16	Room 208 East Wall	⊥				✓
-32	17	Room 224 East Floor	Brown Stair Tread				✓
-33	17	Room 224 West Floor	⊥				✓
-34	18	Room 224 East Wall	6" Brown Vinyl Covebase				✓
-35	18	Room 224 West Wall	⊥				✓
-36	19	North Hallway - East Floor	Gray Leveling Compound				✓
-37	19	North Hallway - West Floor	⊥				✓
-38	20	East Hallway - North Floor	12"x12" Light Blue w/ Blue Specks VFT				✓
-39	20	East Hallway - South Floor	⊥				✓
-40	21	Room 223 South Wall	4" Wht Vinyl Covebase				✓

MC NOV 15 2016 9:40AM

1604/623

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Inspector: Derrick Klein

Date: 11/10/16

Page: 3 of 3

Sample #	HA #	Location	Description	Quantity (sf, lf, yd³)	Condition	Friable/ CHECK F	Friable/ CHECK NF
GrC200-41	22	Room 224 Above ACT	Gray Duct Seam Tape		Good		✓
-42	22	Room 201 Above ACT	1				✓
-43	23	Room 221 North Floor	Blue Ceramic Floor Tile				✓
-44	24	Room 218 North Floor	Purple Ceramic Floor Tile				✓
-45	25	NE Hallway - East Entrance	White Ceramic Floor Tile				✓
-46	26	Room 218 - North Wall	Gray Ceramic Wall Tile				✓
-47	27	Room 224 South Room	Black Floor Tile Mastic				✓
-48	29	Exterior South Window	Black Window Glazing				✓
-49	30	Exterior South Window	Black Exterior Window Masonry Joint Sealant				✓
-50	31	Exterior South Door	Black Exterior Door Masonry Joint Sealant		1		✓

MC

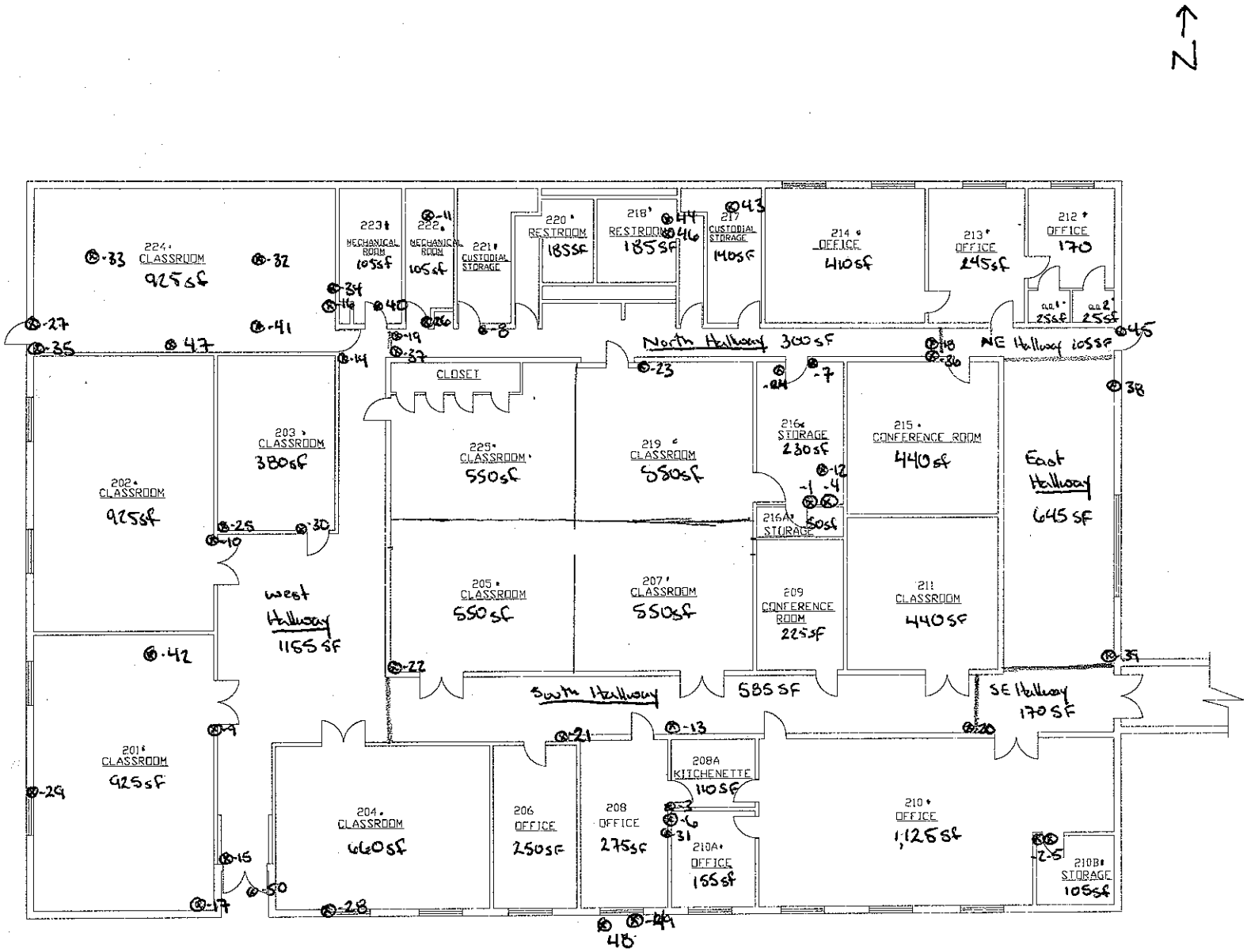
10:40AM

APPENDIX B

BEC BULK SAMPLING LOCATIONS

&

ASBESTOS BULK SAMPLING LOGSHEET


N
224 CLASSROOM 925sf
223 MECHANICAL ROOM 105sf
222 MECHANICAL ROOM 105sf
221 CUSTODIAL STORAGE
220 RESTROOM 185sf
218 RESTROOM 185sf
217 CUSTODIAL STORAGE 140sf
214 OFFICE 410sf
213 OFFICE 245sf
212 OFFICE 170
aa1 25sf
aa2 25sf
North Hallway 300sf
NE Hallway 105sf
CLOSET
225 CLASSROOM 550sf
219 CLASSROOM 580sf
216 STORAGE 230sf
215 CONFERENCE ROOM 440sf
East Hallway 645 SF
203 CLASSROOM 380sf
202 CLASSROOM 925sf
216A STORAGE 50sf
205 CLASSROOM 550 sf
207 CLASSROOM 550sf
209 CONFERENCE ROOM 225sf
211 CLASSROOM 440sf
West Hallway 1155 SF
South Hallway 585 SF
SE Hallway 170 SF
201 CLASSROOM 925sf
204 CLASSROOM 660sf
206 OFFICE 250sf
208 OFFICE 275sf
208A KITCHENETTE 110sf
210A OFFICE 155sf
210 OFFICE 1,125sf
210B STORAGE 105sf
48

BOGGS
ENVIRONMENTAL CONSULTANTS

ASBESTOS INSPECTION BULK SAMPLING LOGSHEET

Project #: MD16295 **Inspector:** Derrick Klein **Date:** 11/10/16
Project Name: Garrett College Building 200
Project Address: 687 Moser Rd, McHenry MD **Page:** 1 of 3

Sample #	HA #	Location	Description	Quantity (sf, lf, yd³)	Condition	Friable/ CHECK F	Friable/ CHECK NF
GC200 - 1	1	Room 216 South wall	Gypsum Board Sheeting		Good		✓
-2	1	Room 210B North wall	↓		↓		✓
-3	1	Room 208 East wall	↓		↓		✓
-4	2	Room 216 South Wall	Joint Finishing Compound		↓		✓
-5	2	Room 210B North Wall	↓		↓		✓
-6	2	Room 208 East Wall	↓		↓		✓
-7	3	Room 216 North Wall	4" Gray Vinyl Cove base		↓		✓
-8	3	North Hallway	↓		↓		✓
-9	5	Room 201 East Wall	4" Brown Vinyl Cove base		↓		✓
-10	5	Room 202 East Wall	↓		↓		✓
-11	7	Room 222 Ceiling	2'x4' Fissured + Pinhole ACT		↓	✓	
-12	7	Room 216 Ceiling	↓		↓	✓	
-13	7	South Hallway - Center Ceiling	↓		↓	✓	
-14	8	West Hallway - North	12"x12" Beige w/ Tan + Gray Specks VFT		↓		✓
-15	8	West Hallway - South	↓		↓		✓
-16	9	Room 224 East Floor	12"x12" Off-White w/ Tan + Gray Specks VFT		↓		✓
-17	9	Room 201 South Floor			↓		✓
-18	10	North Hallway - East Floor	12"x12" Tan w/ Brown Streaks VFT		↓		✓
-19	10	North Hallway - West Floor	↓		↓		✓
-20	11	South Hallway - East Floor	12"x12" White w/ Gray + Green Specks VFT		↓		✓

BOGGS
ENVIRONMENTAL CONSULTANTS

ASBESTOS INSPECTION BULK SAMPLING LOGSHEET

Project #: MD16295 **Inspector:** Derrick Klein **Date:** 11/10/16
Project Name: Garrett College Building 200
Project Address: 687 Moser Rd Mc Henry MD **Page:** 2 of 3

Sample #	HA #	Location	Description	Quantity (sf, lf, yd³)	Condition	Friable/ CHECK F	Friable/ CHECK NF
GC200-21	11	South Hallway - West Floor	12"x12" White w/ Gray + Green Specks VFT		Good		✓
-22	12	Room 205 South Floor	12"x12" Off-White w/ Brown Streaks VFT				✓
-23	12	Room 219 North Floor	⊥				✓
-24	13	Room 216 North Floor	Yellow Carpet Mastic				✓
-25	13	Room 203 South Floor	⊥				✓
-26	14	Room 222 South Door	Brown Masonry Door Joint Sealant				✓
-27	14	Room 224 West Door	⊥				✓
-28	15	Room 204 South Window	Black Window Masonry Joint Sealant				✓
-29	15	Room 201 West Window	⊥				✓
-30	16	Room 203 South Wall	Blue Vinyl Covebase				✓
-31	16	Room 208 East Wall	⊥				✓
-32	17	Room 224 East Floor	Brown Stair Tread				✓
-33	17	Room 224 West Floor	⊥				✓
-34	18	Room 224 East Wall	6" Brown Vinyl Covebase				✓
-35	18	Room 224 West Wall	⊥				✓
-36	19	North Hallway - East Floor	Grey Leveling Compound				✓
-37	19	North Hallway - West Floor	⊥				✓
-38	20	East Hallway - North Floor	12"x12" Lgh Blue w/ Blue Specks VFT				✓
-39	20	East Hallway - South Floor	⊥				✓
-40	21	Room 223 South Wall	4" White Vinyl Covebase				✓

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ASBESTOS INSPECTION BULK SAMPLING LOGSHEET

Project #: MD16295
Project Name: Garrett College Building 200
Project Address: 687 Moser Rd, McHenry MD

Inspector: Derrick Klein

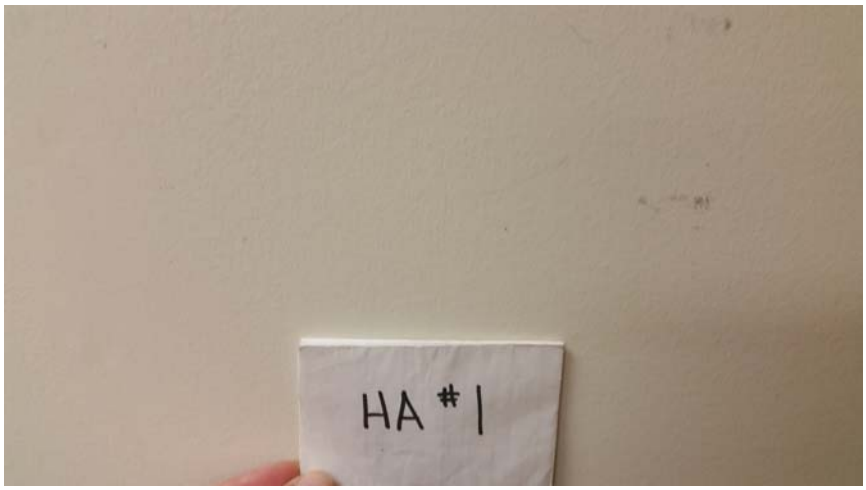
Date: 11/10/16

Page: 3 of 3

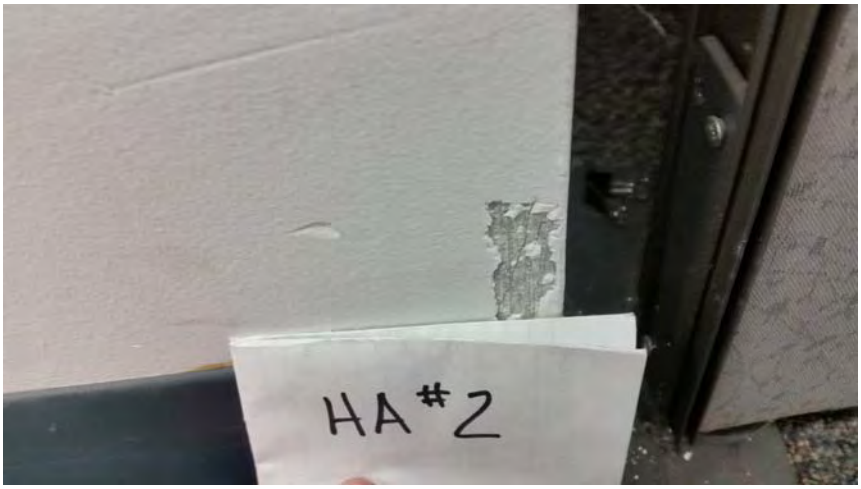
Sample #	HA #	Location	Description	Quantity (sf, lf, yd³)	Condition	Friable/ CHECK F	Friable/ CHECK NF
GrC200-41	22	Room 224 Above ACT	Gray Duct Seam Tape		Good		✓
-42	22	Room 201 Above ACT	↓		↓		✓
-43	23	Room 221 North Floor	Blue Ceramic Floor Tile				✓
-44	24	Room 218 North Floor	Purple Ceramic Floor Tile				✓
-45	25	NE Hallway · East Entrance	White Ceramic Floor Tile				✓
-46	26	Room 218 · North Wall	Gray Ceramic Wall Tile				✓
-47	27	Room 224 South Room	Black Floor Tile Mastic				✓
-48	29	Exterior South Window	Black Window Glazing				✓
-49	30	Exterior South Window	Black Exterior Window Masonry Joint Sealant				✓
-50	31	Exterior South Door	Black Exterior Door Masonry Joint Sealant		↓		✓

APPENDIX C

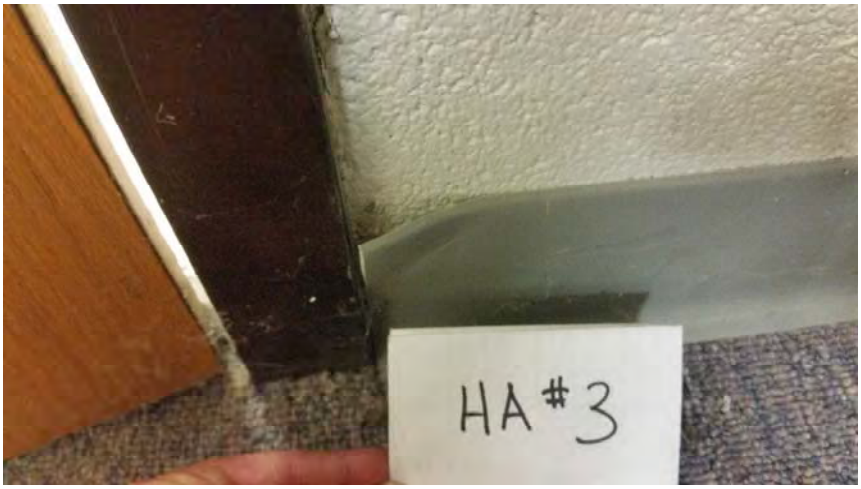
HA PHOTO SHEET



HA #1: Gypsum Board Sheeting

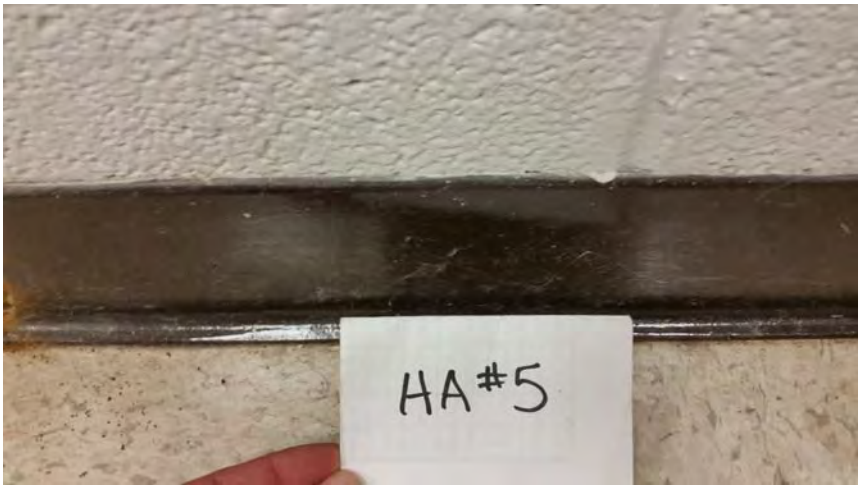


HA #2: Joint Finishing Compound



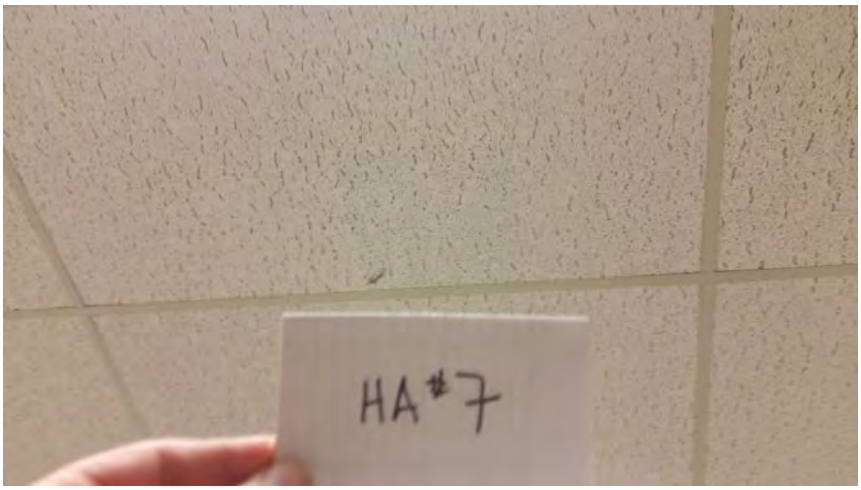
HA #3: 4’ Gray Vinyl Covebase

HA #4: Tan Vinyl Covebase Mastic

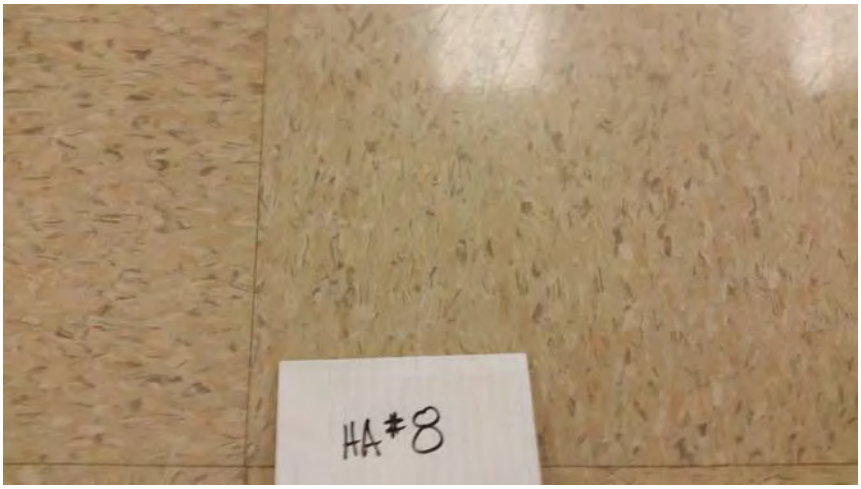


HA #5: 4" Brown Vinyl Covebase

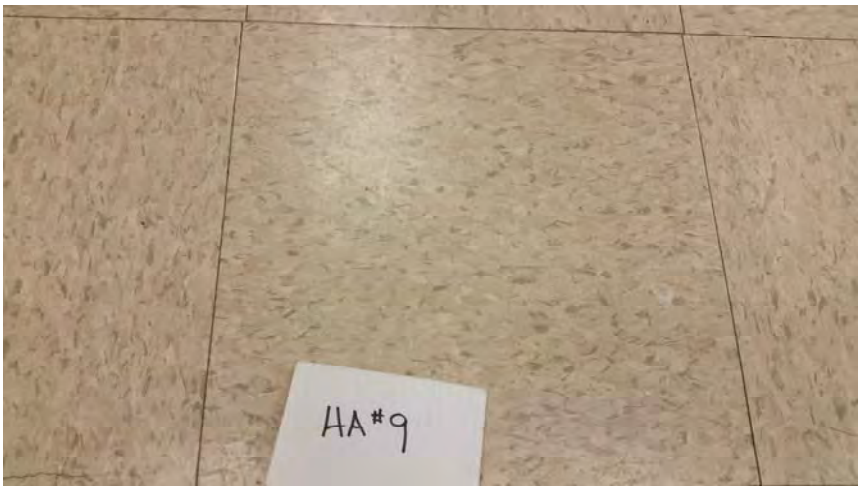
HA #6: Brown Vinyl Covebase Mastic



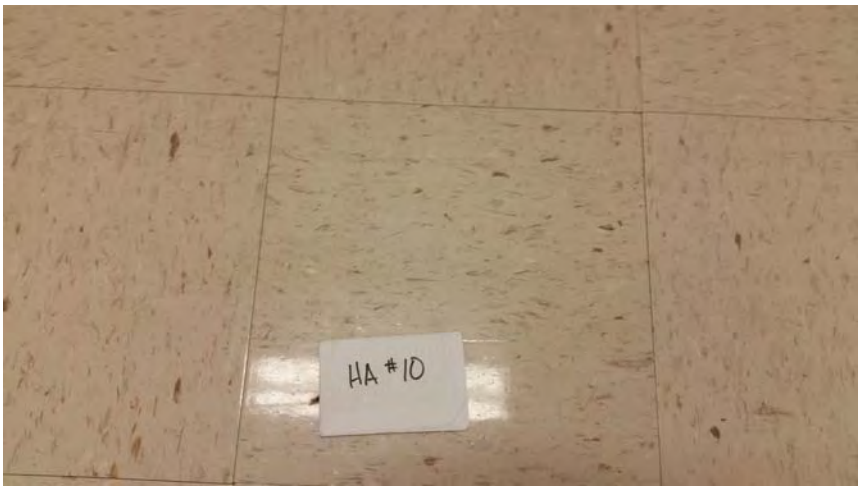
HA #7: 2’ x 4’ Fissured & Pinhole Acoustical Ceiling Tile



HA #8: 12” x 12” Beige w/Tan & Gray Specks Vinyl Floor Tile

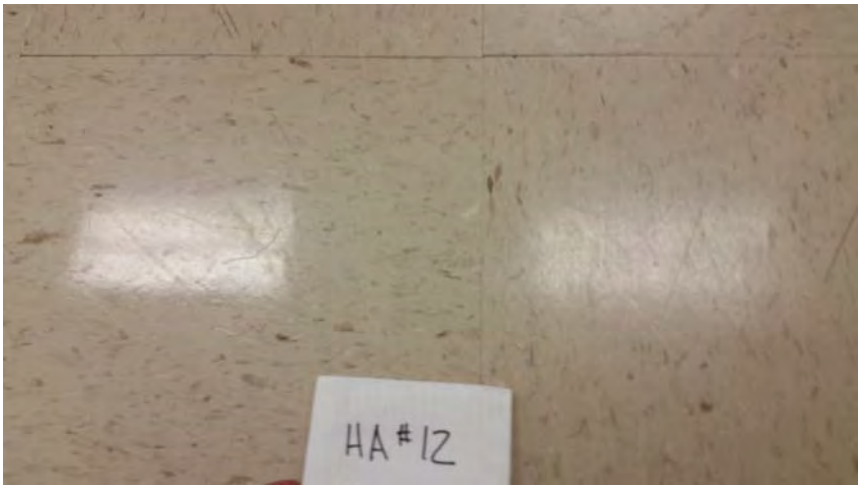


HA #9: 12” x 12” Off-White w/Tan & Gray Specks Vinyl Floor Tile



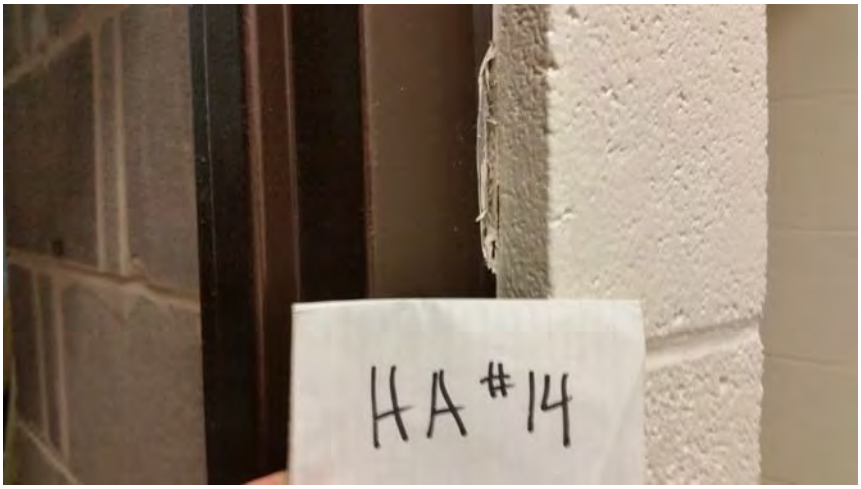
HA #10: 12” x 12” Tan w/Brown Streaks Vinyl Floor Tile

12” x 12” White w/Gray & Green Specks Vinyl Floor Tile

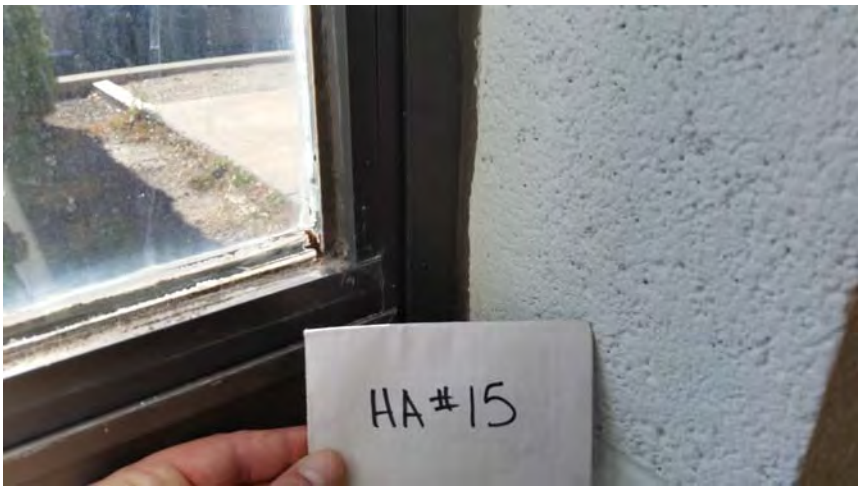


HA #12: Off-White w/Brown Streaks Vinyl Floor Tile

HA #13: Yellow Carpet Mastic



HA #14: Brown Masonry Door Joint Sealant



HA #15: Black Window Masonry Joint Sealant

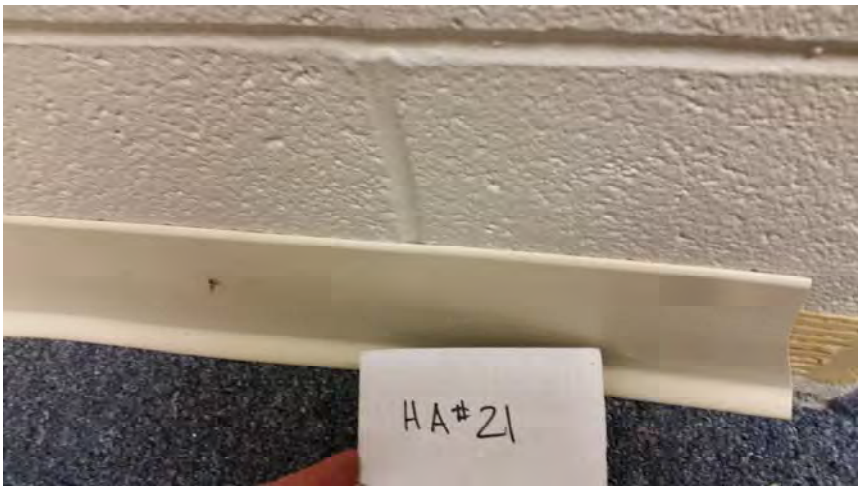
HA #16: 4” Blue Vinyl Covebase

HA #17: Brown Stair Tread

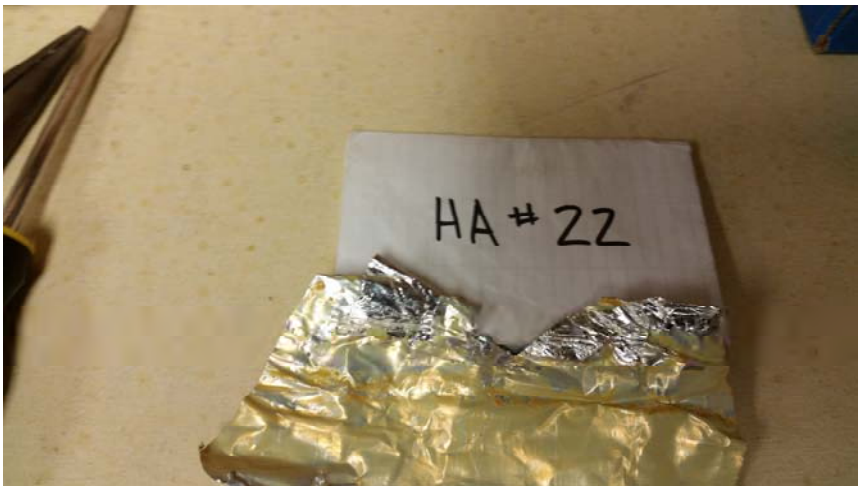
HA #18: 6” Brown Vinyl Covebase

HA #19: Gray Leveling Compound

HA #20: 12” x 12” Light Blue w/Blue Specks Vinyl Floor Tile

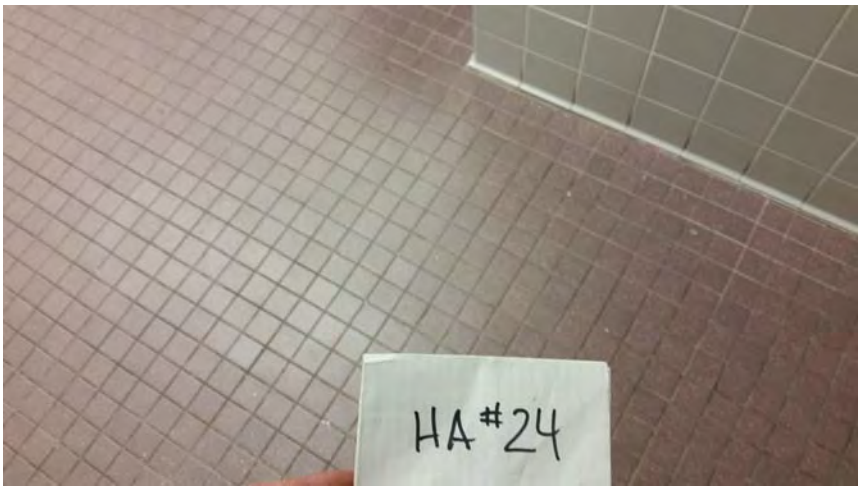


HA #21: White Vinyl Covebase



HA #22: Gray Duct Seam Tape

HA #23: Blue Ceramic Floor Tile

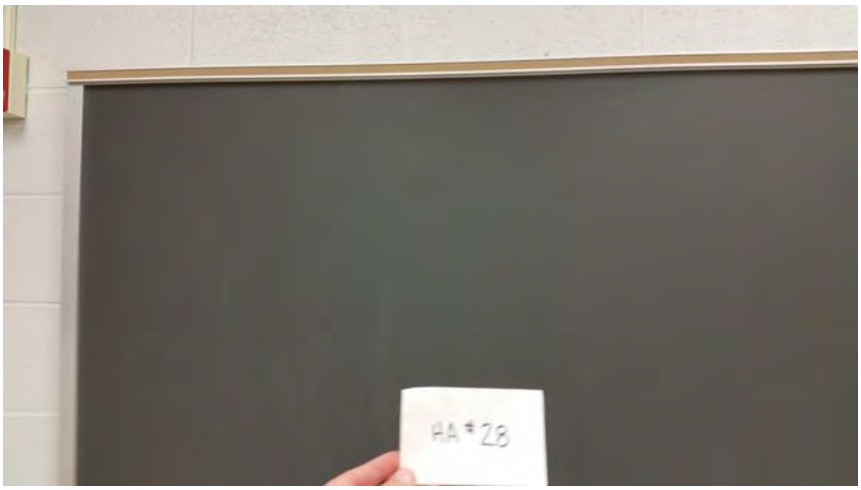


HA #24: Purple Ceramic Floor Tile

HA #25: White Ceramic Floor Tile

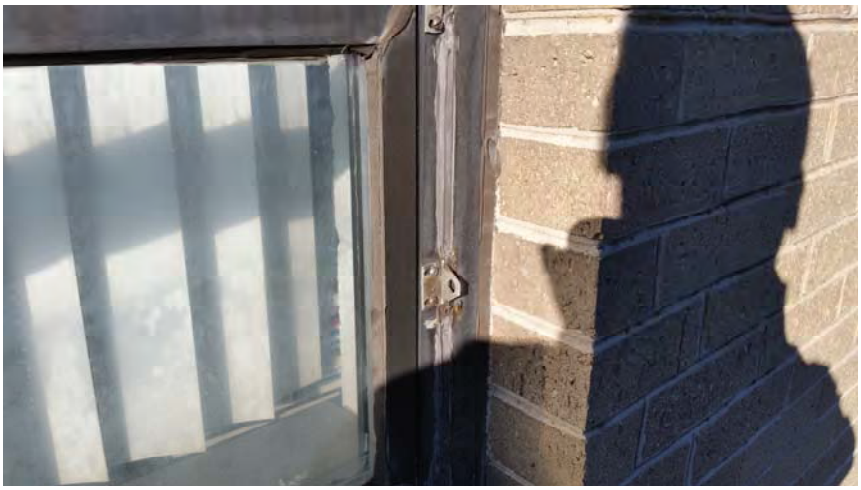
HA #26: Gray Ceramic Wall Tile

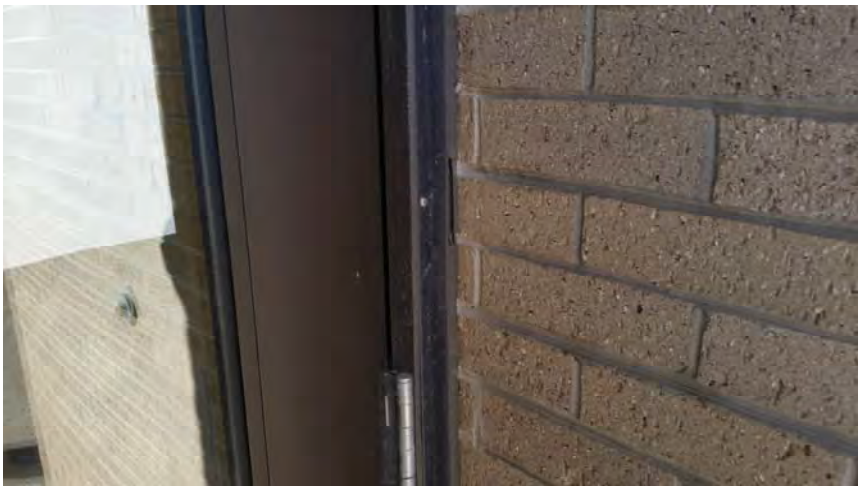
HA #27: Black Floor Tile Mastic



HA #28: Presumed Chalkboard Mastic


HA #29: Black Window Glazing


HA #30: Black Exterior Window Masonry Joint Sealant



HA #31: Black Exterior Door Masonry Door Joint Sealant

APPENDIX D

BEC STAFF QUALIFICATIONS

Asbestos License

MDE

Derrick Klein
Name

Signature

Inspector Review
Course Title

Course Date: 03/14/2016
Exp Date: 03/14/2017
Exam Date: 03/31/2016

16006101

STATE OF MARYLAND

PCBs & MERCURY INSPECTION

GARRETT COLLEGE
BUILDING 200

687 Moser Road,
McHenry, Maryland 21541

Prepared for

OFFICE OF FACILITIES MANAGEMENT

687 Moser Road,
McHenry, Maryland 21541

Attention: Ms. Kathy Farley Meagher, P.E.
Director of Facilities

BEC Project #MD16295

Fieldwork Conducted: November 10, 2016

Report Date: November 28, 2016

Prepared by

BOGGS ENVIRONMENTAL CONSULTANTS
Middletown MD ~ Morgantown, WV
Corporate Office: 200 W Main Street, Middletown, MD 21769
Tel: (301) 694-5687 ~ Fax: (301) 694-9799

ENVIRONMENTAL SCIENCE, ENGINEERING & INDUSTRIAL HYGIENE SERVICES

PCBs & MERCURY INSPECTION

GARRETT COLLEGE
BUILDING 200

687 Moser Road,
McHenry, Maryland 21541

TABLE OF CONTENTS

BOGGS ENVIRONMENTAL CONSULTANTS, INC.

Fieldwork Conducted and Final Report Prepared By:

Richard Robinson
Vice President

SECTION I: SITE DESCRIPTION

Project Site:	**Garrett College Building 200** McHenry, Maryland 21541
Requester Name:	Ms. Kathy Farley Meagher, P.E.
Requester Address:	**Office of Facilities Management** 687 Moser Road McHenry, Maryland 21541

Subject Site Description & Scope of Work:

The subject site is located at 687 Moser Road, McHenry, Maryland 21541, and is single story building comprised of a typical layout. The structure consists of office spaces, classrooms, bathrooms, and common areas. BEC received authorization from M. Kathy Farley Meagher, P.E. of Garrett College, to provide support services to determine the presence of PCB and Mercury containing building materials prior to renovation activities. Ms. Kathy Farley Meagher requested the asbestos inspection to ensure in compliance with United States Environmental Protection Agency's (US EPA) and State of Maryland, regulations, prior to disturbance of building construction materials anticipated (scheduled) to occur during renovation activities.

SECTION II: PCB's & MERCURY CONTAINING MATERIALS

BOGGS ENVIRONMENTAL CONSULTANTS, INC. (BEC) conducted a PCBs and Mercury inspection at the subject site. Polychlorinated-Biphenyls, or PCB's, were extensively used prior to 1979 as dielectric and coolant fluids in electrical equipment, such as capacitors, transformers, and motors. The environmental toxicity and classification of PCB's as a persistent organic pollutant resulted in a ban on their production by the United States Congress in 1979.

As such, BEC staff members Mr. Richard Robinson surveyed the subject site for the presence of polychlorinated-biphenyl (PCB) compound -containing light ballasts, as well as mercury containing light tubes, electrical switches, thermometers and thermostats on November 10, 2016. During the course of the survey, BEC staff members performed critical visual inspection at a minimum ten percent of all light ballasts within a given suite. It is relevant to note, that often a quantity greater than ten percent may have been required, in effort to achieve an accurate representation of the ballasts within each room. As exhaustive inspection of all light ballasts within the building (i.e. every room, hallway and common area) was not feasible, this method is reasonably anticipated to provide an accurate representation of current conditions at the site.

Polychlorinated-Biphenyl Containing Materials

BEC concludes, based upon onsite visual inspection that PCB containing construction materials (ie. light ballasts, light tubes) were **WERE IDENTIFIED** at the subject site and is listed hereafter in **Table A – Mercury Containing Materials**.

TABLE A – PCB CONTAINING MATERIALS

HA #	Description	Location	Mercury	Quantity
8	Advance Transformer Company – Light Ballasts	Room #219 (Above Drop Ceiling)	Yes	~ 8 Each

SECTION II: PCB's & MERCURY CONTAINING MATERIALS

Mercury Containing Materials

BEC concludes, based upon onsite visual inspection that Mercury containing construction materials (ie. light tubes, thermostats, thermometers) **WERE IDENTIFIED** at the subject site and is listed hereafter in **Table B – Mercury Containing Materials**.

TABLE B – MERCURY CONTAINING MATERIALS

HA #	Description	Location	Mercury	Quantity
1	8' Gray Light Tubes	Room 222 & 223A	Yes	~4 Each
4	4' Gray Light Tubes	Room 201, 202, 203, 204, 206, 208, 208A, 209, 210, 211, 212, 213, 214, 215, 216, 216A, 217, 219, 221, 222, 223, 224, Men's Restroom, Women's Restroom & Hallways	Yes	~466 Each
5	Sylvania Metal Arc Tubes	Room 222	Yes	~2 Each

Other Hazardous Containing Materials

BEC advises, during the course of the investigation, potential hazardous chemicals **WERE IDENTIFIED** at the subject site and is listed hereafter in **Table C – Other Hazardous Containing Materials**.

TABLE B – OTHER HAZARDOUS CONTAINING MATERIAL

HA #	Description	Location	Quantity
2	Lead Acid Battery – Fire Panel	Room 222	~2 Each
3	Fire Extinguisher	Room 222 & Hallways	~3 Each
6	Water Fountains (Refrigerant)	Hallways	~2 Each
7	Emergency Lighting Batteries	Hallways	~7 Each
9	CRT TV	Room 201, 219, & 224	~5 Each
10	R22 Refrigerant Unit	Exterior	~3 Each

SECTION III: CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. BEC concludes, based upon onsite visual inspection, one (1) individual and discernable types of ballast was identified, or presumed, to contain PCBs at the subject site.

2. BEC concludes, based upon onsite visual inspection, electrical lighting fluorescent lamp light tubes, containing mercury and/or phosphorus, were identified at the subject site.

3. BEC concludes, based upon US EPA 40 CFR Part 261 "Identification & Listing of Hazardous Waste" regulations, **DO APPLY** to the handling and management (removal and disposal) of both the PCB, mercury and the Other Hazardous containing materials identified at the subject site.

Recommendations

1. BEC recommends, in order to identify **all** PCB containing ballasts definitively, that during the course of demolition activities each ballast should be inspected for the presence of PCBs and disposed of accordingly.

2. BEC recommends, in order to identify **all** mercury containing fluorescent lamps definitively, that during the course of demolition activities each lamp should be inspected for the presence of manufacturer's labels indicating the presence of mercury and disposed of accordingly.

3. BEC recommends, in accordance with recognized industry practice, a professional hazardous waste abatement contractor, should conduct the removal of the PCB and mercury-containing materials located at 687 Moser Road, McHenry, Maryland 21541.

4. BEC recommends, in accordance with recognized industry practice, recycling of all mercury containing fluorescent lamp tubes, pursuant to their removal.

5. BEC recommends in accordance with recognized industry practice all MSDS chemicals/cleaners present within the housekeeping closets should be disposed in accordance with local, state, and federal regulations.

6. BEC recommends in accordance with recognized industry practice all "Other" hazardous containing materials should be reclaimed and/or disposed of in accordance with local, state, and federal regulations.

APPENDIX A

BEC FIELD DOCUMENTATION

BOGGS
ENVIRONMENTAL CONSULTANTS

PCB & HG INSPECTION LOGSHEET

Project #: MD16295
Project Name: Garrett College
Project Address: Building 208

Inspector: RR

Date: 11/10/2016

Page: 1 of 2

HA #	Location	Device	Description	Quantity	Condition	CHECK PCB	CHECK Hg
1	Room 222		Gray 8' Light Tubes	2			
2			Lead Acid Battery - Fire Panel	2			
3			Fire Extinguisher	1			
4			(2) Boxes 4' Gray Light Tubes	50			
5			Sylvania Metal Arc Bulbs	2			
4	Hallway		4' Gray Light Tubes	76			
6			Water Coolers - Refrigerant	2			
7			Emergency Lighting Batteries	7			
3			Fire Extinguisher	2			
4	Room 223		4' Gray Light Tubes	8			
1	Room 223A		8' Green Light Tubes	2			
4	Room 204		4' Gray Light Tubes	12			
4	Room 206			4			
4	Room 201			18			
			CRT TV	1			
4	Room 202		4' Gray Light Tubes	18			
4	Room 203			8			
4	Room 224			18			
			CRT TV	2			
4	Mens Restroom		4' Gray Light Tubes	10			

BOGGS
ENVIRONMENTAL CONSULTANTS

PCB & HG INSPECTION LOGSHEET

Project #: M016295
Project Name: Garrett College
Project Address: Building 200

Inspector: RR

Date: 11/10/2016

Page: 2 of 2

HA #	Location	Device	Description	Quantity	Condition	CHECK PCB	CHECK Hg
4	Women Restroom		4' Gray Light Tubes	10			
4	Room 221			4			
4	Room 217			8			
4	Room 214			18			
4	Room 212			12			
4	Room 213			12			
4	Room 215			16			
4	Room 211			16			
4	Room 210			40			
4	Room 208A			4			
4	Room 208			8			
4	Room 210B			4			
	Room 209		CRT TV	2			
4	〃		4' Gray Light Tubes	84			
8	Room 219		Advance Transformer Company (Above ceiling)	4			
4	Room 216		4' Gray Light Tubes	6			
4	Room 216A		〃	2			
4	Room 209		4' Gray Light Tubes	16			
	Exterior		(3) R22 Refrigerant Units				

SECTION 02 41 00 – SITE DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Site improvement demolition as indicated on the drawings, excluding removal of hazardous materials and toxic substances.

B. Abandonment and removal of existing utilities and utility structures or remove as indicated on the drawings.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

D. Demolish: Tearing down, destruction, breakup, razing or removal of the whole or part of a building or structure, or free standing machinery or equipment that is directly related to the function of the structure.

E. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.

1.3 OWNERSHIP OF REMOVED MATERIALS

A. Prior to demolition operations, the Owner reserves the right to salvage any items that otherwise would be part of the demolition; the Owner will remove equipment, material and fixtures they wish to retain.

B. After demolition operations begin, equipment, material and fixtures indicated for demolition become the property of the Contractor to be removed, salvaged or disposed of by the Contractor.

1.4 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

C. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

D. Section 01 74 19 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

E. Section 02 41 19 - Selective Demolition for building demolition work.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Predemolition Phtographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations.

C. Site Plan: Showing:
   1. Areas for temporary construction and field offices.

D. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Use of elevator and stairs.
   5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

E. Informational Submittals:
   1. Submit shop drawings showing shoring, bracing, and temporary supports for the existing and re-installed structure as appropriate.
   2. Design of Bracing and Support: Submit engineering calculations of shoring and bracing designs.
      a. Shoring, bracing and support shall be designed to maintain existing lines and surfaces without deflection during work; design shall be in accordance with gravity dead, live and wind load resistance requirements of the jurisdiction.
      b. Design shall be sufficient for existing and new material loads and anticipated construction loads.
      c. Stresses on supporting structure shall not exceed safe, commonly allowable stresses for the materials in consideration of their age and conditions.
   3. Provide certification of professional engineer responsible for the preparation or review of the shop drawings and design calculations.
   4. Construct shoring, bracing and support in accordance with design submittal and proper and standard construction practice.

F. Closeout Submittals:
   1. Inventory: Submit a list of items that have been removed and salvaged.
   2. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
   3. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

G. LEED Submittal:
   1. LEED Credit MRc2: Tally the amount of Construction Waste Management diverted from the demolition activities and include it in the Construction Waste Management scope per section 01 74 19.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI A10.6 and NFPA 241.

C. Predemolition Conference: Conduct conference at Project site to comply with requirements in the Contract Documents.
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   3. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
   4. Review areas where existing construction is to remain and requires protection.

1.7 PROJECT CONDITIONS

A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Storage or sale of removed items or materials on-site is not permitted.

D. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 PRODUCTS

2.1 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

C. The following items shall be salvaged and returned to Owner:
   1. As indicated on drawings.

PART 3 EXECUTION

3.1 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. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   5. Do not close or obstruct roadways or sidewalks without permit.
   6. 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.
   7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

3.2 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 disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.3 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site; comply with requirements of Section 01 74 19 - Waste Management.

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 41 19 - SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of selected portions of building or structure.

B. Related Sections include the following:
   1. Division 1 Section "Summary" for use of premises, and phasing, and Owner-occupancy requirements.
   2. Division 1 Section "Site Procedures and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
   3. Division 1 Section "Execution Requirements" for cutting and patching procedures.
   4. Section 02 41 00 - Site Demolition: For site and utility demolition outside of the building.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

D. Demolish: Tearing down, destruction, breakup, razing or removal of the whole or part of a building or structure, or a free standing machinery or equipment that is directly related to the function of the structure.

E. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.

1.3 SUBMITTALS

A. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations.

1.4 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Administrative Requirements."

1.5 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Abatement: Coordinate hazardous materials management with abatement trades, as required. [OSHA 1926.850(e); ANSI A10.6]
   1. Determine lead concentrations in any suspect surface coatings, structural steel rust inhibitors and ceramic tiles prior to selective demolition. Coordinate lead management with abatement trade, as required. [29 CFR 1926.850(e) and 1926.62(d)(2)]

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

1.6 WARRANTY

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

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

D. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

E. Survey of Existing Conditions:
   1. Record existing conditions by use of preconstruction photographs.
   2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
   2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
   3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
      a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 PREPARATION

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

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   3. Cover and protect furniture, furnishings, and equipment that have not been removed.
   4. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
   1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

C. Existing Items to be Salvaged by the Owner: Prior to demolition activities, the Owner will salvage the following items:
1. Doors: 1 - 4’ x 7’, 1 – 3’ x 7’
2. Door Hardware: Handles, Panic Bars, Closures, Stops
3. Commodes & Urinals (including flush meters, controls, etc.)
4. Mirrors
5. Toilet Paper & Paper Towel Dispensers
6. 2 Iron Slop Sinks
7. Fire Alarms: Smoke detectors, Horn/Strobe, Pull Stations
8. HVAC 2 Diffusers
9. Water Fountain
10. EM Lights
11. AEDs
12. IT access points
13. SMARTBoards & Projectors
14. Cameras
15. Clocks
16. White Boards & Bulletin Boards
17. Room & Directional Signs
18. Foundation Tree
19. Art Work
20. Various Furniture

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Roofing:
   1. Before commencing with cutting and patching of roofing, consult with the Owner regarding the existence of an outstanding roofing warranty. If such a warranty exists, obtain written approval of the methods to be used from the roofing manufacturer who issued the warranty so as not to affect the value of the warranty.
   2. Cut, patch, repair and extend roofing and installation as follows:
      a. Where disturbed or damaged by alteration Work or activities related to same.
      b. Where new Work connects to existing construction.
   3. Roof areas penetrated for alterations shall be protected against damage and leakage by the Contractor performing the Work. Roof openings shall not be left uncovered or unprotected overnight or during any periods of rainy or inclement weather.
   4. Remove loose aggregate, if applicable, and store away from work area.
   5. Work shall be performed in a manner to provide for permanent water-tight splice or repair.
   6. Roof repair and alteration Work and materials shall match existing roofing materials and construction.
   7. Upon completion and inspection of splice or repair Work, remove debris from the roof and replace the aggregate as required.
   8. Protect undisturbed existing and newly repaired roofing subject to traffic and damage.
   9. Upon completion of demolition operations requiring the shoring of roof structure, manufacturer holding the existing warranty shall inspect all base flashings and roofing membrane; perform all repairs required following demolition operations.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
   1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

F. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

G. Hazardous Materials:
   1. Coordinate hazardous materials management with abatement trades, as required." [OSHA 1926.850(e); ANSI A10.6]
   2. Determine lead concentrations in any suspect surface coatings, structural steel rust inhibitors and ceramic tiles prior to selective demolition. Coordinate lead management with abatement trade, as required. [29 CFR 1926.850(e) and 1926.62(d)(2)]
   3. CAUTION: Lamp ballasts are regulated toxic substances. PCB and DEHP WASTES shall be salvaged. [EPA 40 CFR 761]
   4. CAUTION: Hydraulic door closures may contain PCB oils. Recover hydraulic door closures intact for salvage and coordinated delivery to Owner. [EPA 40 CFR 761 and 29 CFR 1926.850(e)]
   5. CAUTION: Fluorescent tubes, batteries and tilt-switch thermostats contain MERCURY. [29 CFR 1926.850(e)]

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.

B. Openings for other work.

C. Form accessories.

D. Form stripping.

1.02 REFERENCE STANDARDS

A. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials; American Concrete Institute.

B. ACI 301 – Specifications for Structural Concrete for Buildings; American Concrete Institute.

C. ACI 318 – Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute.

D. ACI 347 – Guide to Formwork for Concrete; American Concrete Institute.

E. ASME A17.1 – Safety Code for Elevators and Escalators; The American Society of Mechanical Engineers.

1.03 SUBMITTALS

A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on void form materials.

C. Shop Drawings: Indicate pertinent dimensions, materials, bracing and arrangement of joints and ties.

1. Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork. Shop drawings shall be signed and sealed by an engineer registered in the local jurisdiction.
2. Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring.
3. Indicate location of all slab joint types.

D. LEED Submittals: If any wood or wood-based form materials, including supports, are permanently installed in the project, submit documentation required for sustainably harvested wood as required by Section 01 60 00 and appropriate forms.

1.04 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 347, ACI 301, and ACI 318.

1. Maintain one copy of standards on project site.

PART 2 - PRODUCTS

2.01 FORMWORK – GENERAL

A. Provide concrete forms, accessories, shoring and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct to provide resultant concrete that conforms to design with respect to shape, lines, and dimensions.

C. Comply with applicable State and local codes with respect to design, fabrication, erection, and removal of formwork.

D. Comply with relevant portions of ACI 347, ACI 301 and ACI 318.

2.02 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor.

2.03 PREFABRICATED FORMS

A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

C. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 2 inches thick.

2.04 FORMWORK ACCESSORIES

A. Form Ties: Snap-off type, galvanized metal, fixed length, cone type, with waterproofing washer, 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.

B. Form Release Agent: Colorless mineral oil that will not stain concrete, absorb moisture, impair natural bonding of concrete finish coatings, or affect color characteristics of concrete finish coatings.

C. Corners: Chamfered, rigid plastic or wood strip type, ¾ x ¾ inch size, maximum possible lengths.

D. Dovetail Anchor Slot: Galvanized steel, 22 gage thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.

E. Flashing Reglets: Galvanized steel, 22 gage thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.

F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

G. Waterstops: Preformed mineral colloid strips, ¾ inch thick, moisture expanding.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.03 ERECTION – FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Provide chamfer strips on external corners of beams, joists, and columns.

D. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

E. Coordinate this section with other sections of work that require attachment of components to formwork.

F. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

3.04 APPLICATION – FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS AND OPENINGS

A. Provide formed openings where required for items to be embedded or passing through concrete work.

B. Locate and set in place items that will be cast directly into concrete.

C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement.

F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
2. During cold weather, remove ice and snow from within forms. Do not use deicing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 117, unless more stringent tolerances are required within the contract documents.

B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.

3.08 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00. Inspection services shall conform to the Statement of Special Inspections noted in the structural drawings.

B. Inspect erected formwork, shoring and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

C. Do not reuse wood formwork more than 3 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.09 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finished concrete surfaces scheduled for exposure to view.

C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION

SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

1.2 REFERENCE STANDARDS

A. ACI 301 – Specifications for Structural Concrete for Buildings; American Concrete Institute.

B. ACI 318 – Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute.

C. ACI SP-66 – ACI Detailing Manual; American Concrete Institute.

D. ASTM A 615/A 615M – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

E. ASTM A 1064/A 1064M – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain, Deformed, for Concrete.

F. CRSI (DA4) – Manual of Standard Practice; Concrete Reinforcing Steel Institute.

G. CRSI (P1) – Placing Reinforcing Bars; Concrete Reinforcing Steel Institute.

1.3 SUBMITTALS

A. See Section 01 30 00: Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

C. LEED Reports: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15 and appropriate forms.
   1. Credit MR 5: Provide documentation of recycled content type and percentage by cost, location of extraction/recovery/harvest of primary raw materials, steel mill process, location of mill, and location of fabrication.
   2. Credit MR 4: Except for sizes not available from regional producers, materials shall be extracted/harvested/recovered and manufactured within 500 miles of the job site.

D. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

E. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.4 QUALITY ASSURANCE

A. Perform work of this section in accordance with CRSI (DA4), CRSI (P1), ACI 301, ACI SP-66, and ACI 318.
   1. Maintain one copy of each document on the project site.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420).
   1. Deformed billet-steel bars.
   2. Unfinished.

B. Steel Welded Wire Reinforcement: ASTM A 1064/A 1064M, plain type.
   1. Flat sheets.
   2. Mesh Size and Wire Gage: As indicated on drawings.

C. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gage.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
   3. Supports and Spacers in Contact with the Ground:
      a. Precast concrete supports with a surface area of not less than 4 in^2, a compressive strength equal to or greater than the specified compressive strength of the concrete being placed, and embedded tie wires for securing the reinforcement.
      b. Chairs with plastic components and sand plates.
      c. Spacers: Plastic.
   4. Provide stainless steel components for placement within 1½ inches of weathering surfaces.

2.2 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) – Manual of Standard Practice.

B. Welding of reinforcement is not permitted.

C. Locate reinforcing splices not indicated on drawings at point of minimum stress.
   1. Review location of splices with Architect.

PART 3 - EXECUTION

3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement before and during concrete placement. Do not deviate from required position.

B. Clean reinforcement of loose rust, mill scale, earth, ice and other foreign materials that would reduce bond to concrete.

C. Do not displace or damage vapor barrier.

D. Accommodate placement of formed openings.

E. Conform to structural drawings for concrete cover over reinforcement.

3.2 FIELD QUALITY CONTROL

A. An independent inspection agency, as specified in Section 01 40 00, will inspect installed reinforcement for conformance to contract documents before placing concrete. Inspection services shall conform to the Statement of Special Inspections noted in the structural drawings.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete for composite floor construction.

B. Floors and slabs on grade.

C. Concrete foundation walls and building walls.

D. Footings.

E. Columns and piers.

F. Joint devices associated with concrete work.

G. Miscellaneous concrete elements, including equipment pads.

1.2 RELATED REQUIREMENTS

A. Section 03 10 00 – Concrete Forming and Accessories.

B. Section 03 20 00 – Concrete Reinforcing.

C. Section 03 39 00 – Concrete Curing.

D. Section 07 95 13 – Expansion Joint Cover Assemblies.

E. Section 07 90 05 – Joint Sealers.

1.3 REFERENCE STANDARDS

A. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute.

B. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete; American Concrete Institute.

C. ACI 301 – Specifications for Structural Concrete for Buildings; American Concrete Institute.

D. ACI 302.1R – Guide for Concrete Floor and Slab Construction; American Concrete Institute.

E. ACI 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute.

F. ACI 305R – Hot Weather Concreting; American Concrete Institute.

G. ACI 306R – Cold Weather Concreting: American Concrete Institute.

H. ACI 318 – Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute.

I. ASTM C 33 – Standard Specification for Concrete Aggregates.

J. ASTM C 39/C 39M – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

K. ASTM C 94/C 94M – Standard Specification for Ready-Mixed Concrete.

L. ASTM C 150 – Standard Specification for Portland Cement.

M. ASTM C 173/C 173M – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

N. ASTM C 260 – Standard Specification for Air-Entraining Admixtures for Concrete.

O. ASTM C 330 – Standard Specification for Lightweight Aggregates for Structural Concrete.

P. ASTM C 494/ C 494M – Standard Specification for Chemical Admixtures for Concrete.

Q. ASTM C 618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

R. ASTM C 881/C 881M – Standard Specification for Epoxy-Resin Base Bonding Systems for Concrete.

S. ASTM C 989 – Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.

T. ASTM C 1077 – Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

U. ASTM C 1107/C 1107M – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).

V. ASTM C 1240 – Standard Specification for Silica Fume Used in Cementitious Mixtures.

W. ASTM D 1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types).

X. ASTM E 96 – Standard Test Methods for Water Vapor Transmission of Materials.

Y. ASTM E 329 – Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction.

Z. IBC 2015 – International Building Code.

1.4 SUBMITTALS

A. See Section 01 30 00 – Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's data on manufactured products showing compliance with specified requirements.

C. LEED Reports: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15 and appropriate forms.
   1. Credit IEQc4: Provide documentation of VOC content in g/L for adhesives and sealants; comply with VOC limits of Section 01 61 16.

2. Credit MR 5: Provide documentation of recycled content type and percentage by cost, location of extraction/recovery/harvest of primary raw materials, steel mill process, location of mill, and location of fabrication.
3. Credit MR 4: Except for sizes not available from regional producers, materials shall be extracted/harvested/recovered and manufactured within 500 miles of the job site.

D. Samples: Submit samples of under-slab vapor retarder to be used.

E. Design Mixtures:

1. Submit for each concrete mixture.

2. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

3. Indicate amounts of mixing water to be withheld for later addition at project site.

1.5 QUALITY ASSURANCE

A. Concrete Producer: Engage a firm with experience in producing concrete similar to that indicated for this project and within 15 percent of this project size, with a record of successful in-service performance as well as sufficient production capacity to supply concrete without delaying the work.

1. Provide documentation that concrete producer has supplied concrete for at least 3 projects within 15 percent of project size and complexity in the last six years.

B. Concrete Contractor: Engage a firm with experience in placing and finishing concrete similar to that indicated for this project and within 15 percent of this project size, with a record of successful in-service performance.

1. Provide documentation that the concrete contractor has installed concrete for at least 3 projects within 15 percent of project size and complexity in the last six years.

C. Perform work of this section in accordance with ACI 301 and ACI 318.

1. Maintain one copy of each document on site.

D. Follow recommendations of ACI 305R when concreting during hot weather.

E. Follow recommendations of ACI 306R when concreting during cold weather.

F. All form release agents and membrane curing compounds used for slabs and walls that are to be waterproofed shall be submitted to the manufacturer of hot fluid waterproofing system for compatibility review prior to application.

G. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1.

2. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

PART 2 - PRODUCTS

2.1 FORMWORK

A. Comply with requirements of Section 03 10 00.

2.2 REINFORCEMENT

A. Comply with requirements of Section 03 20 00.

2.3 CONCRETE MATERIALS

A. Cement – ASTM C 150 Type 1 – Normal Portland type.
   1. Acquire all cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C 33.
   1. Acquire all aggregates for entire project from same source.

C. Lightweight Aggregate: ASTM C 330.

D. Ground Granulated Blast Furnace Slag: ASTM C 989, Grade 100 or 120.

E. Fly Ash: ASTM C 618 Class F.

F. Calcined Pozzolan: ASTM C 618 Class N.

G. Silica Fume: ASTM C 1240.

H. Water: Clean and not detrimental to concrete.

I. Regional Materials: Provide cement and aggregate manufactured and of primary raw materials extracted or recovered within 500 mile radius of Project Site.

2.4 CHEMICAL ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C 260.

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

D. High Range Water Reducing Admixture: ASTM C 494/C 494M, Type F.

E. Water Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.

F. Water Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

G. Accelerating Admixture: ASTM C 494/C 494M, Type C.

H. Retarding Admixture: ASTM C 494/C 494M, Type B.

I. Water Reducing Admixture: ASTM C 494/C 494M, Type A.

2.5 ACCESSORY MATERIALS

A. Underslab Vapor Retarder: Comply with ASTM E 1745, Class A.
   1. Maximum Permeance ASTM E 96: 0.018 perms (English).
   2. Provide standard accessories and tape for complete system.
   3. Acceptable Products:
      a. Stego Wrap (15-mil) Vapor Barrier by Stego Industries LLC.
      b. Perminator: 15 mils by W.R. Meadows, Inc.
      c. 15 Mil Green by Reef Industries, Inc.

d. Vapor Block 15 by Raven Industries.
e. Yellow Guard 15-mil Vapor Barrier by Poly-America.

4. Single ply polyethylene is prohibited.

B. Non-Shrink Grout: ASTM C 1107/C 1107M; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

1. Minimum Compressive Strength at 48 Hours: 2,400 psi.
2. Minimum Compressive Strength at 28 Days: 7,000 psi.

C. Curing Materials: Comply with requirements of Section 03 39 00.

2.6 BONDING AND JOINTING PRODUCTS

A. Bonding Agent: Epoxy bonding system complying with ASTM C 881/C 881M and of Type required for specific application.

B. Waterproofing Admixture Slurry: Slurry coat of Portland cement, sand, and crystalline waterproofing additive, mixed with water in proportions recommended by manufacturer to achieve waterproofing at cold joints in concrete.

1. Manufacturers:
   a. Aquafin, Inc.: www.aquafin.net.
   b. Xypex Chemical Corporation: www.xypen.com.
   c. Kryton International Inc: www.kryton.com.

C. Self-Expanding Strip Waterstops: Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophilic material for adhesive bonding to concrete.

1. Available Products:
   a. Volclay Waterstop-RX: Colloid Environmental Technologies Co.
   b. Conseal CS-231: Concrete Sealants Inc.
   c. Swellseal Joint: De Neef Construction Chemicals (U.S.) Inc.
   d. Hydrotite: Greenstreak.
   e. Mirastop: Mirafil Moisture Protection, Div. of Royal Ten Cate (USA), Inc.
   f. Adeka Ultra Seal: Mitsubishi International Corporation.
   g. Superstop: Progress Unlimited Inc.

D. Joint Filler: Non-extruding, resilient asphalt impregnated fiberboard, cork or flexible foam, complying with ASTM D 1751, thickness as indicated on drawings and full depth of slab less ½ inch; tongue and groove profile.

E. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with minimum1 inch diameter holes for conduit or rebars to pass through at 6 inches on center, ribbed steel stakes for setting.

1. Provide removable plastic cap strip that forms wedge-shaped joint for sealant installation.
2. Height: To suit slab thickness.

F. Sealant and Primer: As specified in Section 07 90 05.

2.7 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

1. Replace no less than 30% and no more than 50% of Portland cement in structural concrete with approved pozzolanic materials.
2. Ground Granulated Blast Furnace Slag Content: Not to exceed 50% of cementitious material by weight.
3. Fly Ash or Calcined Pozzolan Content: Not to exceed 25% of cementitious material by weight.

4. Silica Fume Content: Not to exceed 10% of total cementitious material by weight.

5. Obtain approval in advance before submitting mix containing any other pozzolanic substances.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

D. Normal Weight Concrete:

1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: As indicated on drawings.

2. Water-Cementitious Materials Ratio: Maximum 58% by weight. Maximum 40% by weight for exterior concrete.
   a. Interior slabs shall have a maximum water-cementitious material ratio of 50% by weight.

3. Entrained air content for trowel-finished interior slabs shall not exceed 3%, determined in accordance with ASTM C 173/C 173M.

4. Entrained air content for footings shall not exceed 4.5%, determined in accordance with ASTM C 173/C 173M

5. Air Content for Exterior Exposed Concrete: Add air entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows with a tolerance of plus 1 or minus 1.5%, unless otherwise indicated.
   a. Air Content: 6% entrained air, determined in accordance with ASTM C 173/C 173M.

6. Maximum Slump: 4 inches.

7. Maximum Aggregate Size: 1 inch.

2.8 MIXING

A. Transit Mixers: Comply with ASTM C 94/C 94M.

B. Do not add water to concrete during delivery, at the project site or during placement except as predetermined by concrete mix, unless approved by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

A. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent, as indicated on the drawings, in accordance with the manufacturer's instructions.

B. Where new concrete with integral waterproofing is to be bonded to previously placed concrete, prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions. Saturate cold joint surface with clean water, and remove excess water before application of coat of waterproofing admixture slurry. Apply slurry coat uniformly with semi-stiff bristle brush at rate recommended by waterproofing manufacturer.

C. In locations where new concrete is doweled to existing work, drill holes in existing concrete and insert steel dowels using an epoxy adhesive approved by the Architect.

D. Install vapor retarder under interior slabs on grade in accordance with manufacturer's instructions and ASTM E 1643.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

D. Separate slabs on grade from vertical surfaces with joint filler.

E. Place joint filler in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

F. Extend joint filler from bottom of slab to within ½ inch of finished slab surface. Conform to Section 07 90 05 for finish joint sealer requirements.

G. Install joint devices in accordance with manufacturer's instructions.

H. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

I. Install joint device anchors for expansion joint assemblies specified in Section 07 95 13. Maintain correct position to allow joint cover to be flush with floor and wall finish.

J. Apply sealants in joint devices in accordance with Section 07 90 05.

K. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

L. Place concrete continuously between predetermined expansion, control and construction joints.

M. Do not interrupt successive placement. Do not permit cold joints to occur.

N. Place slabs on grade with saw cut pattern indicated.

O. Saw cut joints as soon as the concrete is firm enough not to be damaged by the cutting action. Use 3/16 inch thick blade, cut into ¼ depth of slab thickness.

3.4 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas ¼ inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas ¼ inch or more in height. Provide finish as follows:

1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.

D. Concrete Slabs: Finish to requirements of Section 03 35 13.

3.5 CURING AND PROTECTION

A. Comply with requirements of Section 03 39 00.

3.6 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00. Inspection services shall conform to Section 1705.3 and Table 1705.3 of the 2015 IBC Code and the Statement of Special Inspections noted in the structural drawings. The exceptions noted in Section 1705.3 shall not be allowed.

B. Provide free access to concrete operations at project site and cooperate with appointed firm; inspection to occur for:

1. Steel reinforcement placement.
2. Anchor bolts and studs.
3. Verification of use of required design mixture.
4. Concrete placement, including conveying and depositing.
5. Curing procedures and maintenance of curing temperature.
6. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

E. Test composite samples of fresh concrete obtained according to ASTM C 172.

F. Compressive Strength Tests: ASTM C 39/C 39M.

1. Compression Test Specimens: ASTM C31/C 31M; cast and laboratory cure five 6”x12” standard cylinder specimens or seven 4”x8” standard cylinder specimens for each composite sample.
2. Test one laboratory-cured specimen at 7 days and one set of two 6”x12” or three 4”x8” specimens at 28 days. Remaining cylinders shall be held in reserve.
3. Obtain test samples for every 75 cu.yd. or less of each class of concrete placed each day.
4. A compressive-strength test shall be the average compressive strength from all specimens obtained from same composite sample and tested at age indicated.
5. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive-strength and no compressive-strength test value falls below specified compressive-strength by more than 500 psi.

G. Take two additional 6”x12” or three additional 4”x8” test cylinders during cold weather concreting, cured on job site under same conditions as concrete it represents. Test at 28 days.

H. Perform one slump test, at point of discharge for each set of test cylinders taken, following procedures of ASTM C 143/C 143M.

I. Perform air content test for each set of test cylinders taken, following procedures of ASTM C 231.

J. Perform unit weight test of structural lightweight concrete for each set of test cylinders taken, following procedures of ASTM C 567.

K. Test concrete temperature each hour when air temperature is 40 degrees F and below and when 80 degrees F and above, and for each set of test cylinders taken, following procedures of ASTM C 1064/C 1064M.

3.7 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to the Architect and Contractor within 24 hours of test.

1. Testing and inspecting agency will make additional tests of concrete when test results indicate that slump, compressive strengths, or other requirements have not been met, as directed by the Architect.
2. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by the Architect.
3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
4. Correct deficiencies that test reports and inspections indicate do not comply with specified requirements.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements. Repair or replace defective concrete, subject to the approval of the Architect.

C. Do not patch, fill, touch-up, repair or replace exposed concrete except upon express direction of the Architect for each individual area.

END OF SECTION

SECTION 03 35 00 - CONCRETE FLOOR SEALERS/DENSIFIERS/HARDENERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surface treatment with concrete hardener and sealer.

1.02 REFERENCE STANDARDS

A. ACI 301 – Specifications for Structural Concrete for Buildings; American Concrete Institute.

B. ACI 302.1R – Guide for Concrete Floor and Slab Construction; American Concrete Institute.

1.03 SUBMITTALS

A. Product Data: Provide data on concrete hardener and sealer, including information on compatibility of different products and limitations.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301 and ACI 302.1R.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer’s sealed packaging, including application instructions.

1.06 PROJECT CONDITIONS

A. Coordinate the work with concrete floor placement and concrete floor curing.

B. Maintain ambient temperature of 50 degrees F minimum.

PART 2 - PRODUCTS

2.01 COMPOUNDS, HARDENERS AND SEALERS

A. Chemical hardener: Clear, chemically reactive, waterborne solution of inorganic siliconate materials and proprietary components, odorless, colorless, that penetrates, hardens, and densifies concrete surfaces.

1. VOC Content: Not to exceed 200 g/L.
2. Acceptable Products:
    a. Ashford Formula, Concrete Chemical Company, Inc.
    b. Seal Hard, L & M Construction Chemicals, Inc.
    c. Titan Hard, Burke Construction Chemicals.
    d. Euco Diamond Hard, Euclid Chemical Company

PART 3 - EXECUTION

3.01 FLOOR SURFACE TREATMENT

A. Prepare surface in accordance with manufacturer's instructions.

B. Clean concrete surfaces of dirt, dust, debris, oil, grease, bond-breaker compounds, curing compounds, sealers, laitance, paint and other contaminants which could adversely affect liquid concrete floor hardener penetration.

C. Apply hardener to floor surfaces in accordance with manufacturer's instructions.

END OF SECTION

SECTION 03 35 13 - HIGH-TOLERANCE CONCRETE FLOOR FINISHING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Finishing slabs on grade and monolithic floor slabs.

B. Surface treatment with concrete hardener and sealer.

1.2 REFERENCE STANDARDS

A. ACI 301 – Specifications for Structural Concrete for Buildings; American Concrete Institute.

B. ACI 302.1R – Guide for Concrete Floor and Slab Construction; American Concrete Institute.

C. ASTM E 1155 – Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness.

1.3 SUBMITTALS

A. Section 01 30 00 – Administrative Requirements for submittal procedures.

B. Product Data: Provide data on concrete hardener and sealer, including information on compatibility of different products and limitations.

C. Submit floor surface flatness and levelness measurements to determine compliance with specified tolerances.

D. Maintenance Data: Provide data on maintenance renewal of applied coatings.

E. LEED Submittal: Provide documentation of VOC content in g/L for primers, sealers and floor coatings applied within the building waterproofing envelope.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.
   1. Maintain one copy on project site.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer’s sealed packaging, including application instructions.

1.6 PROJECT CONDITIONS

A. Coordinate the work with concrete floor placement and concrete floor curing.

1.7 FIELD CONDITIONS

A. Maintain ambient temperature of 50 degrees F minimum.

B. Provide ventilation sufficient to prevent injurious gases from temporary heat or other sources affecting concrete.

PART 2 - PRODUCTS

2.1 COMPOUNDS – HARDENERS AND SEALERS

A. Chemical Hardener: Clear, chemically reactive, waterborne solution of inorganic siliconate materials and proprietary components, odorless, colorless, that penetrates, hardens, and densifies concrete surfaces.
   1. Provide for interior slabs not receiving a subsequent finish.
   2. VOC Content: Not to exceed 200 g/L.
   3. Acceptable Products:

a. Ashford Formula, Concrete Chemical Company, Inc.
b. Seal Hard, L & M Concrete Chemicals, Inc.
c. Euco Diamond Hard, Euclid Chemical Company.

PART 3 - EXECUTION

3.1 FLOOR FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1R.

B. Steel trowel surfaces that will receive carpeting, resilient floors, seamless flooring, thin set terrazzo or thin set ceramic tile.

3.2 FLOOR SURFACE TREATMENT

A. Apply hardener to floor surfaces in accordance with manufacturer's instructions.

3.3 TOLERANCES

A. Contractor will engage an independent testing agency, as specified in Section 01 40 00, to test finished slabs for flatness.

B. Measure for F(F) and F(L) tolerances for floors in accordance with ASTM E 1155, within 48 hours after slab installation.

C. Finish concrete to achieve the following tolerances:
1. Slabs to be Covered with Thin Floor Coverings (i.e., resilient flooring). Specified overall values of flatness F(F) 35 and of levelness F(L) 25; with minimum local values of flatness, F(F) 24 and of levelness F(L) 17.
2. Slabs to be Covered with Carpet and Other Slabs: Specified overall values of flatness F(F) 25 and of levelness F(L) 20; with minimum local values of flatness, F(F) 17 and of levelness F(L) 15.
3. The F(L) values listed above are not applicable to elevated slabs on deck. Only F(F) values apply to elevated slabs.

D. Correct the slab surface if tolerances are less than specified.

E. Correct defects by grinding or by removal and replacement of defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

END OF SECTION

SECTION 03 39 00 - CONCRETE CURING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Initial and final curing of horizontal and vertical concrete surfaces.

1.02 REFERENCE STANDARDS

A. ACI 301 – Specifications for Structural Concrete for Buildings; American Concrete Institute.

B. ACI 302.1R – Guide for Concrete Floor and Slab Construction; American Concrete Institute.

C. ACI 305R – Hot Weather Concreting; American Concrete Institute.

D. ACI 306R – Cold Weather Concreting; American Concrete Institute.

E. ACI 308R – Guide to Curing Concrete; American Concrete Institute.

F. ASTM C 171 – Standard Specification for Sheet Materials for Curing Concrete.

G. ASTM C 309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

H. ASTM D 2103 – Standard Specification for Polyethylene Film and Sheeting.

1.03 SUBMITTALS

A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on curing compounds, moisture-retaining sheet, and polyethylene film, including compatibility of different products and limitations.

C. LEED Submittal: Provide documentation of VOC content in g/L for concrete curing compound.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301 and ACI 302.1R.

PART 2 - PRODUCTS

2.01 MATERIALS

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

B. Membrane Curing Compound: ASTM C 309 Type 1 – Clear or translucent, Class B.

1. VOC Content not to exceed 350 g/L.

C. Moisture-Retaining Sheet: ASTM C 171.

1. Curing paper, regular.
2. Polyethylene film, clear, minimum nominal thickness of 0.0040 in.

3. White-burlap-polyethylene sheet, weighing not less than 10 oz/per linear yd., 40 inches wide.

D. Polyethylene Film: ASTM D 2103, 4 mil thick, clear.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to be cured.

3.02 EXECUTION – HORIZONTAL SURFACES

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306R for cold-weather protection and ACI 305R 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./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 floor surfaces in accordance with ACI 308.

D. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges; maintain in place for not less than 4 days.

E. Absorptive Moisture-Retaining Sheet: Saturate burlap-polyethylene and place burlap side down over floor slab areas, lapping ends and sides; maintain in place for 7 days.

F. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions in one coat.

3.03 EXECUTION – VERTICAL SURFACES

A. Cure surfaces in accordance with ACI 308.

B. Membrane Curing Compound: Apply compound in accordance with manufacturer's instructions in one coat.

3.04 PROTECTION

A. Do not permit traffic over unprotected floor surface.

END OF SECTION

SECTION 03 52 50 - REPAIR MORTARS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes Portland cement-based, microsilica-modified, fast setting structural repair mortar suitable for overlays, form & pour applications, and full depth repairs at existing floor trenches.

B. Related Sections include the following:
   1. Section 033000, Cast-In-Place Concrete

1.2 REFERENCES

A. ASTM C 109, Standard Compressive Strength of Hydraulic Cement Mortars

B. ASTM C 78, Standard Test Method for Flexural Strength of Concrete

C. ASTM C 469, Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression

D. ASTM D 4541, Pull-Off Strength of Coatings Using Portable Adhesion Testers

E. ASTM C 496, Splitting Tensile Strength of Cylindrical Concrete Specimens

F. ASTM C 157, Length Change of Hardened Hydraulic-Cement Mortar and Concrete

G. ASTM C 309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

H. ICRI Technical Guideline No. 03732 Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

I. ICRI Technical Guideline No. 03730 Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used. Include manufacturer's Material Safety Data Sheets.

B. Qualifications Data: For Installer

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: The manufacturer shall be a company with at least five years experience and regularly engaged in the manufacture and marketing of products specified herein.

B. Installer Qualifications: Installation of the ARDEX product must be completed by a factory-trained applicator using mixing equipment and tools approved by the manufacturer. Please contact ARDEX Engineered Cements (724) 203-5000 for a list of recommended installers.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.

B. Store products in a dry area with temperature maintained between 50° and 85° F (10° and 29° C) and Protect from direct sunlight.

C. Handle products in accordance with manufacturer's printed recommendations.

1.6 PROJECT CONDITIONS

A. Do not install material below 50° F (10° C) surface and air temperatures. These temperatures must also be maintained during and for 48 hours after the installation of products included in this section. Install quickly if substrate is warm and follow warm weather instructions available from the ARDEX Technical Service Department.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: ARDEX Engineered Cements; www.ardex.com.

B. Sika Corporation.

2.2 REPAIR MORTAR

A. Formable, pourable, pumpable, Portland cement-based, microsilica-modified, structural repair mortar for horizontal, vertical, and overhead applications for deteriorated interior and exterior concrete above, on, or below grade.
   1. Basis-of-Design Products:
      a. ARDEX TRM™ as manufactured by ARDEX Engineered Cements, 400 Ardex Park Drive, Aliquippa, PA 15001 USA 724-203-5000.
   2. Performance and Physical Properties: Meet or exceed the following values for material cured at 73° F and 50 percent relative humidity.
      a. Compressive Strength (ASTM C109): 2 hours 3500 psi 245.0 kg/cm2, 3 hours 4500 psi 315.0 kg/cm2, 1 day 5750 psi 402.5 kg/cm2, 7 days 7500 psi 525.0 kg/cm2, 28 days 11500 psi 805.0 kg/cm2
      b. Flexural Strength (ASTM C78): 7 days 850 psi 59.5 kg/cm2, 28 days 1100 psi 77.0 kg/cm2
      c. Splitting Tensile Strength (ASTM C496): 7 days 550 psi 38.5 kg/cm2, 28 days 625 psi 43.75 kg/cm2
      d. Modulus of Elasticity: 28 days 3.8 x 106 psi 2.7 x 105 kg/cm2
      e. Direct Tensile Bond Strength (ASTM D4541): 28 days 240 psi 16.8 kg/cm2
      f. Slant Shear Bond Strength (ASTM C882): 1 day 1250 psi 87.5 kg/cm2, 7 days 2000 psi 140.0 kg/cm2
      g. Mortar (Max Scaled Material): 25 cycles 0.008 psf 0.000004 kg/cm2, 50 cycles 0.01 psf 0.000005 kg/cm2
      h. Time of Setting (ASTM C191): Initial Set 10 min.
      i. Final Set 15 min.
      j. Length Change (ASTM C157, 28 days): In Water -0.002%, In Air -0.05%
      k. Scaling Resistance / Visual Rating (ASTM C672): 25 cycles 1, 50 cycles 1
      l. Pot Life / Working Time: 10 - 20 minutes
      m. Time to Traffic: Foot - 2 hours
      n. Full, Including Rolling Loads - 6 hours
      o. Coat or Seal: Approx. 6 hours
      p. Color: Gray

PART 3 – EXECUTION

3.1 PREPARATION

A. General: Prepare substrate in accordance with manufacturer's instructions. Prior to proceeding with any repair, please refer to the International Concrete Repair Institute's ICRI 03730 Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion; ICRI 03732 Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays; and the American Concrete Institute's ACI 546R-04 Concrete Repair Guide for general guidelines for concrete repair.
   1. All concrete and masonry substrates must be sound, solid, dry, and completely free of all oil, grease, dirt, curing compounds and any substance that might act as a bond breaker. Overwatered, frozen or otherwise weak concrete surfaces must also be cleaned down to sound, solid concrete by mechanical methods such as scarifying, scabbling or similar in accordance with ICRI 03732 before priming. Acid etching and the use of sweeping compounds and solvents are not acceptable.
   2. The repair area must be saw cut in a basic rectangular shape at least 1/2" (12 mm) in depth. The cuts should be made at 90° angle, and should be slightly keyed. Chip out the
   3. concrete inside the cuts to a minimum depth of 1/2" (12 mm) until the area is squared or box shape.
   4. Mechanically prepare surface to obtain an exposed aggregate surface with a minimum surface profile of approximately 1/16" (1.5 mm).
   5. For cases with exposed reinforcing steel, mechanically clean the steel to remove all rust and any other contaminants in accordance with ICRI 03730. Prime the steel with ARDEX Bonding & Anti-Corrosion Agent™ prior to proceeding with repair. For further details, please refer to the ARDEX Technical brochure.

B. Joint Preparation
   1. Moving Joints and Cracks – honor all expansion and isolation joints up through the ARDEX TRM™. A flexible sealing compound suitable for the application may be installed. ARDEX ARDISEAL™ RAPID PLUS may be installed for interior applications only.
   2. Control Joints and dormant cracks greater than 1/16" – fill all non-moving joints and cracks with ARDEX ARDIFIX™ Joint Filler.

3.2 INSTALLATION OF ARDEX TRM™ Transportation Repair Mortar:

A. Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

B. Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas and landscaping from contact due to mixing and handling of materials.

C. Mixing: Comply with manufacturer's printed instructions and the following.
   1. Precondition components to temperature of 70° plus or minus 5° F (21° plus or minus 2.5° C) prior to mixing.
   2. Pre-dampen the inside of a 5 gallon pail or inside of a clean mortar mixer, and remove any excess water.
   3. Add 5-6 pints (2.37 L TO 2.84 L) of clean potable water per 50-pound (22.7 kg) bag.
   4. Slowly add 1/3 of a 50 lb. (22.7 kg) bag. Once material is blended in, add the next third and so on until all material is added.

5. Mix using a ½" to ¾" (12 to 19 mm) low speed heavy-duty mixing drill with a heavy gauge square box (butterfly) mixing paddle. Forced action mortar mixers are also suitable. Mix to a uniform, lump-free consistency. Do not overwater.
6. For application depths greater than 4 inches, add up to 25 pounds (11.3 kg) clean, uniformly graded, saturated-surface-dry 3/8-inch (.95 mm) aggregate per bag, as directed by manufacturer.

D. Application: Comply with manufacturer's printed instructions and the following.
1. Do not apply in freezing conditions or during precipitation.
2. Comply with manufacturer's guides for hot and cold weather application.
3. Primer: Dampen substrate to fill concrete pores with water. Remove ponding, glistening, or surface water (saturated surface dry). Alternatively, ARDEX P 71™ Primer can be used in accordance with the ARDEX Technical brochure. Do not allow the concrete or ARDEX P 71™ to dry before installing ARDEX TRM™. If ARDEX Bonding & Anti-Corrosion Agent is specified as a primer, follow the application instructions in the ARDEX Technical Brochure.
4. ARDEX TRM™ can be applied to any prepared concrete surface using standard concrete practices. Allow material to take initial set before finishing.
5. When overlaying, Apply scrub coat of repair mortar into primed or saturated surface dry substrate to ensure intimate contact and establish bond. Apply ARDEX TRM™ while scrub coat is wet.
6. Steel trowel the mortar to the desired finish once it takes its initial set.
7. Vibrate closed–form repairs to ensure intimate contact with the substrate, establish bond, and ensure proper consolidation. Avoid over-vibration.
8. ARDEX TRM™ can be installed to a minimum thickness of ½" up to 4" (6 mm to 5 cm) neat. For application depths greater than 4", including full depth repairs up to 8", extend ARDEX TRM™ with aggregate as recommended by manufacturer.

E. Curing:
1. Keep surface damp for 48 hours with continuous light water-fogging or curing blanket.
2. If no coating or sealer is to be applied, a water-based curing compound meeting ASTM C309 may be used. Do not use solvent-based curing compounds.
3. Allow to cure a minimum 6 hours before applying any final coatings or sealers.
4. Acceptable for foot traffic in 2 hours and vehicular traffic in 6 hours.

F. Cleaning: Remove excess material before material cures. If material has cured, remove using mechanical methods that will not damage substrate.

END OF SECTION

SECTION 04 01 01 - MASONRY CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

A. The principal items of work are related to furnishing all labor, materials, tools, equipment and services necessary for and reasonably incidental to complete the cleaning of the exterior masonry of the existing 200 building and all new masonry.

B. Clean all existing precast concrete window sills.

1.3 SUBMITTALS:

A. Product Data: Submit product data and manufacturer's literature for all materials to be used in the performance of the work.

B. Submit qualifications of the Contractor as specified.

C. Protection Program: Prior to the preparation of field samples, submit a written description of the materials and methods proposed for providing access to the work areas, for protecting the portion of the building not being cleaned, for protecting site vegetation and for protecting pedestrian traffic from cleaning chemicals and operations.

D. Submit a written description of the cleaning materials, equipment and procedures proposed for use on the project.

1.4 FIELD SAMPLES

A. Sample Cleaning Panels:
   1. Prior to the start of cleaning operations prepare the following sample cleaning panels at location on the building selected by the Architect.
   2. Prepare sample panels of approximate size listed for each type of specified cleaning material or method at locations selected by the Architect. Cleaning sample shall be performed in the presence of the Architect. Adjust dwell times, working pressures and dilution rates as directed by the Architect until the samples panels are accepted for each type of cleaning.
      a. Provide one (1) 12-inch by 12-inch sample panel for each of the following:
         1) Ferrous and Iron Stain Remover
         2) Graffiti, Tar and Paint Remover
      b. Obtain the Architect written approval of cleaning methods, working pressures, materials, equipment used and sample panels before proceeding with general cleaning. Allow a minimum 7 day period for review.
   3. Protection Mock Up: Prior to the start of cleaning, prepare a mock up of the methods and materials proposed for protection of the surrounding building and site materials not being cleaned. Use actual cleaning materials and working pressures to test the effectiveness of the protection methods. Perform testing in the presence of the Architect.

1.5 QUALITY ASSURANCE

A. The cleaning work of this section shall be performed by a firm with a minimum of five years of specialized experience in the successful cleaning of masonry the same as that required by this project.

B. Submit a written record of a minimum of three completed projects for which the cleaning contractor has performed stone masonry cleaning, the same as required for this project. Projects submitted shall include steam, and chemical cleaning of exterior masonry and shall be similar in scope and size to this project. Include the name and address of the building, a description of the work performed, the approximate cost of the work and the name and current telephone number of a reference for the project.

C. Submit the qualifications of all individuals who will be performing the cleaning work, with evidence of their experience in the cleaning of historic stone masonry, including experience with steam and chemical cleaning operations similar to the work of this project. Include the names of the projects for which similar work has been performed and years of experience with the firm. Only persons with acceptable previous experience and only those persons whose qualifications have been reviewed and accepted will be allowed to perform the cleaning work.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site in the manufacturer's original and unopened containers and packaging, bearing labels as to the type of material, brand name and manufacturer's name. Delivered materials shall be identical to approved samples.

B. Store materials off the ground in a dry, clean location. Remove materials which are damaged or otherwise not suitable for use from the job site. Store materials at temperatures and humidity conditions required by the manufacturer.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Temperature: No cleaning shall be executed when air temperatures fall below 50 degrees F or are projected to fall below 50 degrees F anytime within the 5 days following cleaning.

B. Illumination: All cleaning shall be conducted in daylight hours with a minimum of 100 footcandles of illumination.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

A. Warm Water: Clean, potable, free of oils, acids, alkalis, salts and organic matter heated to 160-180 degrees F delivered at 100-120 psi at 4-6 gallons per minute.

B. General Cleaning Solution: A non-acidic mild cleaning solution capable of cleaning the stone without staining, bleaching, etching, streaking, discoloring or otherwise damaging polished stone, including one or more of the following ProSoCo products. The cleaning material or combination of materials will be determined during sample panel preparation.
   1. EK2010 All Surface Cleaner by ProSoCo
   2. Sure Klean Lite Duty Restoration Cleaner by ProSoCo
   3. BioKlean (Cleaner and Activator) by ProSoCo

C. Ferrous and Iron Stain Remover: To be used in areas of special staining such as ferrous or copper staining. Use ProSoCo, Inc. Ferrous Stain Remover or approved equal, in strict accordance with the manufacturers' recommended mixing and application procedures.

1. Graffiti, Tar and Paint Remover: Solvent based strippers with formulations to be determined based upon the type of paint, marker or other deposits to be removed. Strippers may include methylene chloride, acetone, toluene, mineral spirits, alcohol, turpentine, or other solvent based materials. May also include citric acid based cleaners if paint or markers are acrylic based.
2. Steam: Water heated to a temperature of 220-300 degrees F, delivered at a pressure of 150-240 psi at one gallon per minute or less.

2.2 CLEANING EQUIPMENT

A. Brushes: Long bristle, soft, natural fiber or nylon bristle only.

B. Water Washing Equipment: Capable of delivering warm water at pressures of 400 psi up to 1000 psi at a constant water flow of 4-6 gallons per minute. Equipment shall have intact, accurately calibrated operational gauges to measure and monitor water pressure and flow. Equipment shall be gas, kerosene or electric powered. If electric, the contractor shall provide a self contained generator to provide power to the cleaning equipment.

C. Spray Tips: Fan and cone type, stainless steel, dispersing a 45 degree spray.

D. Steam Equipment: Capable of delivering live steam at a temperature of 220-330 degrees F at a pressure of 150-240 psi at one gallon per minute or less. Equipment shall be gas, kerosene or electric powered. If electric contractor shall provide a self contained generator to provide power to cleaning equipment.

2.3 WORKING PRESSURES

A. Working pressure shall be measured at the nozzle of the spray apparatus, not at the masonry surfaces. Pressures shall be measured as follows:
   1. Low Pressure: 100-400 psi
   2. Medium Pressure: 401-800 psi
   3. High Pressure: 801-1000 psi

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect site conditions to determine that cleaning operations can be conducted without endangering or causing interference with other materials or work at the site.

B. Verify that all miscellaneous hardware, fasteners, anchors, membrane, flashing, sealants, etc. have been removed and the stone surfaces are properly prepared for cleaning.

C. Inspect the site and building drainage to determine that it is adequate to carry away all materials and runoff. Inspect building drainage to verify that any internal leaders or drains are connected to the storm water drainage system and that runoff will not drain into the building. Inspect and maintain drains daily to insure that they are operating and capable of collecting the runoff generated by the cleaning operations. Provide dams to divert cleaning runoff to drains in compliance with municipal code.

3.2 PREPARATION

A. Take all necessary precautions and protective measures to protect surrounding materials on the site not being cleaned from coming in contact with the cleaning materials and run-off.

B. Take necessary precautions to protect workmen and pedestrians from cleaning overspray and run-off.

C. Contact Architect prior to the start of cleaning at severely deteriorated areas of the material.

3.3 GENERAL MASONRY CLEANING

A. Wet the surface of the stone lightly with low pressure (240 psi) warm water and apply the general cleaning solution determined to work most effectively during field sample cleaning tests, to the stone with soft bristle brushes. At all wall surfaces, wash in small, ten (10) square feet or less, overlapping areas starting from the base of the walls and working up. Agitate the cleaner with soft bristle brushes as necessary to loosen dirt and staining.

B. Rinse each cleaned area with low pressure (240 psi) clear water to remove cleaner and dirt before proceeding to the next area. Do not allow cleaner to dry on the surface. Rinse the entire cleaned area with low pressure (240 psi) clear water and dry with soft cloths or sponges.

C. Cleaned surfaces shall be evenly clean, evenly colored, without streaking, spotting or staining.

3.4 IRON STAIN REMOVAL

A. For use at areas of iron staining at the masonry.

B. Pre-wet the stain and surrounding area with warm water at low pressure.

C. Apply Ferrous Stain Remover limited to the immediate area of the staining. Allow to stand for 3 minutes or as determined optimum during testing. Reapply and agitate with brushes. Rinse with warm water at low to medium pressure to remove stain and chemical.

END OF SECTION

SECTION 04 20 00 - UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete Block.
B. Clay Facing Brick.
C. Mortar and Grout.
D. Reinforcement and Anchorage.
E. Flashings.
F. Lintels.
G. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.3 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.
B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2014.
D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2013.
E. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2013.
F. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.
G. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2014.
H. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
I. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
J. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
K. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2012.
L. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
M. ASTM C476 - Standard Specification for Grout for Masonry; 2010.
N. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.
O. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
P. IBC 2015 - International Building Code.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Samples for Verification: For each type and color of the following:
   1. Face brick, in the form of straps of five or more bricks.
   2. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.

D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

E. Shop Drawings:
   1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.Fabricated
   2. Flashing: Detail inside/outside corner units, sill and head conditions; end-dam conditions; base-of-wall, lintel and low roof-to-wall conditions; and other special applications.

F. Mix Designs: For each type of mortar and grout.
   1. Include description of type and proportions of ingredients.
   2. Include test reports, per ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

G. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00; report recycled content for masonry units and reinforcement.
   1. Credit MR 5.1 and 5.2:
      a. Provide product data indicating location of manufacturer and location of extraction/recovery of primary raw materials.
      b. Include statement indicating cost for each regionally manufactured material.
   2. Credit MR 4.1 and 4.2: Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
      a. Contributions to this Credit include recycled content of bottom ash and recycled content of steel reinforcement.

H. LEED Submittals:
   1. Credit EQ 4.1: Product Data highlighting VOC content of cavity wall insulation adhesive.

I. Coordinate with Construction Waste Management requirements.

J. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

K. Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with hot-weather requirements.

L. Temporary Bracing Plan:
   1. Provide a temporary bracing plan for the information-only of the Architect; plan to be submitted minimum two weeks prior to initiating masonry Work.
   2. The bracing plan must be based on the Mason Contractors Association of America's Standard Practice for Bracing Masonry Walls Under Construction, and Masonry Wall Bracing Design Handbook, or another industry recognized standard.

3. Bracing plan must be reviewed by a Professional Structural Engineer licensed in the State of Maryland; Professional Structural Engineer to provide a letter certifying his review of the plan and acknowledgement of its completeness.
4. The bracing plan and Professional Structural Engineer's letter must indicate project conditions unique to any referenced standard and provide for the unique bracing required for those conditions.
5. Maintain one copy of any industry standard referenced within the plan, on project site.

1.5 QUALITY ASSURANCE

A. Masonry Contractor Qualification:
   1. Engage a trade contractor with at least 10 years experience in masonry construction of type and scope included in the construction documents.
   2. Demotrate experience by submitting to the Owner a list of at least 10 masonry projects of similar size, complexity and scope.
   3. Submit resumes of all key personnel that will be assigned to the Project; dedicate assigned personnel to the Project for the entire scope of Work.

B. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
   1. Maintain one copy of each document on project site.

C. Fire-Resistance Ratings: Where indicated, provide materials identical to those assemblies with fire-resistance ratings conforming to the Standard Method for Determining Fire Resistance of Concrete and Masonry Assemblies, ACI 216.1-97/TMS-0216-07, National Concrete Masonry Association TEK 7-1A, and ASTM E-119, and acceptable to authorities having jurisdiction.
   1. Certification of concrete masonry units for fire ratings must be provided by the National Concrete Masonry Association or qualified independent testing agency.
   2. Provide Letter of Certification for aggregates used in mix design assuring compliance with ASTM C 33 and ASTM C 331.
   3. Provide mix design and determined equivalent thickness, for units incorporating recycled content materials.

1.6 MOCK-UP

A. Mock-up: Prior to installing unit masonry, construct sample wall panels to verify selections made under sample submittals and to demonstrate aesthetic effects as well as other qualities of materials and execution. Build mockups to comply with the following requirements, using materials for final unit of Work.
   1. Locate mockup on site within 4 weeks of Contract award in location as directed by Architect.
   2. List of Material Used in Construction Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to specifically identify exact materials used. Include mix proportions for mortar and grout and source of aggregates.
   3. Build mockup of typical wall.
      a. Include exterior face brick wall with cast stone trim.
      b. Include aluminum storefront frame complying with requirements of Division 8 Section "Aluminum-Framed Storefront" with applicable window lintel detail.
      c. Seal perimeter of window complying with requirements of Division 7 Section "Joint Sealers."

d. Include sealant-filled control joints complying with requirements of Division 7 Section "Joint Sealers."

4. Build mockup as detailed on the drawings.
5. Coordinate construction of mockup with Architect such that elements within wall construction can be reviewed prior to being concealed.
6. Notify the Architect when mock-up is ready for inspection. Remove and replace defective and deficient parts of the wall as identified by the Architect, and replace until such time that all the work is acceptable to the Architect and Owner.
7. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   a. Acceptance of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
   b. Acceptance of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.
   c. When directed, demolish and remove mockups from Project site.

1.7 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

B. Store masonry units, cementitious materials, and preblended, dry mortar mix on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securly tied. If units become wet, do not install until they are dry.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
   2. Where 1 wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
   3. Verify masonry protection at end of each day; inadequate protection by the trade contractor to be corrected or replaced by the Contractor, for proper protection; costs incurred by the Contractor is not the Owner's responsibility, but may be recovered under agreement with trade contractor.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold and Hot Weather Requirements: Comply with requirements of ACI 530.1/ASCE 6/TMS 602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
   2. Special Shapes:
      a. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
      b. Provide bullnose units for outside corners, unless otherwise indicated.
      c. Bullnose units are not to be used at areas scheduled to be covered with tile.
   3. Load-Bearing Units: ASTM C90, normal weight.
   4. Recycled Content: Provide units having a minimum fly ash content of 10 percent.
      a. Provide testing and chain-of-custody certification recycled materials.
      b. Properly modify the equivalent thickness of fire-rated concrete masonry units, as may be necessary due to the selection and percentage of recycled content materials.
   5. Regional Material: Provide concrete block manufactured and of raw materials extracted and/or recovered within 500 miles of project site.

2.2 BRICK UNITS

A. Manufacturers:
   1. Selections - Basis-of-Design:
      a. Type 1: Glen Gery Sable Brown Flash.
      b. Type 2: Hanson 724 Red.

B. Facing Brick: ASTM C 216, Type FBS, Grade SW.
   1. Size: Modular.
   2. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
   3. Regional Material: Provide brick manufactured and of raw materials extracted and/or recovered within 500 miles of project site.

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.

B. Packaged blend of portland cement complying with ASTM C 150, Type II/I or Type III, and hydrated lime.
   1. Not more than 0.60 percent alkali.
   2. Hydrated Lime: ASTM C207, Type S.
   3. Mortar Aggregate: ASTM C144.
   4. Grout Aggregate: ASTM C404.

C. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979.
   1. Manufacturers:
      a. Basis-of-Design: Lehigh Cement Company.
      b. Davis Colors: www.daviscolors.com.
      c. Lambert Corporation: www.lambertusa.com.
      d. Solomon Colors: www.solomoncolors.com.
      e. ESSROC Cement Corp.; Flamingo.
   2. Colors: Architect shall select mortar color at time of approval of submitted brick color options. Color selected will be from, and must match, Lehigh Cement Company's full range of colors. Architect may select up to 3 separate colors for exterior masonry.

D. Admixtures: Permitted for cold- and hot-weather masonry work as permitted by referenced standards; non-chloride types.

E. Water: Clean and potable.

2.4 REINFORCEMENT AND ANCHORAGE

A. Manufacturers of Joint Reinforcement and Anchors:
   1. AA Wire Products Co.
   2. Dur-O-Wal: www.dur-o-wal.com.
   3. Heckman Building Products, Inc.
   4. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com.
   5. WIRE-BOND: www.wirebond.com.
   6. National Wire Products Industries.

B. Reinforcing Steel: ASTM A615/A615M, Grade 60 - 60,000 psi, deformed billet bars; galvanized.

C. Joint Reinforcement - General:
   1. Provide in lengths of not less than 10 feet.
   2. Provide with prefabricated corner and tee units of same design type, wire thickness and finish as adjoining joint reinforcement.

D. Single Wythe Joint Reinforcement: Ladder; ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M, Class 3; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

E. Adjustable Multiple Wythe Joint Reinforcement: Ladder type with adjustable ties or tabs spaced at 16 in on center ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/153M, Class B; 0.1875 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face.
   1. Vertical adjustment: Not less than 2 inches.
   2. Fabricate so that eye is located 3 inches from face of masonry.

F. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
   1. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.

G. Masonry Veneer Anchors: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
   1. Anchor plates: Designed for fastening to structural backup through sheathing by two fasteners.
      a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
      b. Fabricate sheet metal anchor sections and other sheet metal parts from minimum 14 gage, steel sheet, galvanized after fabrication.
   2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
   3. Vertical adjustment: Not less than 3-1/2 inches.
   4. Products:
      a. Hohmann & Barnard, Inc.; BL-407 Anchor.
      b. Construction Tie Products; CTP Veneer Anchoring System.
   5. Organic-Polymer-Coated, Steel Drill Screws:
      a. Dril-Flex; Elco Industries, Inc.
      b. Traxx; ITW-Buildex.

H. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by ¼ inch thick by 24 inches long, with ends turned up 2 inches unless otherwise indicated.
   1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

I. Reinforcing Bar Positioners:
   1. Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells, or as indicated on Drawings. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated. Provide units at all reinforced walls.
   2. Products:
      a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
      b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
      c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
      d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

J. Reinforcing Bar Couplers:
   1. Mechanical splice connectors capable of developing intension or compression at least 125 percent of the specified yield strength of the bar.
   2. Representative Product: BarSplice Products, Inc., Tapered Threaded Grip-Twist Series.

2.5 FLASHINGS

A. Flexible Flashing - CMU Backup: For flashing not exposed to the exterior, use the following, unless otherwise indicated:

1. A full, single sheet of 5 ounce copper sheet bonded with a rubber base adhesive, between two layers of fiberglass fabric weighing not less than 0.3 ounces per square foot per layer with a minimum of 10 x 20 threads per inch.
2. Performance Requirements:
   a. Tensile Strength: ASTM E8; 32,000 psi.
   b. Elongation: ASTM D412 die C; 50 percent.
   c. Puncture Resistance: ASTM E154; minimum 390 pound.
   d. Tear Resistance-Initial: ASTM D1004; minimum 43.8 pound.
   e. Tear Resistance-Propagation: ASTM D1938; minimum 22.2 pound.
   f. Permeance: ASTM E96-B; 0.00 perms.
   g. Water Absorption: ASTM D570; Pass.
3. Accessories: Flashing mastic composed of asphalt, mineral stabilizers and interfiber, manufactured to a trowel grade consistency, double-sided EPDM tape, or choice of polyurethane or silicone caulks.
4. Available Products:
   a. Multi-Flash 500, Manufactured by York Manufacturing, Inc.; red color-coded.
   b. Copper Sealtight 2000 by Advanced Building Products, Inc.
   c. Copper-Tuff by Hohmann & Barnard, Inc.

B. Flexible Flashing - Stud Wall Backup: For flashing not exposed to the exterior, use the following, unless otherwise indicated:
1. Surface Adhered Flashing System:
   a. Basis-of-Design: Hyload Cloaked Flashing System by Hyload.
2. Surface Adhered Membrane with Rubberized Adhesive:
   a. Surface adhered membrane to be a composite 40 mil membrane consisting of 25 mils of elastomeric/thermal plastic membrane incorporating DuPont Elvaloy and 15 mils of SBS asphaltic adhesive; 1-1/2 inch sealant compatible drip edge and silicone release sheet added.
   b. Reinforce with synthetic fibers, calendered into sheet form, rolled and cut to standard widths.
3. Performance Requirements:
   a. Elongation: ASTM D412; 225 percent.
   b. Tensile Strength: ASTM D412; 875 psi.
   c. Tear Strength: ASTM D624; 270 psi.
   d. Low Temperature Flexibility: ASTM D146; -25 degrees F Pass.
   e. Water Absorption: ASTM D471; less than 0.1 percent.
   f. Color as selected by Architect from manufacturer's range of black, grey, buff or white.
   g. Compatible with urethane and silicone sealant.
   h. UV stable.
4. Pre-Formed Three-Dimensional Shapes:
   a. System cloaks are pre-formed, three-dimensional flexible units used to detail corners, level changes, stop ends, and special applications.
   b. Standard type cloaks and special designs to be fabricated as required by the design.
5. Related Materials:
   a. Two-sided, self-adhering tape used must seal the top of cloaks against the back-up wythe; system adhesive to be used as an alternative.
   b. Mastic must be used to seal laps, joints, and top terminations.

C. Flexible Flashing at Stud Wall Backup - Contractor Option: Contractor may select to use the Flex-Flash Flashing System with #T1 Termination Bar by Hohmann & Barnard, Inc., at the Contractor's discretion, instead of the Hyload System without additional cost to the Owner.
   1. Sheet Material: 40 mil membrane with DuPont Elvaloy Kee; pressure sensitive clear adhesive for full bond to backup construction.
   2. Provide system with preformed corners and end dams fabricated by Hohmann & Barnard, Inc.; Elvaloy Kee or stainless steel material.
   3. Termination bar to be predrilled; fastening provided directly at steel framing locations.
   4. Conforms to ASTM D412, ASTM D2240, ASTM D624 Die C, and ASTM G154.

D. Stainless Steel Drip Plates:
   1. Provide at flexible flashing locations, all locations.
   2. Material: Minimum 26 gage stainless steel.
   3. Profile:
      a. Provide with closed hemmed drip edge to extend past face of wall.
      b. Provide vertical leg extending up backup wall minimum 2 inches.
      c. Provide pitch in drip plate as indicated on Drawings.
      d. Provide shop fabricated inside and outside corner.
      e. At lip brick profiles, match profile with step in drip plate.
   4. Flexible flashing will cover drip plate; cut flush with face of mortar joint.
   5. Provide 1/8 inch thick sealant tape between drip plate and steel structural member.
   6. Bond flexible flashing to drip plate as recommended by flexible flashing manufacturer; product selection to ensure against adhesive drool beyond face of brick.
   7. Backer rod and sealant to be provided under drip edge per Division 7, at locations protecting steel.

E. Drip Plate Fasteners - CMU Backup: Use low-velocity powder actuated ballistic point fastener with pre-mounted washer; submit ICC-ES Evaluation Report under product data submittals indicating fastener selection appropriate for intended use.

F. Drip Plate Fasteners - Stud Backup: Corrosion-resistant screws located at every stud line.

G. Self-adhering Flashing Seam Tape:
   1. Sheet Material: 40 mil membrane with DuPont Elvaloy Kee; pressure sensitive clear adhesive for full bond to stainless steel drip plate and backup construction.
   2. Conforms to ASTM D412, ASTM D2240, ASTM D624 Die C, and ASTM G154.
   3. Basis-of-Design Product: Flex-Flash 8-inch wide roll by Hohmann & Barnard, Inc.

2.6 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.

B. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to fully fill depth of air space, and designed to prevent mortar droppings from clogging cavity vents and allow proper cavity drainage.
   1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
      a. Manufacturers:
         1) Mortar Net Solutions; Mortar Net with Insect Barrier: www.mortarnet.com.
         2) Keene Building Products; Product Keenestone Cut 2".
         3) Hohmann and Barnard, Inc.; Product Mortar Trap.

C. Cavity Vents: Polyester mesh or cellular insect-resistant vents.

1. Locations: Flashing location at base of cavity wall construction.
2. Manufacturers:
   a. CavClear/Archovations, Inc: www.cavclear.com.
   b. Dur-O-Wal; Product D1006 Cell Vents: www.dur-o-wal.com.
   c. Hohmann & Barnard, Inc; Quadro-Vent: www.h-b.com.
   d. Mortar Net Solutions; Mortar Net Weep Vents: www.mortarnet.com.

D. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials, as recommended by brick manufacturer.

2.7 LINTELS

A. Concrete Lintels: Precast units made from concrete matching concrete masonry units in color, texture, and compressive strength and with reinforcing bars required to support loads indicated. Cure precast lintels by same method used for concrete masonry units.

B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam concrete masonry units with reinforcing bars placed as required by the structural drawings and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.8 MORTAR AND GROUT MIXES

A. Mortar for Unit Masonry: ASTM C270, using the Property Specification.
   1. Masonry below grade and in contact with earth: Type M.
   2. Exterior, loadbearing masonry: Type S.
   3. Exterior, brick veneer: Type N.
   4. Interior, loadbearing masonry: Type N, except reinforced masonry to be Type S.
   5. Interior, non-loadbearing masonry: Type O or Type N (Contractor's discretion).

B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

C. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

PART 3 EXECUTION

3.1 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.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 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.

3.3 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

3.4 INSTALLATION - GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Do not install cracked, broken or chipped masonry units for any location to be exposed in completed work; do not install cracked, broken or chipped masonry units exceeding ASTM allowances in work to remain concealed or within mechanical or electrical spaces.

E. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

F. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
   1. Mix units from several pallets or cubes as they are placed.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

H. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.
   1. Install compressible filler in joint between top of partition and underside of structure above.
   2. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 07 84 46.

3.5 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. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

E. Brick Units:
   1. Bond: Running.
   2. Mortar Joints: Concave.

3.6 PLACING AND BONDING

A. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

B. Remove excess mortar and mortar smears as work progresses.

C. Interlock intersections and external corners.

D. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

E. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

F. Cut mortar joints flush where wall tile is scheduled, resilient base is scheduled, cavity insulation vapor barrier adhesive is applied, or bitumen dampproofing is applied.

G. Pointing:
   1. During the tooling of joints, enlarge voids and holes, and completely fill with mortar.
   2. Point joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance.
   3. Prepare joints for sealant application, where indicated.

H. Isolate masonry partitions from vertical structural framing members with a control joint and flexible anchors.

I. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.7 CAVITY VENTS

A. Place cavity vents such as two consecutive vertical joints will include vent followed by a vertical joint without; repeat this placement for full length of application.

B. Install vents in contact with flashing, full-width of head joint and uninterrupted by mortar.

3.8 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug cavity vents.

B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

C. Install cavity mortar diverter at base of cavity and at other flashing locations indicated on Drawings and as recommended by manufacturer to prevent mortar droppings from blocking cavity vents.

3.9 REINFORCEMENT AND ANCHORAGE - GENERAL

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere.
   1. Space reinforcement not more than 16 inches o.c.
   2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
   3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
      a. Reinforcement of this subparagraph 3 is in addition to continuous reinforcement.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

E. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

F. 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 36 inches horizontally and 24 inches vertically.
   1. Provide an open space not less than 1/2 inch in width between masonry and structural member, unless otherwise indicated.
   2. Keep open space free of mortar and other rigid materials.

3.10 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Install horizontal joint reinforcement 16 inches on center.

B. Typical: Place masonry joint reinforcement in first and second horizontal joints above and below openings.
   1. Extend minimum 16 inches each side of opening.
   2. Modify placement where flashing occurs in joint; flashing takes precedent; joint reinforcement location adjusted as accepted by Architect.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

E. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 16 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.

F. 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.

G. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.

3.11 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 of openings and at least 4 inches into adjacent masonry at each end; turn up not less than 2 inches to form end dams.
   2. Carry flashing across air space behind veneer and up face of backup construction at least 8 inches to form watertight pan; extend flashing into masonry backup minimum 1-3/4 inches; secure flashing at non-masonry construction with termination bar and seal.
   3. Remove or cover protrusions or sharp edges that could puncture flashings.
   4. Embed flashings in mortar joint; place flashing on sloping bed of fresh mortar and cover with fresh mortar
   5. Seal lapped seams of stainless steel drip plates with self-adhering flashing seam tape; stop self-adhering flashing seam tape 3/8 inch of brick face and extend over turned up edge 3 inches onto backup construction; center tape on overlapping edge.
   6. Seal lapped ends and penetrations of flashing with adhesive or sealant, as recommended by flashing manufacturer, before covering with mortar.

B. Lap end joints of flashings at least 6 inches and seal watertight as recommended by flashing manufacturer.

C. Cut flashing flush with face of mortar joint after masonry construction is complete and inspected.

3.12 LINTELS

A. Install loose steel lintels over openings.

B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.

3.13 GROUTED COMPONENTS

A. Lap splices minimum 48 bar diameters, unless otherwise noted in the structural drawings.

B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

C. Place and consolidate grout fill without displacing reinforcing.

D. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.14 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
   2. Limit height of vertical grout pours to not more than 48 inches.

3.15 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.16 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

D. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

E. Do not build into masonry construction organic materials that are subject to deterioration.

3.17 TOLERANCES

A. Maximum Variation from Alignment of Columns: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/8 inch, plus 1/8 inch.

3.18 CUTTING AND FITTING

A. Cut and fit for chases, pipes, and conduit. Coordinate with other sections of work to provide correct size, shape, and location.

3.19 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00. Inspection services shall conform to Section 1705.4 or IBC 2015, Level B Quality Assurance Program of TMS 402/ACI 530/ASCE 5 and TMS 602/ACI 530.1/ASCE 6 and the Statement of Special Inspections noted in the structural drawings.

B. Clay Masonry Unit Tests: Test each variety of clay masonry in accordance with ASTM C67 requirements, sampling 5 randomly chosen units for each 50,000 installed.

C. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for conformance to requirements of this specification.

D. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

1. Test three samples for each 5,000 square feet of wall or portion thereof; test one sample at 7 days and two at 28 days for each set.

3.20 REPAIRING WORK

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units; install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

3.21 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.22 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 04 72 00 - CAST STONE MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Architectural cast stone.

B. Units required are:
   1. Exterior wall units, including wall caps and sills.
   2. Other items indicated on the drawings.

1.2 RELATED REQUIREMENTS

A. Section 04 20 00 - Unit Masonry: Installation of cast stone in conjunction with masonry.

B. Section 07 92 00 - Joint Sealants: Sealing joints indicated to be left open for sealant.

C. Section 07 90 05 - Joint Sealers: Materials and execution methods for sealing soft joints in cast stone work.

1.3 DESIGN REQUIREMENTS

A. Wind Loads:
   1. Design anchors to withstand positive and negative wind loads acting normal to plane of wall, including increased loads at building corners.
   2. Design Wind Load: To design pressure of 25 psf.

B. Design anchor attachment to cast stone with factor of safety of 5:1.

C. Design each individual anchor with factor of safety in vertical dead-load-bearing direction of 4:1 and in horizontal lateral-load-bearing direction of 2:1.

D. Fabrication to be per methods allowed under ASTM C 1364; wet or dry cast.

1.4 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.

B. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.

C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2015.

D. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009.

E. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2014.

F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2013.

G. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

H. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.

I. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2012.

J. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

K. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete; 2013.

L. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.

M. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2010b.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Test results of cast stone components made previously by the manufacturer.
   1. Include one copy of ASTM C1364 for Architect's use.

C. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.

D. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00; report recycled content for masonry units and reinforcement.
   1. Credit MR 5.1 and 5.2:
      a. Provide product data indicating location of manufacturer and location of extraction/recovery of primary raw materials.
      b. Include statement indicating cost for each regionally manufactured material.
   2. Credit MR 4.1 and 4.2: Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
      a. Contributions to this Credit include recycled content of bottom ash and recycled content of steel reinforcement.

E. Mortar Color Selection Samples.

F. Verification Samples: Pieces of actual cast stone components not less than 12 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.

G. Source Quality Control Test Reports.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. A firm with a minimum of 5 years experience producing cast stone of types required for project.
   2. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.
   3. Design anchors, cast units under direct supervision of Professional Engineer experienced in design of this Work and licensed in jurisdiction.

B. Mock-Up: Provide full size cast stone components for installation in mock-up of exterior wall.

   1. Remove mock-up not incorporated into the work and dispose of debris.

C. Source Quality Control: Test compressive strength and absorption of specimens selected at random from plant production.
   1. Test in accordance with ASTM C642.
   2. Select specimens at rate of 3 per 500 cubic feet, with a minimum of 3 per production week.
   3. Submit reports of tests by independent testing agency, showing compliance with requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.

B. Number each piece individually to match shop drawings and schedule.

C. Store cast stone components and installation materials in accordance with manufacturer's instructions.

D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.

E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.

F. Store mortar materials where contamination can be avoided.

G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Architectural Cast Stone:
   1. Continental Cast Stone Manufacturing Company.
   2. Reading Rock.
   3. Arban Precast Stone, Ltd..
   4. Calstar

2.2 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C1364.
   1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
   2. Freeze-Thaw Resistance: Demonstrated by field experience.
   3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 5 feet.
   4. Color: Selected by Architect from manufacturer's full range.
   5. Remove cement film from exposed surfaces before packaging for shipment.

B. Shapes: Provide shapes indicated on drawings.
   1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
   2. Unless otherwise indicated on drawings, provide:
      a. Wash or slope of 1:12 on exterior horizontal surfaces.
      b. Drips on projecting components, wherever possible.
      c. Raised fillets at back of sills and at ends to be built in.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.
   1. Reinforcement shall be noncorrosive where faces exposed to weather are covered with less than 1.5 in. of concrete material.
   2. All reinforcement shall have minimum coverage of twice the diameter of the bars.

3. Panels, soffits and similar stones greater than 24 in. in one direction shall be reinforced in that direction.
4. Units less than 24 in. in both their length and width dimension shall be non-reinforced unless otherwise specified.
5. Minimum amount of reinforcing shall be 0.25 percent of the cross section area.

2.3 MATERIALS

A. Portland Cement: ASTM C150.
   1. For Units: Type I or II, white.
   2. For Mortar: Type I or II, except Type III may be used in cold weather.

B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.

C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.

D. Pigments: ASTM C979, inorganic iron oxides; do not use carbon black.
   1. Provide colored mortar for exposed cast stone work; color to be selected by Architect.

E. Admixtures: ASTM C494/C494M.

F. Integral Water-repellant: Standard product accepted by cast stone fabricator within the mix design; product for mix design and setting mortar to be from same source.
   1. Provide for all units and mortar.

G. Water: Potable.

H. Reinforcing Bars: ASTM A615/A615M deformed bars, galvanized.
   1. Galvanized in accordance with ASTM A767/A767M, Class I.

I. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.

J. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.

K. Mortar: Portland cement-lime, ASTM C 270, Type N; do not use masonry cement.

L. Sealant: As specified in Section 07 90 05.

M. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.4 FABRICATION

A. General Requirements: Fabricate units straight and true to component shapes detailed, and with accurate dimension control.
   1. Provide holes, sleeves, and slots to receive anchors and dowels and to provide drips.
   2. Provide reinforcement as shown on the approved shop drawings.
   3. Provide anchors, inserts, dowels, etc. in accordance with approved shop drawings and as required for proper installation of cast stone units.

B. Joints in sills and headers on multiple windows to occur at center of mullions or columns, or constructed with two equal length pieces with joint occurring in centerline of window elevation.

C. Compressive Strength: 7,000 psi at 28 days.

D. Air Entrainment: Not less than 4-1/2 percent nor more than 6 percent.

E. Curing - Dry Cast Method: Steam cure dry cast units in a warm curing chamber approximately 100ºF at 100 percent relative humidity for approximately 12 hours, or form cure wet cast units in a 95 percent moist environment at a minimum 70ºF for 16 hours after casting. Additional yard curing at 95 percent relative humidity shall be 350 degree-days (i.e. 7 days @ 50°F or 5 days @ 70°F) prior to shipping. Form cured units shall be protected from moisture evaporation with curing blankets or curing compounds after casting.

F. Curing - Wet Cast Method: Cure in form overnight within a climate controlled environment.

2.5 SOURCE QUALITY CONTROL

A. Test and analyze three random specimens for each 500 cubic feet, or portion thereof, of fabricated cast stone units:
   1. Compressive Strength: In accordance with ASTM C1194.Cold Water Absorption: In accordance with ASTM C1195.
   2. Resistance to Freezing and Thawing: In accordance with ASTM C666; maximum cumulative percent mass loss in accordance with ASTM C1364.
   3. Visually inspect color differences between fabricated units and approved sample in accordance with ASTM D1729.
   4. Absorption: ASTM C1195; maximum 6 percent for cold water and 10 percent for boiling water at 28 days.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.

B. Do not begin installation until unacceptable conditions have been corrected.

3.2 INSTALLATION

A. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 20 00.

B. Mechanically anchor cast stone units indicated; set remainder in mortar.

C. Setting:
   1. Drench cast stone components with clear, running water immediately before installation.
   2. Set units in a full bed of mortar unless otherwise indicated.
   3. Fill vertical joints with mortar.
   4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
   5. Do not shift or tap cast stone units after mortar has achieved initial set; where adjustment is required, remove mortar and replace.
   6. Keep exposed faces free of mortar; immediately remove mortar that comes in contact with faces using brush and clean water.

D. Joints: Make all joints 3/8 inch, except as otherwise detailed.
   1. Rake mortar joints 3/4 inch for pointing.
   2. Remove excess mortar from face of stone before pointing joints.
   3. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
   4. Leave the following joints open for sealant:
      a. Head joints in top coarses, including copings, cornices and sills.
      b. Joints in projecting units.

c. Joints below lugged sills.
d. Joints below ledge and relieving angles.
e. Joints labeled "expansion joint".

5. Cut out defective mortar joints and repoint.

E. Sealant Joints: Install sealants as specified in Section 07 90 05.

F. Installation Tolerances:
1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

G. Repairs: Repair chips and other surface damage noticeable when viewed in direct daylight at 5 feet.
1. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
2. Repair methods and results subject to Architect 's approval.

3.3 CLEANING

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 5 feet.
1. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
2. Repair methods and results subject to Architect 's approval.

B. Keep cast stone components clean as work progresses.

3.4 PROTECTION

A. Protect completed work from damage.

B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

C. Protect from splashing by mortar and other damage.

END OF SECTION

SECTION 04 72 30 - HIGH-DENSITY MASONRY UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. High density masonry units.

B. Units required are:
   1. Exterior wall units.
   2. Other items indicated on the drawings.

1.2 RELATED REQUIREMENTS

A. Section 04 20 00 - Unit Masonry: Installation of high density masonry in conjunction with masonry.

B. Section 07 90 05 - Joint Sealers: Materials and execution methods for sealing soft joints in high density masonry work.

1.3 DESIGN REQUIREMENTS

A. Wind Loads:
   1. Design anchors to withstand positive and negative wind loads acting normal to plane of wall, including increased loads at building corners.
   2. Design Wind Load: To design pressure of 30 psf.

B. Design anchor attachment to high density masonry with factor of safety of 5:1.

C. Design each individual anchor with factor of safety in vertical dead-load-bearing direction of 4:1 and in horizontal lateral-load-bearing direction of 2:1.

D. Fabrication to be per methods allowed under ASTM C 1364; machine dry cast.

1.4 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International.

B. ASTM A 185/A 185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

C. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

D. ASTM C 33 - Standard Specification for Concrete Aggregates.

E. ASTM C 150 - Standard Specification for Portland Cement.

F. ASTM C 270 - Standard Specification for Mortar for Unit Masonry.

G. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete.

H. ASTM C 642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.

I. ASTM C 979 - Standard Specification for Pigments for Integrally Colored Concrete.

J. ASTM C 1364 - Standard Specification for Architectural Cast Stone.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Test results of high density masonry components made previously by the manufacturer.
   1. Include one copy of ASTM C 1364 for Architect 's use.

C. Shop Drawings: Submit manufacturer's shop drawings including elevations, dimensions, layouts, profiles, cross sections, reinforcement (if required), exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.

D. Mortar Color Selection Samples.

E. Verification Samples: Pieces of actual high density masonry components not less than 12 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.

F. Source Quality Control Test Reports.

G. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00; report recycled content for masonry units and reinforcement.
   1. Credit MR 5.1 and 5.2:
      a. Provide product data indicating location of manufacturer and location of extraction/recovery of primary raw materials.
      b. Include statement indicating cost for each regionally manufactured material.
   2. Credit MR 4.1 and 4.2: Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
      a. Contributions to this Credit include recycled content of fly ash and recycled content of steel reinforcement.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm with a minimum of 5 years of experience in producing high density masonry of the types required for project and:
   1. Adequate plant capacity to furnish quality, sizes, and quantity of high density masonry required without delaying progress of the work.
   2. Products previously produced by plant and exposed to weather that exhibit satisfactory appearance.
   3. Design anchors, cast units under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Maryland.

B. Mock-Up: Provide full size high density masonry components for installation in mock-up of exterior wall.
   1. Remove mock-up not incorporated into the work and dispose of debris.

C. Source Quality Control: Test compressive strength and absorption of specimens selected at random from plant production.
   1. Select specimens at rate of 3 per 500 cubic feet, with a minimum of 3 per production week.
   2. Submit reports of tests by independent testing agency, showing compliance with requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver high-density masonry components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.

B. Number each piece individually to match shop drawings and schedule.

C. Store high-density masonry components and installation materials in accordance with manufacturer's instructions.

D. Store high-density masonry components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt. Do not double stack pallets.

E. Protect high-density masonry components during handling and installation to prevent chipping, cracking, or other damage.

F. Store mortar materials where contamination can be avoided.

G. Schedule and coordinate production and delivery of high-density masonry components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design: RockCast by Reading Rock.

B. Arriscraft International, a General Shale Brick, Inc. Company.

C. Franklin Stone distributed by Betco Supreme.

2.2 ARCHITECTURAL HIGH DENSITY MASONRY

A. High-density Masonry Units: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C 1364.
   1. Compressive Strength: As specified in ASTM C 1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
   2. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 5 feet.
   3. As indicated on the drawings, provide the following two sizes:
      a. RockCast Series Smooth ST005, 7-5/8 x 23-5/8 inches.
      b. RockCast Series Smooth ST003, 11-5/8 x 23-5/8 inches.
   4. Color:
      a. Match RockCast Bowie Blend by Reading Rock.
   5. Texture: Smooth.
   6. Portland Cement: ASTM C 150.
      a. For Units: Type I or II, white.
      b. For Mortar: Type I or II, except Type III may be used in cold weather.
   7. Coarse Aggregate: ASTM C 33, except for gradation; granite, quartz, or limestone.
   8. Fine Aggregate: ASTM C 33, except for gradation; natural or manufactured sands.
   9. Pigments: ASTM C 979, inorganic iron oxides; do not use carbon black.
   10. Admixtures: ASTM C 494/C 494M.
   11. Integral Water-repellant: Standard product accepted by high density masonry fabricator within the mix design; product for mix design and setting mortar to be from same source.
      a. Provide for all units and mortar.
   12. Air Entrainment: Not less than 4-1/2 percent nor more than 6 percent.
   13. Curing - Machine Cast Method: Steam cure units in a warm curing chamber approximately 100ºF at 100 percent relative humidity for approximately 12 hours, or form cure wet cast units in a 95 percent moist environment at a minimum 70ºF for 16 hours after casting. Additional yard curing at 95 percent relative humidity shall be 350

degree-days (i.e. 7 days @ 50°F or 5 days @ 70°F) prior to shipping. Form cured units shall be protected from moisture evaporation with curing blankets or curing compounds after casting.

14. Remove cement film from exposed surfaces before packaging for shipment.

B. Shapes: Provide shapes indicated on drawings including, but not limited to, coping, caps, sills and headers.
   1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
   2. Unless otherwise indicated on drawings, provide:
      a. Wash or slope of 1:12 on exterior horizontal surfaces.
      b. Drips on projecting components, wherever possible.
      c. Raised fillets at back of sills and at ends to be built in.
   3. Color:
      a. Match high-density masonry units, unless indicated as Cast Stone on the Drawings.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.
   1. Reinforcement shall be noncorrosive where faces exposed to weather are covered with less than 1.5 in. of concrete material.
   2. All reinforcement shall have minimum coverage of twice the diameter of the bars.
   3. Panels, soffits and similar stones greater than 24 in. in one direction shall be reinforced in that direction.
   4. Units less than 24 in. in both their length and width dimension shall be non-reinforced unless otherwise specified.
   5. Minimum amount of reinforcing shall be 0.25 percent of the cross section area.

D. Veneer Wall Ties and Anchors: Refer to Section 04810.

E. Weeps: Refer to Section 04 20 00; provide 16 inches o.c. at flashing locations.

F. Recycled Content: Provide masonry units with the highest recycled content feasible.

2.3 MATERIALS

A. Water: Potable.

B. Reinforcing Bars: ASTM A 615/A 615M deformed bars, galvanized or epoxy coated.
   1. Recycled Content: Provide minimum 90 percent total recycled content, 60 percent shall be post-consumer recycled content.
   2. Regional Materials: Provide steel reinforcement manufactured and of primary raw materials extracted or recovered within 500 mile radius of project Site.

C. Steel Welded Wire Reinforcement: ASTM A 185/A 185M, galvanized or epoxy coated.

D. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.

E. Mortar: Masonry Cement; ASTM C 91, Type N.
   1. Provide colored mortar for exposed high density masonry work; color to match selection of Section 04810.
   2. Provide water-repellant in mortar mix.

F. Sealant: As specified in Section 07900 and 01616.

G. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or

damaging masonry surfaces; approved for intended use by high density masonry manufacturer and by cleaner manufacturer for use on high density masonry and adjacent masonry materials.

2.4 FABRICATION

A. General Requirements: Fabricate units straight and true to component shapes detailed, and with accurate dimension control.
   1. Provide holes, sleeves, and slots to receive anchors and dowels and to provide drips.
   2. Provide reinforcement as shown on the approved shop drawings.
   3. Provide anchors, inserts, dowels, etc. in accordance with approved shop drawings and as required for proper installation of high density masonry units.

B. Joints in sills and headers on multiple windows to occur at center of mullions or columns, or constructed with two equal length pieces with joint occurring in centerline of window elevation.

C. Compressive Strength: 6,500 psi at 28 days.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine construction to receive high density masonry components. Notify Architect if construction is not acceptable.

B. Do not begin installation until unacceptable conditions have been corrected.

3.2 INSTALLATION

A. Install high-density masonry components in conjunction with masonry, complying with requirements of Section 04 20 00.

B. Mechanically anchor high-density masonry units indicated; set remainder in mortar.

C. Setting:
   1. Drench high-density masonry components with clear, running water immediately before installation.
   2. Set units in a full bed of mortar unless otherwise indicated.
   3. Fill vertical joints with mortar.
   4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
   5. Do not shift or tap high density masonry units after mortar has achieved initial set; where adjustment is required, remove mortar and replace.
   6. Keep exposed faces free of mortar; immediately remove mortar that comes in contact with faces using brush and clean water.

D. Joints: Make all joints 3/8 inch, except as otherwise detailed.
   1. Rake mortar joints 3/4 inch for pointing.
   2. Remove excess mortar from face of stone before pointing joints.
   3. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
   4. Leave the following joints open for sealant:
      a. Head joints in top coarses, including copings, cornices and sills.
      b. Joints in projecting units.
      c. Joints below lugged sills.
      d. Joints below ledge and relieving angles.
      e. Joints labeled "expansion joint".
   5. Cut out defective mortar joints and repoint.

E. Sealant Joints: Install sealants as specified in Section 07 90 05.

F. Installation Tolerances:
   1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
   2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
   3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
   4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

G. Repairs: Repair chips and other surface damage noticeable when viewed in direct daylight at 5 feet.
   1. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
   2. Repair methods and results subject to Architect 's approval.

3.3 CLEANING

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 5 feet.
   1. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
   2. Repair methods and results subject to Architect 's approval.

B. Keep high density masonry components clean as work progresses.

C. Do not use the following to clean units:
   1. Muriatic acid.
   2. Power washing.
   3. Sandblasting.
   4. Harsh cleaning materials or methods that would damage or discolor surfaces.

3.4 PROTECTION

A. Protect completed work from damage.

B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

C. Protect from splashing by mortar and other damage.

END OF SECTION

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Structural steel framing members, support members and struts.

B. Base plates, embedded plates, shear stud connectors and expansion joint plates.

C. Grouting under base plates.

1.02 REFERENCE STANDARDS

A. AISC (MANUAL) – Steel Construction Manual; American Institute of Steel Construction, Inc.

B. AISC S303 – Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.

C. AISC S348 – Specification for Structural Joints Using ASTM A325 or A490 Bolts.

D. ASTM A 36/A 36M – Standard Specification for Carbon Structural Steel.

E. ASTM A 53/A 53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

F. ASTM A 108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.

G. ASTM A 123/A 123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

H. ASTM A 153/A 153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

I. ASTM A 307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

J. ASTM A 325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

K. ASTM A 490 – Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.

L. ASTM A 500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

M. ASTM A 501 – Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

N. ASTM A 563 – Standard Specification for Carbon and Alloy Steel Nuts.

O. ASTM A 992/A 992M – Standard Specification for Structural Steel Shapes.

P. ASTM C 1107/C 1107M – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).

Q. ASTM E 94 – Standard Guide for Radiographic Examination.

R. ASTM E164 – Standard Practice for Ultrasonic Contact Examination of Weldments.

S. ASTM E 165 – Standard Test Method for Liquid Penetrant Examination.

T. ASTM E 709 – Standard Guide for Magnetic Particle Examination.

U. ASTM F 436 – Standard Specification for Hardened Steel Washers.

V. ASTM F 959 – Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.

W. ASTM F 1554 – Standard Specification for Anchor Bolts, Steel, 36, 55 and 105 ksi Yield Strength.

X. AWS A2.4 – Standard Symbols for Welding, Brazing, and Non-Destructive Examination.
1. American Welding Society.

Y. AWS D1.1/D1.1M – Structural Welding Code – Steel; American Welding Society.

Z. IBC 2015 – International Building Code.

1.03 SUBMITTALS

A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:
1. Indicate profiles, sizes, spacing, and locations of structural members.
2. Include details of cuts, openings, attachments, fasteners, splices and camber.
3. Detail all connections.
   a. Indicate pre-tensioned and slip-critical high-strength bolted connections.
   b. Indicate welded connections with AWS welding symbols. Include type, size and length.
   c. Indicate all AWS weld designations for pre-qualified full and partial penetration welds and detail all joint preparations.
4. Provide erection details for all field welded connections.
5. For structural-steel connections indicated to comply with design loads, connections and structural analysis data shall be signed and sealed by the qualified professional engineer registered in the State of Maryland responsible for their preparation.

C. AISC certification for fabricator and erector.

D. Mill Test Reports: Signed by manufacturer certifying that the product complies with specified requirements. Indicate structural strength, destructive test analysis and non-destructive test analysis.

E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

F. Quality control test reports for shop and field including ultrasonic test results.
1. Submit certification by a Professional Engineer registered in the State of Maryland that all joint preparation for complete joint penetration welds meet AISC requirements and that all welding procedure specification requirements have been met.

G. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15 and appropriate forms.

1. Provide documentation of recycled content type and percentage by cost, location of extraction/recovery/harvest of primary raw materials, steel mill process, location of mill, and location of fabrication.

2. Except for sizes not available from regional producers, structural steel shall be extracted/harvested/recovered and manufactured within 500 miles of the job site.

1.04 QUALITY ASSURANCE

A. Structural steel shall be domestic origin, produced and supplied from the United States of America only.

B. Fabricate structural steel members in accordance with AISC "Steel Construction Manual" and AISC "Code of Standard Practice for Steel Buildings and Bridges".

C. Comply with Section 10 of AISC "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.

D. Welding: Comply with AWS D1.1, "Structural Welding Code-Steel" for procedures, tolerances, appearance and quality.

E. Fabricator: Engage a firm experienced in fabricating structural steel similar to that indicated for this project and within 15 percent this project size, with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.

1. Provide documentation that fabricator has provided material for and erected at least 3 projects within 15 percent of project size and complexity, in the last six years.

2. Allow the Owner's representative to visit the fabrication plant as required to inspect in place quality control procedures and structural steel fabrication.

3. Fabricators who are not an AISC Certified Building Fabricator (BU), shall meet the following additional requirements:
   a. Demonstrate that the fabricator has in place a quality control program for meeting IBC requirements and compliance with AISC recommendations and standards.
   b. At no additional cost to the Owner, provide an independent shop inspection for compliance with IBC, AISC and AWS recommendations and standards. The independent inspection agency shall be different than the testing agency engaged by the Owner.
   c. Shop inspection tasks required by AISC 360 to be performed by the fabricator's quality control personnel, shall be overseen by the independent inspector hired by the fabricator.
   d. At completion of fabrication, and prior to erecting steel, submit a certificate of compliance signed and sealed by the third party inspector, stating that the steel fabrication complies with the requirements of the construction documents.
   e. Shop drawings shall be signed and sealed by a professional engineer, registered in the local jurisdiction, responsible for the design of the connections. The professional engineer shall carry a minimum of $1,000,000.00 of professional liability insurance.
   f. The steel fabricator shall provide field repair details, along with computations, for all required field modifications. The details and calculations shall be signed and sealed by the same professional engineer that certified the shop drawings.

F. Erector: Engage a firm experienced in erecting structural steel similar to that indicated for the project and within 15 percent of this project size, with a record of successful in-service performance.

1. Erector must be designated an AISC Certified Steel Erector (CSE).

2. Provide documentation that the erector has erected at least 3 projects within 15 percent of project size and complexity in the last six years.

G. Design connections not detailed on the drawings under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State of Maryland.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off the ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.

1. Store fasteners in a protected place. Clean and re-lubricate bolts and nuts that become dry or rusty before use.

2. Do not store materials on structure in a manner that might cause deterioration, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.06 COORDINATION

A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel angles, Channels and Plates: ASTM A 36/A 36M. ASTM A 572 where plate is noted on plans to have a yield strength of 50 ksi.

B. Steel W Shapes and Tees: ASTM A 992/A 992M.

C. Cold-Formed Structural Tubing: ASTM A 500, Grade B.

D. Pipe: ASTM A 53/A 53M, Grade B, Finish black.

E. Shear Stud Connectors: Made from ASTM A 108 Grade 1015 bars. Headed stud type.

F. Rods: ASTM A 36/A 36M.

G. Structural Bolts and Nuts: Carbon steel, ASTM A 307, Grade A.

H. High-Strength Structural Bolts, Nuts, and Washers: ASTM A 325, with matching ASTM A 563 nuts and ASTM F 436 washers; Type 1, medium carbon, plain. Bolts and nuts shall be heavy hex.

I. High Strength Structural Bolts: ASTM A 490, with matching ASTM A 563 nuts and ASTM F 436 washers; Type 1 alloy steel. Bolts and nuts shall be heavy hex.

J. Unheaded Anchor Rods: ASTM F 1554, Grade 36, plain, with matching ASTM A 563 nuts and ASTM F 436 washers.

K. Headed Anchor Rods: ASTM A 307, Grade C.

L. Load Indicator Washers: Provide washers complying with ASTM F 959 at all connections requiring pre-tensioned high-strength bolts.

M. Welding Materials: AWS D1.1; type required for materials being welded.

N. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C 1107/C 1107M and capable of developing a minimum compressive strength of 7,000 psi at 28 days.

O. Shop and Touch-Up Primer: Type specified in Section 09 91 20, complying with VOC limitations of authorities having jurisdiction.

P. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Shop fabricate to the greatest extent possible.

B. Develop required camber for members.

C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements of AWS D1.1.

D. Bolt Holes: Drill or punch standard bolt holes perpendicular to metal surfaces.

E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

2.03 FINISH

A. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted with slip-critical connections.

B. Surface preparation: SSPC-SP2: "Hand Tool Cleaning" or SSPC-SP3, "Power Tool Cleaning".
1. Refer to Division 9 for preparation of surfaces that are to receive coatings other than shop primer.

C. Provide a dry film thickness of not less than 1.5 mil.

D. Galvanize structural steel members to comply with ASTM A 123/A 123M. Provide minimum 1.7 oz/sq ft. galvanized coating. Galvanize shelf angles, lintels and hung plates located in exterior walls. Galvanize all exterior steel.

2.04 SOURCE QUALITY CONTROL

A. An independent testing agency will perform source quality control tests, as specified in Section 01 40 00. Inspection services shall conform to Section 1705.2 of the 2015 IBC Code, the quality assurance inspection requirements of AISC 360 and the Statement of Special inspections noted in the structural drawings.

B. High-Strength Bolts: Provide testing and verification of all shop-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts".

1. Pre-tensioned and slip-critical bolts shall be installed using direct-tension-indicator washer method or twist-off type tension control bolt method.

C. Welded Connections: Visually inspect all shop-welded connections and test all full penetration welds using ultrasonic testing performed in accordance with ASTM E 164.

1. Inspect all joint preparations for complete joint penetration welds and verify compliance with welding procedure specification requirements.

PART 3 - EXECUTION

3.01 ERECTION

A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".

B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Field weld components indicated on shop drawings.

D. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

E. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with AISC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts".

F. Do not field cut or alter structural members without the approval of the Architect.

G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete and surfaces that will be fireproofed. Repair damaged galvanized coatings with galvanized repair paint.

H. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for non-shrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.02 TOLERANCES

A. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges".

3.03 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00. Inspection services shall conform to Section 1705.2 of the 2015 IBC Code, the quality assurance inspection requirements of AISC 360 and the Statement of Special Inspections noted in the structural drawings.

B. High-Strength Bolts: Provide testing and verification of all field-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts".

1. Pre-tensioned and slip-critical bolts shall be installed using direct-tension-indicator washer method or twist-off type tension control bolt method.

C. Welded Connections: Visually inspect all field-welded connections and test all full penetration welds using ultrasonic testing performed in accordance with ASTM E 164.

1. Inspect all joint preparations for complete joint penetration welds and verify compliance with welding procedure specification requirements.

D. In addition to visual inspection, field-welded shear connectors shall be tested and inspected according to the requirements of AWS D1.1 for stud welding.

E. Correct deficiencies in work that inspections indicate does not comply with the specified requirements.

END OF SECTION

SECTION 05 12 13 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes architecturally exposed structural-steel framing.
   1. Requirements in Division 05 Section "Structural Steel Framing" also apply to AESS framing.

B. Location: All exposed lobby and canopy steel shall be AESS.

1.2 DEFINITIONS

A. Architecturally Exposed Structural Steel: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents and as defined in this specification.

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.
   1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
   2. Include embedment drawings.
   3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
   4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections. Indicate orientation of bolt heads.
   5. Indicate exposed surfaces and edges and surface preparation being used.
   6. Indicate special tolerances and erection requirements.

B. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15 and appropriate forms.
   1. Provide documentation of recycled content type and percentage by cost, location of extraction/recovery/harvest of primary raw materials, steel mill process, location of mill, and location of fabrication.
   2. Except for sizes not available from regional producers, structural steel shall be extracted/harvested/recovered and manufactured within 500 miles of the job site.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
   1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.5 PROJECT CONDITIONS

A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

1.6 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 PRODUCTS

2.1 STEEL MATERIALS

A. Comply with Section 05 12 00 for all steel materials.

2.2 PRIMER

A. Primer: Comply with Division 09 painting Sections.

2.3 FABRICATION

A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.

B. In addition to special care used to handle and fabricate AESS, comply with the following:
   1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
   2. Grind sheared, punched, and flame-cut edges of AESS to remove burrs and provide smooth surfaces and edges.
   3. Fabricate AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
   4. Fabricate AESS with exposed surfaces free of seams to maximum extent possible.
   5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
   6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
   7. Fabricate AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
   8. Seal-weld open ends of hollow structural sections with 1/4-inch closure plates for AESS.

C. Curved Members: Fabricate indicated members to curved shape by rolling to final shape in fabrication shop.
   1. Distortion of webs, stems, outstanding flanges, and legs of angles shall not be visible from a distance of 20 feet under any lighting conditions.

D. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for AESS.

E. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
   1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.

2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.4 SHOP CONNECTIONS

A. Connection Preference: Shop connections shall be welded unless specifically indicated otherwise.

B. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.

C. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.
4. Provide continuous welds of uniform size and profile where AESS is welded.
5. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch for AESS.
6. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for AESS.
7. At locations where welding on the far side of an exposed connection of AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
8. Make fillet welds for AESS oversize and grind to uniform profile with smooth face and transition.

2.5 SHOP PRIMING

A. Shop prime steel surfaces except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards as required for applied finish:
1. SSPC-SP 11, "Power Tool Cleaning to Bare Metal" or;
2. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film

thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
   1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
   1. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.

3.3 ERECTION

A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
   1. Erect AESS to the tolerances specified in AISC 303 for steel that is designated AESS.

B. Do not use thermal cutting during erection.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened.
   2. Orient bolt heads as indicated on Drawings.

B. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.
   1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for AESS.
   2. Remove erection bolts in AESS, fill holes, and grind smooth.
   3. Fill weld access holes in AESS and grind smooth.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: A qualified independent testing and inspecting agency as specified in Section 01 40 00 will be employed to inspect AESS as specified in Division 05 Section "Structural Steel Framing." The testing agency will not be responsible for enforcing requirements relating to aesthetic effect.

B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

3.6 REPAIRS AND PROTECTION

A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning, unless a more stringent finishing method is required for applied finish.

END OF SECTION

SECTION 05 21 00 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Open web steel joists, with bridging, attached seats and anchors.

B. Loose bearing members, such as plates and anchor bolts for site placement.

C. Joist accessories.

1.02 REFERENCE STANDARDS

A. AISC S348 – Specification for Structural Joints Using ASTM A 325 or A 490 bolts.

B. ASTM A 36/A 36M – Standard Specification for Carbon Structural Steel.

C. ASTM A 325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

D. ASTM E 94 – Standard Guide for Radiographic Examination.

E. ASTM E 164 – Standard Practice for Ultrasonic Contact Examination of Weldments.

F. ASTM E 165 – Standard Test Method for Liquid Penetrant Examination.

G. ASTM E 709 – Standard Guide for Magnetic Particle Examination.

H. AWS D1.1/D1.1M – Structural Welding Code – Steel; American Welding Society.

I. SJI (SPEC) – Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders; Steel Joist Institute.

J. SSPC-SP 2 – Hand Tool Cleaning; Society for Protective Coating.

K. IBC 2015 – International Building Code.

1.03 SPECIAL JOISTS

A. Design special joists to withstand design loads indicated with live load deflection no greater than L/360 of the span.

1.04 SUBMITTALS

A. See Section 01 30 00 – Administrative requirements for submittal procedures.

B. Shop Drawings: Show layout, designation, number, type, location, and spacing of joists. Include joining and anchorage details, bracing, bridging, joist accessories, splice and connection locations and details; and attachments to other construction.

1. Indicate locations and details of bearing plates to be embedded in other construction.
2. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer licensed in the State of Maryland who is responsible for its preparation.

C. Welding Certificates.

D. Manufacturer's Certificates: Signed by manufacturers certifying that joists comply with requirements.

E. Manufacturer's Mill Certificates: Signed by bolt manufacturers certifying that bolts comply with requirements.

F. LEED Report: Accurately document the use of recycled materials and local/regional materials as required by Section 01 35 15 and appropriate forms.

1. Provide documentation of recycled content type and percentage by cost, location of extraction/recovery/harvest of primary raw materials, steel mill process, location of mill and location of fabrication.

2. Steel joists shall be extracted/recovered/harvested and manufactured within 500 miles of the job site.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable specifications and load tables of SJI "Specifications".

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. SJI Specifications: Comply with standard specification in SJI's "Specifications" that are applicable to types of joists indicated.

C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M "Structural Welding Code – Steel".

PART 2 - PRODUCTS

2.01 MATERIALS

A. Open Web Joists: SJI Type K and KCS Joists:

1. Provide bottom and top chord extensions as indicated.

2. Finish: Shop primed.

B. Steel: Comply with SJI's Specifications for web and angle chord members.

C. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel bolts with ASTM A 563 heavy hex nuts and ASTM F 436 washers; plain.

D. Structural Steel for Supplementary Framing: ASTM A 36/A 36M.

E. Welding Materials: AWS D1.1; type required for materials being welded.

F. Shop and Touch-Up Primer: Type specified in Section 09 91 20, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Manufacture steel joists to meet SJI's "Specifications", with steel angle top and bottom- chord members; of joist type and end and top-chord arrangements as indicated.

B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

C. Provide holes in chord members for connecting and securing other construction to joists.

D. Camber steel joists according to SJI's "Specifications".

E. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds ¼ inch per twelve inches.

F. Bridging: Provide bridging anchors and number of rows of horizontal and diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Provide additional erection bridging if required for stability and where indicated on the Drawings.

G. Fabricate steel bearing plates with integral anchorages of sizes and thicknesses indicated. Shop prime paint.

H. Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within ½ inch of finished wall surface unless otherwise indicated.

I. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.03 FINISH

A. Prepare surfaces to be finished in accordance with SSPC-SP 2.

B. Apply shop primer to joists and joist accessories to provide a continuous dry paint film not less than 2 mil thick; apply two coats of shop primer if necessary to meet specified dry film thickness.

PART 3 - EXECUTION

3.01 ERECTION

A. Erect joists with correct bearing on supports.

B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.

C. After joist alignment and installation of framing, field weld joist seats to steel bearing surfaces.

D. Coordinate placement of anchors in concrete and masonry construction for securing bearing plates.

E. Position and field weld joist chord extensions and wall attachments as detailed.

F. Do not permit erection of decking until joists are braced, bridged, and secured or until completion of erection and installation of permanent bridging and bracing.

G. Do not field cut or alter structural members without approval of joist manufacturer.

H. After erection, prime welds and damaged shop primer, except surfaces specified not to be primed.

3.02 TOLERANCES

A. Maximum Variation From Plumb: ¼ inch.

B. Maximum Offset From True Alignment: ¼ inch.

3.03 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00. Inspection services shall conform to Section 1705.2 of the 2015 IBC Code and the Statement of Special Inspections noted in the structural drawings.

B. High-Strength Bolts: Provide testing and verification of all field-bolted connections in accordance with AISC "Specification for Structural Joists Using ASTM A 325 or A 490 Bolts".

C. Welded Connections: Visually inspect all field-welded connections and test 100 percent of full-penetration welds using ultrasonic testing performed in accordance with ASTM E 164.

D. Correct deficiencies in work that inspections indicate are not in compliance with specified requirements.

END OF SECTION

SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Roof deck.

B. Composite floor deck.

C. Supplementary framing for openings up to and including 12 inches.

D. Bearing plates and angles.

E. Stud shear connectors.

1.02 REFERENCE STANDARDS

A. ASTM A 36/A 36M – Standard Specification for Carbon Structural Steel.

B. ASTM A 108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.

C. ASTM A 653/A 653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM A 1008/A 1008M – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened.

E. AWS D1.1/D1.1M – Structural Welding Code – Steel; American Welding Society.

F. AWS D1.3 – Structural Welding Code – Sheet Steel, American Welding Society.

G. SDI (DM) – Publication No. 31, Design Manual for Composite Decks, Form Decks, Roof Decks; Steel Deck Institute.

H. SSPC-Paint 20 – Zinc-Rich Primers (Type I, “Inorganic”, and Type II “Organic”); The Society for Protective Coatings.

1.03 SUBMITTALS

A. See Section 01 30 00 – Administrative Requirements, for submittals procedures.

B. Shop Drawings: Indicate deck plan, support locations, anchorage details, projections, openings, reinforcement, cellular raceways and outlet box locations, pertinent details, and accessories.

C. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.

D. Certificates: Certify that products furnished meet or exceed specified requirements.

E. Welders Certificates: Certify welders employed on the Work are certified to perform welding according to AWS requirements with AWS 1.3 qualification within the previous twelve months.

F. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15 and appropriate forms.

1. Provide documentation of recycled content type and percentage by cost, location of extraction/recovery/harvest of primary raw materials, steel mill process, location of mill, and location of fabrication.

2. All steel decking shall be extracted/harvested/recovered and manufactured within 500 miles of the job site.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this Section with minimum of 5 years of documented experience.

1.05 DELIVERY, STORAGE AND HANDLING

A. Cut plastic wrap to encourage ventilation.

B. Separate sheets and store deck on dry wood sleepers, slope for positive drainage.

PART 2 - PRODUCTS

2.01 STEEL DECK

A. Roof Deck: Non-composite type, fluted steel sheet.

1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), with G60/Z180 galvanized coating.
   a. Grade 33.

B. Composite Floor Deck: Fluted steel sheet embossed to interlock with concrete.

1. Galvanized Steel Sheet: ASTM A 653/A 653M, Designation SS, with G60/Z180 galvanized coating.
   a. Grade 50.

2.02 ACCESSORY MATERIALS

A. Bearing Plates and Angles: ASTM A 36/A 36M steel.

B. Stud Shear Connectors: Made from ASTM A 108/A 108M Grade 1015 bars.

C. Welding Materials: AWS D1.1.

D. Fasteners: Galvanized hardened steel, self tapping screws, No. 10 minimum.

E. Weld Washers: Mild steel, uncoated, ¾ inch outside diameter, 1/8 inch thick.

F. Shop and Touch-Up Primer: Type specified in Section 09 91 20, complying with VOC limitations of authorities having jurisdiction.

G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.

H. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the deck.

2.03 FABRICATED DECK ACCESSORIES

A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 20 gage minimum thick sheet steel; of profile and size as indicated; material and finish same as deck.

B. Cant Strips: Formed sheet steel, 16 gage thick, 45 degree slope, 3½ inch nominal width and height, flange for attachment.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.02 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.

B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before permanently fastening.

C. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck and support of other work.

D. Weld deck in accordance with AWS D1.3.

E. Where deck changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.

F. At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete. Provide stops of sufficient strength to remain stationary without distortion.

G. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.

H. Close openings above walls and partitions perpendicular to deck flutes with single row of foam cell closures.

I. Place metal cant strips in position and field weld.

J. Weld stud shear connectors through steel deck to structural members below.

K. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

3.03 ROOF DECK INSTALLATION

A. Fasten roof deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1½ inches long, and as follows:

1. Weld Diameter: 3/4 inch, nominal.
2. Weld Spacing: Weld edge ribs of panel at each support; space additional welds at 12" o.c. and as indicated on Drawings.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 36 inches, and as indicated on Drawings.

1. Mechanically fasten with self-drilling, No.10 diameter or larger, carbon-steel screws.
2. Fasten with a minimum of 1½ inch-long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1½ inches, with end joints lapped 2 inches minimum.

3.04 FLOOR DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter: 3/4 inch, nominal.
2. Weld Spacing: Weld edge ribs of panel at each support and at 12” on center.

B. Side-lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches, and as indicated on Drawings.

1. Fasten with a minimum of 1½ inch long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1½ inches, with end joints butted.

3.05 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00. Inspection services shall conform to Section1705.2 of the 2015 IBC Code and the Statement of Special Inspections noted in the structural drawings.

B. Inspection shall include, but not be limited to, deck alignment, support, welds, side lap attachments and touch-up galvanizing.

C. Remove and replace work that does not comply with specified requirements.

END OF SECTION

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Formed steel stud exterior wall framing.

1.02 REFERENCE STANDARDS

A. AISI SG02-1 – North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute (replaced SG-971).

B. ASTM A 153/A 153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

C. ASTM A 653/A 653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM A 1008/A 1008M – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

E. ASTM C 955 – Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.

F. AWS D1.1/D1.1M – Structural Welding Code – Steel; American Welding Society.

G. SSPC-Paint 20 – Zinc-Rich Primers (Type I, “Inorganic” and Type II, “Organic”); Society for Protective Coatings.

H. IBC 2015 – International Building Code.

1.03 DESIGN REQUIREMENTS

A. Axial and lateral load bearing elements shall be designed to the following conditions unless more stringent requirements are imposed by governing code; these requirements take precedence when more stringent than governing code.

1. Gravity loads: Per ASCE 7-2010.
2. Wind and Seismic Loads: Per ASCE 7-2010.

B. Maximum Allowable Deflection:

1. Backing of Masonry Veneer and Stone: 1:600 of span.
2. Other Systems: 1:240 of span.

C. Wall and General System:

1. Design to AISI SG-973 Cold-Formed Steel Design Manual.
2. Design to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
3. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

4. Design to meet loading and anchorage requirements for window systems and curtainwall system based on calculations provided by the respective subcontractors.
5. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as in accordance with IBC Code.

1.04 SUBMITTALS

A. See Section 01 30 00 – Administrative Requirements for submittal procedures.

B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.

C. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.

D. Shop Drawings: Indicate stud layout, component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related work.
1. Provide details, shop drawings and computations stamped by a Professional Engineer licensed in the State of Maryland.

E. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15 and appropriate forms.
1. Provide documentation of recycled content type and percentage by cost, location of extraction/recovery/harvest of primary raw materials, steel mill process, location of mill, and location of fabrication.
2. All cold-formed metal framing shall be extracted/harvested/recovered and manufactured within 500 miles of the job site.

1.05 QUALITY ASSURANCE

A. Calculate structural properties of framing members in accordance with requirements of AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
1. Maintain one copy of document on project site.

B. Design structural elements under supervision of a Professional Engineer experienced in design of this Work and licensed in the State of Maryland.

1.06 PROJECT CONDITIONS

A. Verify that field measurements are as indicated on the drawings.

PART 2 - PRODUCTS

2.01 FRAMING SYSTEM

A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

2.02 FRAMING MATERIALS

A. Studs and Track: ASTM C 955; studs formed to channel, with punched web; U-shaped track in matching nominal width and compatible height.

1. Galvanized Steel Sheet: ASTM A 653/A 653M Structural Steel (SS) with G90/Z275 hot-dipped galvanized coating.
2. Gage and depth: As indicated on the drawings and as required to meet specified performance levels.
3. Grade: As indicated on the drawings.

B. Framing Connectors: Factory-made formed steel sheet, ASTM A653/A 653M SS Grade 50, with G90/Z275 hot-dipped galvanized coating and factory punched holes.

1. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members; minimum 16 gage, 0.06 inch thickness.
2. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, screws and anti-friction bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
   a. Connect stud to structure in manner allowing vertical movement of structure without affecting studs; allow for minimum movement of ½ inch.
   b. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.

2.03 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.

B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I – Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.04 FASTENERS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot-dip galvanized per ASTM A 153/A 153M.

B. Anchorage Devices: Power actuated.

C. Welding: In conformance with AWS D1.1.

2.05 SHOP FABRICATED ASSEMBLIES

A. Shop fabricate metal framing to the greatest extent possible.

B. Fabricate assemblies of framed sections of sizes and profiles required; with framing members fitted, reinforced, and braced to suit design requirements.

C. Fit and assemble in largest practical sections for delivery to site, ready for installation.

PART 3 - EXECUTION

3.01 INSTALLATION OF STUDS

A. Install components in accordance with manufacturer’s instructions and ASTM C 1007 requirements.

B. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches on center. Coordinate installation of sealant with floor and ceiling tracks.

C. Construct corners using minimum of three studs. Install double studs, as a minimum, at wall openings, door and window jambs.

D. Install load bearing studs full length in one piece. Splicing of studs is not permitted.

E. Install load bearing studs, braced and reinforced, to develop full strength and achieve design requirements.

F. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.

G. Install intermediate studs above and below openings to align with wall stud spacing.

H. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.

I. Attach cross studs to studs for attachment of fixtures anchored to walls.

J. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

K. Touch-up field welds and damaged galvanized surfaces with primer.

3.02 TOLERANCES

A. Maximum Variation from True Position: 1/8 inch.

B. Maximum Variation of any Member from Plane: 1/8 inch.

3.03 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00. Inspection services shall conform to the Statement of Special Inspections noted in the structural drawings.

B. Inspections:

1. Perform inspections in order to assure strict conformance to the shop drawings at all phases of construction.
2. Check members for proper size, gage, plumbness, alignment, bearing, completeness of attachments, reinforcement, connection to structural frame, etc.
3. Check attachments for conformance with the shop drawings; all welds shall be touched up as specified.
4. Complete general inspection of structure prior to applying loads to those members.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Rough hardware.

B. Steel ladders.

C. Loose bearing and leveling plates.

D. Loose steel lintels.

E. Shelf angles.

F. Steel framing and supports for countertops.

G. Steel framing and supports for mechanical and electrical equipment.

H. Steel framing and supports for applications where framing and supports are not specified in other Sections.

I. Miscellaneous metal trim.

J. Metal bollards.

K. Miscellaneous storm drainage piping specialties.

L. Two step stair at penthouse with open grate treads.

1.2 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 2012.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

C. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.

D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

F. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010 w/Errata.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the Work.

B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel," AWS D1.2 "Structural Welding Code--Aluminum," and AWS D1.3 "Structural Welding Code--Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.4 SUBMITTALS

A. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show

anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

1. For installed products indicated to comply with design loads include structural analysis data and shop drawings signed by the qualified professional engineer responsible for their preparation.

B. Samples representative of materials and finished products as may be requested by Architect.

C. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include a list of completed projects with project name, addresses, names of architects and owners, and other information specified.

E. Qualification data for professional engineer responsible for designing fabrications indicated to comply with specific design loads.

F. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15 and appropriate forms.

1. Credit MR 5: Provide documentation of recycled content type and percentage by cost, location of extraction/recovery/harvest of primary raw materials, steel mill process, location of mill, and location of fabrication.
2. Credit MR 4: Except for sizes not available from regional producers, materials shall be extracted/harvested/recovered and manufactured within 500 miles of the job site.

1.5 PROJECT CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

A. Metal Surfaces, General:

1. For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes.
2. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
3. Recycled Content: Provide steel with minimum 30 percent total recycled content, 25 percent shall be post-consumer recycled content.
4. Regional Materials: Provide steel manufactured and of primary raw materials extracted or recovered within 500 mile radius of Project Site.
5. Domestic Origin: Consistent with the Maryland Annotated Code, Article 78A known as the “Buy American Steel” Act of the General Assembly of Maryland, Acts of 1978, provide steel manufactured in the United States of America.

B. Steel Sections: ASTM A 36/A 36M.

C. Steel Tubing: Product type (manufacturing method) and as follows:
   1. Cold-Formed Steel Tubing: ASTM A 500.
   2. Hot-Formed Steel Tubing: ASTM A 501.
      a. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.

D. Plates: ASTM A 283.

E. Steel Pipe: ASTM A 53, standard weight (schedule 40), unless otherwise indicated, or another weight required by structural loads.
   1. Galvanized finish for exterior installations and where indicated.
   2. Black finish elsewhere, unless otherwise indicated.

F. Gray-Iron Castings: ASTM A 48, Class 30.

G. Malleable-Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).

H. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
   1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

I. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

2.2 MATERIALS - ALUMINUM

A. General:
   1. Recycled Content: Give preference to aluminum with the highest recycled content feasible.
   2. Regional Materials: Give preference to aluminum manufactured and of primary raw materials extracted or recovered within 500 mile radius of Project Site.

B. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632 (ASTM B 632M) Pattern 1, alloy 6061-T6.

2.3 PAINT

A. Shop Primer for Ferrous Metal - Interior Locations, Loose Lintels, Plates, etc.: Refer to Division 9 painting specifications.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.

C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers.

2.4 FASTENERS

A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568, Property Class 4.6), with hex nuts, ASTM A 563 (ASTM A 563M), and, where indicated, flat washers.

C. Machine Screws: ANSI B18.6.3.

D. Lag Bolts: ANSI B18.2.1 (ANSI B18.2.3.8M).

E. Plain Washers: Round, carbon steel, ANSI B18.22.1 (ANSI B18.22M).

F. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
   1. Material - General: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
   2. Material - Exposed exterior or in contract with ground: Group 1 alloy 304 or 316 stainless-steel bolts and nuts complying with ASTM F 593 (ASTM F 738M) and ASTM F 594 (ASTM F 836M).

H. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as required.

2.5 GROUT

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

B. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
   1. Construction Grout; W. R. Bonsal Co.
   2. Sure-grip High Performance Grout; Dayton Superior Corp.
   3. Euco N-S Grout; Euclid Chemical Co.
   4. Crystex; L & M Construction Chemicals, Inc.
   5. Masterflow 928 and 713; Master Builders Technologies, Inc.
   6. Sealtight 588 Grout; W. R. Meadows, Inc.
   7. Sonogrout 14; Sonneborn Building Products--ChemRex, Inc.

2.6 FABRICATION

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
   1. Temperature Change (Range): 120 deg F.

D. Shear and punch metals cleanly and accurately; remove burrs.

E. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

F. Remove sharp or rough areas on exposed traffic surfaces.

G. Weld corners and seams continuously to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

K. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

M. Fabricate items with joints tightly fitted and secured.

N. 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.

O. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.7 ROUGH HARDWARE

A. Furnish bent, or otherwise custom-fabricated, bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.

B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts that bear on wood structural connections, and furnish steel washers elsewhere.

2.8 STEEL LADDERS

A. General: Fabricate ladders for the locations shown, with dimensions, spacings, details, and anchorages as indicated. Comply with requirements of ANSI A14.3.

B. Siderails: Continuous, steel, 1/2-by-2-1/2-inch flat bars, with eased edges, spaced 18 inches apart.

C. Bar Rungs: 3/4-inch diameter steel bars, spaced 12 inches o.c.

D. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.

E. Support each ladder at top and bottom and at intermediate points spaced not more than 5 feet o.c. with welded or bolted steel brackets.
   1. Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7 inches.
   2. Extend side rails 42 inches above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent structure does not extend above the top rung, goose-neck the extended rails back to the structure to provide secure ladder access.

F. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to the rung by a proprietary process.
   1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
      a. Mebac, IKG Borden.
      b. SLIP-NOT, W. S. Molnar Co.

G. Galvanize ladders, including brackets and fasteners, in the following locations:
   1. All locations.

2.9 LOOSE STEEL LINTELS

A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels for equal bearing of 1 inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.

D. Hot dip galvanize loose steel lintels located in exterior walls.

2.10 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of the required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

2.11 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
   1. Equip units with integrally welded anchors; furnish inserts if units must be installed after concrete is placed.
      a. Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

C. Galvanize miscellaneous framing and supports in the following locations:
   1. Exterior locations.
   2. Interior locations where indicated.

2.12 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices wherever possible.

B. Provide cutouts, fittings, and anchorages as required to coordinate assembly and installation with other Work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches o.c., unless otherwise indicated.

C. Galvanize miscellaneous steel trim in the following locations:
   1. Exterior locations.
   2. Interior locations where indicated.

2.13 MISCELLANEOUS STORM DRAINAGE PIPING SPECIALTIES

A. Downspout Boots: Provide downspout boots made from cast gray iron in heights indicated with inlets of size and shape to suit downspouts.
   1. Outlet: NPS 4 (DN 100) outlet, to discharge into pipe.
   2. Cast with ears to attach to building.
   3. Size: Inlet size to match downspout and NPS 4 (DN 100) outlet.
   4. Finish: Shop-applied bituminous coating.

B. Downspout Adaptors: Provide downspout adaptors made from cast gray iron casting, for attaching to horizontal-outlet, parapet roof drain and to exterior, sheet metal downspout.
   1. Inlet size to match parapet drain outlet.

2.14 PIPE BOLLARDS

A. Provide Schedule 40 black steel pipe of size and height indicated as detailed on the Drawings.

B. Permanent Setting:
   1. Set posts in concrete to a depth of 3'-0"; footing diameter minimum 3 times post diameter.
   2. Fill posts completely with concrete and dome on top.

C. Finish: Painted as specified in Division 9 "Exterior Painting."

2.15 FINISHES - STEEL AND IRON

A. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements:
   1. ASTM A 153 for galvanizing iron and steel hardware.
   2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch (0.76 mm) thick or thicker.

B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
   1. Exteriors (SSPC Zone 1B): SSPC-SP 6 "Commercial Blast Cleaning."
   2. Interiors (SSPC Zone 1A): SSPC-SP 3 "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.

2.16 FINISHES - ALUMINUM

A. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

C. Class I Natural Anodized Finish (unless indicated otherwise): AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.17 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

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

B. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

3.2 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

E. Field Welding: Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.3 SETTING LOOSE PLATES

A. Clean concrete bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

B. Set loose leveling and bearing plates on wedges or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.
   1. Use nonshrink, nonmetallic grout, unless otherwise indicated.
   2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a 2.0-mil (0.05-mm) minimum dry film thickness.

B. For galvanized surfaces, clean welds, bolted connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 05 51 33.23 - ALTERNATING TREAD STEEL STAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services and perform all operations necessary or required for the work of this section, in accordance with the Drawings and Specifications, and including fabrication and installation of alternating tread steel stairs.

B. Related work specified elsewhere includes but is not limited to:
   1. Metal Fabrications in another Division 5 section
   2. Painting in Division 9

1.2 PERFORMANCE REQUIREMENTS

A. Stair Treads: Capable of withstanding a single concentrated 1000 pound load without permanent deformation; or 100 pounds per square foot or 300 pounds on an area of 4 square inches without exceeding the allowable working stress of the material.

B. Handrail: Capable of withstanding a single concentrated load of 200 pounds or a uniform load of 50 pounds per linear foot applied in any direction at any point on the rail without exceeding the allowable working stress of the material.

C. Stair Stringers: Capable of withstanding a single concentrated load of 1000 pounds at any point on the stair without permanent deformation; or a uniform live loading of 100 pounds per square foot applied in a downward direction to all tread surfaces or a 300 pound load on an area of 4 square inches without exceeding the allowable working stress of the material.

1.3 CONSTRUCTION REQUIREMENTS

A. Landings, Treads, and Mounting Base: Stamped and formed from single piece material. Stock shapes, hand forming, or welded remnants shall not be permitted. All stamped parts shall have integrally formed rigidizing bends and shall be spot welded to stringers of like material.

B. Welds: Minimum of 8 welds per tread, and 12 welds each on the landing and mounting base. Each weld shall be quality controlled and be capable of withstanding a minimum of 2800 lbs. in shear.

C. Pedestrian Surfaces: Punched through with upset non-skid openings.

D. Riser Spacing: Equally spaced to within 3/16" for adjacent risers and to within 3/8" for any two non-adjacent risers on a stair.

E. Handrails: Contoured for body guidance and underarm support and shall be attached to the outside stringers and landings by bolting.

F. Landing Reinforcement: 1/4" steel angle notched and punched and factory welded to the landing at the points of a handrail attachment.

G. Rubber Foot Divider: Affixed to the central portion of the landing; a rubber bumper strip shall be attached or will be provided for field attaching to the central stringer.

1.4 DIMENSIONS

A. Stair Angle: 56 degrees from horizontal as required in the Drawings.

B. Vertical Drop: Change in elevation, as shown in the drawings, between the upper finished floor surface where the top landing will be attached and the lower finished floor surface where the base of the stair will be secured.

1.5 SUBMITTALS

A. Dimensional Prints: Submitted for approval prior to fabrication.

B. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.

1. Provide documentation of recycled content type and percentage, location of extraction/recovery of primary raw materials, location of fabrication and costs.

PART 2- PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: Lapeyre Stair, Inc., Harahan, LA 70123; (800) 535-7631 or, subject to compliance with requirements, provide one of the following manufacturers:

B. Vestil Equipment (800) 338-1382.

C. Global Industrial Stairs and Ladders (888) 978-7759.

2.2 MATERIALS

A. Carbon Steel:

1. Treads: 13 Gauge 1010/15 HRPO per ASTM A569
2. Landing & Foot Stampings: 11 Gauge 1010/15 per ASTM A569
3. Stringers:
   a. 2" x 1 3/4" x 11 Gauge 1010/15 per ASTM A569 for 56 degree stairs under 10 vertical feet and for 68 degree stairs under 12 vertical feet.
   b. 3" x 1 3/4" x 11 Gauge 1010/15 for 56 degree stairs over 10 vertical feet and for 68 degree stairs over 12 vertical feet.
4. Handrails: 1 1/2" OD x 0.083" 1010/15 CS per ASTM A569 cold drawn, fully annealed tube per ASTM 513.

B. Miscellaneous Material:

1. Rubber Spine: Hollow neoprene
2. Rubber Foot Divider: Solid neoprene

2.3 FINISHES

A. Carbon Steel:

1. Safety Yellow Paint: Powder Coat Baked Enamel.

2.4 FABRICATION

A. General: Fabricate alternating tread steel stairs to conform with performance and construction requirements, and in accordance with approved shop drawings or dimensional prints. Fabricate and shop-assemble to greatest extent possible.

B. Carbon Steel: Gas metal arc welded with treads spot welded to stringers and bolt-on handrails with included bolts using the specified materials.

C. Handrail design standard narrow handrail; 42 inch rail height from top of landing.

PART 3- EXECUTION

3.1 PREPARATION

A. Coordination: Coordinate start and installation of steel alternating treads with all other related and adjacent work. Installation shall not start until the construction has progressed to the point that weather conditions and remaining construction operations will not damage stair installation.

B. Verification: Verify that dimensions and angle are correct and that substrate is in proper condition for stair installation. Do not proceed to install until all necessary corrections have been made.

3.2 INSTALLATION

A. If bumper has not been installed at the factory, install the bumper in accordance with the manufacturer's instructions using glue supplied with the stair.

B. Prepare mounting holes.

C. Position stair with top tread at same elevation as upper finished floor or roof surface.

D. Secure stair with not less than 2 bolts or studs at top and with not less than 2 at bottom of stair.

E. Touch up with matching paint any chipped or abraded damage to factory finish or

F. Touch up any damage to galvanized surfaces using galvanized repair paint in accordance with ASTM A780.

3.3 CLEAN

A. Leave work area clean and free of debris.

END OF SECTION

SECTION 05 52 13 - PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Stair railings and guardrails.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 04 20 00 - Unit Masonry: Placement of anchors in masonry.

C. Section 09 21 16 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.

D. Section 09 21 16 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.

1.3 REFERENCE STANDARDS

A. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2016.

B. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.

C. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).

1.4 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.

1. Non-welded field connections in aluminum handrails to be limited to greatest fabricated section lengths; locations accepted by Architect and consistent for multiple locations.

C. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.

1. Provide documentation of recycled content type and percentage, location of extraction/recovery of primary raw materials, location of fabrication and costs.

PART 2 PRODUCTS

2.1 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.

B. Design railing assembly, wall rails, and attachments to resist lateral force of 75 lbs at any point without damage or permanent set. Test in accordance with ASTM E 935.

C. Allow for expansion and contraction of members and building movement without damage to connections or members.

D. Dimensions: See drawings for configurations and heights.

1. Infill: Round vertical pickets; size and spacing indicated on drawings.

E. 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 masonry, provide brackets to be embedded in masonry, for bolting anchors.
   3. For anchorage to stud walls, provide backing plates, for bolting anchors.

F. 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.

2.2 COMPONENTS

A. Stainless Steel Pipe and Tube Railing Systems:
   1. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2016.
   2. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing; 2015.
   3. Stainless Steel Components:
      a. ASTM A666, Type 304 for interior applications, Type 316 for exterior applications.
      b. Stainless Steel Tubing: 16 gage (0.0625 inch), 1-1/2 inch diameter.
      c. Stainless Steel Finish: No. 4 Satin.

2.3 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.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

A. Clean and strip stainless steel 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.

3.3 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. Anchor railings securely to structure.

D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

E. Handrail Field Joints:
   1. Clean area to be joined thoroughly.

2. Apply epoxy adhesive to inside of pipe.
3. Insert sleeve and fit components together, wipe excessive adhesive.
4. Provide stainless steel set screws concealed on underside of handrail; fill head with epoxy setting adhesive and clean excess.

3.4 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 05 53 20 - STAIR NOSINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Extruded aluminum stair nosings for exterior stairs.

1.2 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturers product specifications, installation and maintenance instructions.

C. Samples for initial selection, in the form of manufacturer's color charts or sections of units showing the full range of colors.

D. Samples for verification, in the form of sections of units in manufacturer's standard sizes; prepare samples from same material to be used for the Work.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain stair nosings from one source and from a single manufacturer.

1.4 SEQUENCING AND SCHEDULING

A. Coordinate with metal stairs so that nosing sub-bases are available for placing integrally with metal pan stair fill.

PART 2 PRODUCTS

2.1 EXTRUDED ABRASIVE NOSINGS

A. Provide extruded aluminum units with abrasive filler consisting of aluminum oxide or silicon carbide grits, or a combination of both, in an epoxy-resin binder. Furnish in lengths as required to accurately fit each opening or conditions.
   1. Provide ribbed units, with abrasive filler strips projecting 1/16 inch (1.5 mm) above the aluminum extrusion and having the maximum recycled content feasible.
      a. Primary Color: To be selected.
      b. Highlight Color: Contrasting; to be selected.
   2. Provide two-piece design. Sub-channel to be set with stair pan fill (use plywood filler for tread).

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
   1. American Safety Tread Co., Inc.; TP-311 Ribbed
   2. Babcock-Davis.; BSTTB-P3.375E.
   3. Balco/Metalines, Inc.; DST-330

C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with the manufacturer.

D. Drill for mechanical anchors with countersunk holes located not more than 4 inches (100 mm) from ends and not more than 12 inches (300 mm) o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by the manufacturer.

E. Set elevation of sub-channel and concrete fill levels to provide flush installation to top of finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Furnish sub-channel to pre-filled stair pan fabricator and exterior concrete step installer for installation at appropriate time.

3.2 INSTALLATION

A. Install stair nosings in accordance with manufacturer's instructions.

B. Install sub-channel with concrete fill.

C. Install tread insert prior to Substantial Completion and protect from damage until acceptance; set insert in sealant applied to sub-channel and clean any sealant seeping from joint following installation of insert.

D. Work shall be aligned plumb, level, and, where required, flush with adjacent surfaces and rigidly anchored to the substrate.

E. Clean exposed surfaces as recommended by the manufacturer.

END OF SECTION

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preservative treated wood materials.

B. Fire retardant treated wood materials.

C. Miscellaneous framing and sheathing.

D. Communications and electrical room mounting boards.

E. Concealed wood blocking, nailers, and supports.

F. Miscellaneous wood nailers, furring, and grounds.

1.2 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.3 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

B. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

D. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood Protection Association; 2012.

E. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology, Department of Commerce; 2010.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials and application instructions.

C. LEED Submittals: Submit applicable LEED Submittal Form for each different product made of sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, as well as locally-sourced wood, as specified in Section 01 35 15.

D. LEED Submittal: Provide documentation indicating no added urea formaldehyde for composite wood and agrifiber products.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

2.2 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.3 CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.4 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

2.5 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. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
   2. 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. Fire Retardant Treatment:
   1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.

b. Treat all exterior rough carpentry items.
c. Do not use treated wood in direct contact with the ground.
d. Treat wood blocking installed in built-up thickness for roofing terminations except top layer in direct contact with roofing membrane.
e. Basis-of-Design: Hoover-X by Hoover Treated Wood Products, Inc.: www.frtw.com.

2. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
b. Treat rough carpentry items as indicated .
c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
1. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
2. Treat lumber in contact with roofing, flashing, or waterproofing.
3. Treat lumber in contact with masonry or concrete.
4. Treat lumber less than 18 inches above grade.
5. Treat lumber in other locations as indicated.
6. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft retention.
a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
b. Treat plywood in contact with roofing, flashing, or waterproofing.
c. Treat plywood in contact with masonry or concrete.
d. Treat plywood less than 18 inches above grade.
e. Treat plywood in other locations as indicated.

D. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative to 0.4 lb/cu ft retention.
1. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.1 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.

3.2 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

3.3 INSTALLATION OF CONSTRUCTION PANELS

A. 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. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.

END OF SECTION

SECTION 06 20 00 - FINISH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Finish carpentry items includes:
   1. Wood trim at cased openings off of lobby.

1.2 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.3 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

C. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.

D. AWPA C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association; 2003.

E. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; Hardwood Plywood & Veneer Association; 2009.

F. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Provide data on fire retardant treatment materials and application instructions.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, to a minimum scale of 1-1/2 inch to 1 ft.

D. Samples: Submit two samples of finish plywood, 24 inches x 24 inch in size illustrating wood grain and specified finish.

E. LEED Report: Submit for wood products made from sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, and locally-sourced wood, as specified in Section 01 35 15.

F. LEED Submittals: Provide documentation of VOC content in g/L for adhesives applied within the building envelope; document no added urea formaldehyde for composite wood, agrifiber products and laminating adhesives.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom grade.

B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

C. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum three years of documented experience.

D. Mockup: Build a mockup panel with samples of exposed trim, for this Project, applied to demonstrate treatment of fasteners and joints between trim sections.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire retardant requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

1.8 PROJECT CONDITIONS

A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

B. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

PART 2 PRODUCTS

2.1 FINISH CARPENTRY ITEMS

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI (AWS) for Premium Grade.

B. Composite Wood and Agrifiber Products (installed within the building waterproofing envelope): No added urea formaldehyde.

C. Laminating Adhesives (installed within the building waterproofing envelope): No added urea formaldehyde.

D. Wood Adhesives (installed within the building waterproofing envelope): Comply with Section 01 61 16.

2.2 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.3 LUMBER MATERIALS

A. Hardwood Lumber: Maple species, plain sawn, maximum moisture content of 6 percent , of quality suitable for transparent finish.

2.4 SHEET MATERIALS

A. Hardwood Plywood: HPVA HP-1, Grade AA, Type II; Veneer core, type of glue recommended for application; Maple face species, rotary cut.

2.5 PLASTIC LAMINATE MATERIALS

A. Plastic Laminate: NEMA LD 3, HGS; color as selected; textured, low gloss finish .

B. Laminate Backing Sheet: NEMA LD 3, BKL; undecorated plastic laminate.

2.6 ADHESIVE

A. Adhesive: Type recommended by laminate manufacturer to suit application .
   1. Comply to VOC limits of Section 01 61 16.

2.7 ACCESSORIES

A. Wood Filler: Solvent base, tinted to match surface finish color.

2.8 WOOD TREATMENT

A. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.

B. Wood Preservative by Pressure Treatment (PT Type): AWPA Treatment C2 using water borne preservative with 0.25 percent retainage.

C. Provide identification on fire retardant treated material.

D. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

E. Redry wood after pressure treatment to maximum 19 percent moisture content.

2.9 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.

C. Cap exposed plastic laminate finish edges with 3mm polyvinylchloride (PVC), machine applied with hot melt adhesive, inside/outside length radiused, corner radiused and buffed.
   1. Color selection for PVC edging will be made at a later date; Architect reserves the right to select colors manufactured and offered by Woodtape Edge Banding (at no additional cost to the Owner), when a standard selection offered by the casework manufacturer does not provide a suitable color in the Architect's opinion.

D. Shop prepare and identify components for book match grain matching during site erection.

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

F. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.

G. Apply laminate backing sheet to reverse face of plastic laminate finished surfaces.

2.10 SHOP FINISHING

A. Apply wood filler in exposed nail and screw indentations.

B. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

C. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent: Conversion varnish (formerly TR-4).
   2. Opaque: Catalyzed polyurethane (formerly OP-6).

D. Back prime woodwork items to be field finished, prior to installation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

3.2 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.3 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 11 13 - BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Bituminous dampproofing.
   1. For use on all new CMU walls below grade.

B. Parging.

1.2 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide properties of primer, bitumen, and mastics.

1.3 QUALITY ASSURANCE

1.4 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Henry Company.

B. Karnak Corporation: www.karnakcorp.com.

C. W.R. Meadows, Inc: www.wrmeadows.com.

2.2 FIBERED TROWEL MASTIC

A. Blend of selected asphalts, fibers, stabilizers, fillers and solvents.

B. Project Standard:
   1. Henry 793.
   2. Karnak 86AF Fibered Trowel Mastic.
   3. WR Meadows Sealmastic Trowel Mastic.

C. Characteristics:
   1. Solvent-based.
   2. ASTM D4586 Type 1 (Non-Asbestos).
   3. Perm Rating: 0.25 metric perms @ 40 mils dry film or better.

2.3 FIBERED TROWEL-GRADE EMULSION MASTIC - CONTRACTOR OPTION

A. Blend of refined asphalt, clay emulsifiers and selected non-asbestos fibers.

B. Project Standard:
   1. Henry HE 785.
   2. Karnak 920AF Fibered Emulsion Mastic.
   3. W.R. Meadows Sealmastic Type 3 Trowel-On Grade.

C. Characteristics:
   1. Select this option when applying dampproofing to concrete that has cured less than 28 days or contains greater than 5 percent moisture content.
   2. Water-based emulsion.
   3. ASTM D1227 Type II, Class 1.

4. Permeability: 0.5 mg/sq. cm or better.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

C. Verify that items that penetrate surfaces to receive dampproofing are securely installed.

3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Parge all CMU prior to applying damproofing.

C. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

D. Do not apply dampproofing to surfaces unacceptable to manufacturer.

E. Apply mastic to seal penetrations, small cracks, or minor honeycomb in substrate.

3.3 APPLICATION

A. Prime surfaces in accordance with manufacturer's instructions.

B. Apply in one trowel coat, continuous and uniform, at minimum rate of 4 gal/100 sq ft.; apply free of pinholes or holidays.

C. Seal items projecting through dampproofing surface with mastic. Seal watertight.

D. Allow film to cure at least 48 hours prior to backfilling; backfilling must take place within 7 days of application.

E. Notify Architect at completion of application and offer the opportunity for inspection prior to backfilling.

END OF SECTION

SECTION 07 21 00 - THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Board insulation at cavity wall construction, perimeter foundation wall, underside of floor slabs, and at cavity wall construction where detailed.

B. Batt insulation in exterior wall construction where indicated.

C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.2 REFERENCE STANDARDS

A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

1.3 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. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.

E. LEED Submittal: Provide documentation indicating VOC content in g/L for adhesives applied within the building waterproofing envelope low-emitting requirements for insulation as specified in Section 01 61 16.

1.4 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.1 APPLICATIONS

A. Insulation Under Concrete Slabs: Extruded polystyrene board.

B. Insulation at Perimeter of Foundation: Extruded polystyrene board.

C. Insulation Inside Masonry Cavity Walls (where detailed): Extruded polystyrene board.

D. Insulation in Metal Framed Walls: Batt insulation with no vapor retarder.

2.2 GENERAL

A. Insulation and adhesive installed within the waterproofing envelope: Comply with low-emitting requirements as specified in Section 01 61 16.

B. Recycled Content: Provide insulation with the highest recycled content feasible.

C. Regional Materials: Give preference to insulation manufactured and of primary raw materials extracted or recovered within 500 mile radius of project site.

2.3 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene Board Insulation: Extruded polystyrene board; ASTM C 578, Type X and Type VI; with either natural skin or cut cell surfaces, and the following characteristics:
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   3. R-value; 1 inch of material at 72 degrees F: 5, minimum.
   4. Board Edges: Square.
   5. Thermal Conductivity (k factor) at 25 degrees F: 0.18.
   6. Compressive Resistance: 15 psi at vertical applications; 40 psi at foundation perimeter.
   7. Board Density: 1.3 lb/cu ft.
   8. Water Absorption, Maximum: 0.3 percent, by volume.
   9. Manufacturers:
      a. Dow Chemical Co: www.dow.com.
      b. Owens Corning Corp: www.owenscorning.com.
      c. Kingspan Insulation LLC; www.trustgreenguard.com.

B. Adhesive: Provide letters from the insulation manufacturer and vapor retarder manufacturer confirming compatibility of adhesive recommended by insulation manufacturer for applying cavity insulation.

2.4 BATT INSULATION MATERIALS

A. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
   2. Thickness: As indicated on the drawings.
   3. Manufacturers:
      a. Johns Manville; MinWool Sound Attenuation Fire Batts: www.jm.com.
      b. Thermafiber, Inc; SAFB: www.thermafiber.com.
      c. ROXUL, Inc; ComfortBatt: www.roxul.com.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.2 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Apply adhesive to back of boards:
   1. Three continuous beads per board length.

B. Install boards horizontally on foundation perimeter.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.3 BOARD INSTALLATION AT CAVITY WALLS

A. Adhere over outer face of block backup where detailed at flashing locations.

B. Apply the insulating board to the outer surface of the inner masonry wythe with sufficient manual pressure to assure tight joint and good contact.

C. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

D. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

E. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.4 BOARD INSTALLATION UNDER CONCRETE SLABS

A. Place insulation under slabs on grade after base for slab has been compacted.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.5 BATT INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install in exterior wall 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. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.

F. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

END OF SECTION

SECTION 07 21 27 - ENCLOSED CAVITY FOAMED INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Foamed-in-place insulation in masonry cavity walls.

1.2 REFERENCES

A. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

B. ASTM D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

C. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.

D. ASTM D 2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.

E. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

F. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.

G. ASTM E 2357 - Standard for Air Barrier Materials.

H. NFPA 285 Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multistory test Apparatus.

1.3 SUBMITTALS

A. Product Data: Provide product description, insulation properties, and preparation requirements.

B. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

C. ICC-ES Evaluation Report to establish code compliance and R-Value.

D. Submit proof of compliance with NFPA 285 for Masonry as well as Rain Screen wall assemblies if applicable.

E. Submit certification of ASTM E-2357 compliance.

F. Submit proof of ABAA- Assembly Testing and Letter from Manufacturer stating SPF contractor in Approved to install Air Barrier SPF Product.

G. LEED Submittal: Provide documentation indicating VOC content in g/L for adhesives and primers applied within the building waterproofing envelope; as specified in Section 01 61 16.

1.4 QUALITY ASSURANCE

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

B. Applicator Qualifications: Company specializing in performing work of the type specified, with minimum three years of experience.

C. Contractor shall be certified by ABAA for SPF air barrier systems. Contractor shall include ABAA inspection and reports, submitted to Architect at each stage.

D. Contractor shall provide a written Safety Program, written Respirator Program and a written Job Hazard Analysis.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke limitations.

1.6 MOCK-UP

A. Include within mock-up for masonry assemblies.

1.7 PRE-INSTALLATION MEETING

A. Convene prior to mock-up and three weeks prior to commencing Work of this section. Review non-standard details, unusual conditions, and quality control procedures for this project.
   1. The following be in addendance: SPF Contractor, General Contractor, Sheathing and or Masonry Contractors, Owner's representative and Architect.

1.8 FIELD CONDITIONS

A. Do not install insulation when ambient temperature is lower than 40 degrees F.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Ecobay CC by Bayer Materials Sciences.

B. Walltite by BASF; www.basf-pfe.com.

C. Corobond III by Johns Manville Company.

D. MD-C-200 by Icynene; www.icynene.com.

E. NCFI InsulBloc by NCFI Polyurethanes; www.ncfi.com.

2.2 MATERIALS

A. Insulation: Polyurethane type.
   1. Thermal Conductivity: When tested in accordance with ASTM C 518:
   2. Water Vapor Transmission: 1.82 perms (1 inch SPF), measured in accordance with ASTM E 96.
   3. Air Permeance: 0.000025 L/s/sq. m. at 75 Pa, when tested in accordance with ASTM E 2178.
   4. Compressive Strength: 22 psi, when tested in accordance with ASTM D 1621.
   5. Density: 2.0 lb/cu ft, when tested in accordance with ASTM D 1622.
   6. Surface Burning Characteristics: Flame spread/Smoke developed index of 25 / 350, when tested in accordance with ASTM E 84 (4 inches SPF thickness).
   7. R-Value: Minimum of R-16.75.
   8. Thickness: 2 1/2 inches.
      a. Variation from thickness will be no more than plus 1/2 inch and no less than minus 1/4 inch.

B. Adhesives, primers applied within the building waterproofing envelope: Comply withlow-emitting requirements in Section 01 61 16.

C. Flexible Flashing - CMU Backup: For flashing not exposed to the exterior, use the following, unless otherwise indicated:
   1. Performance Requirements:
      a. Tensile Strength (Membrane): ASTM D412 Die C; 800 psi.
      b. Tensile Strength (Film): ASTM D412 Die C; 5,000 psi.
      c. Elongation: ASTM D412 Die C; 200 percent miminum.

d. Puncture Resistance: ASTM E154; minimum 134 pound.
e. Tear Resistance-Initial: ASTM D1004; minimum 45 pound.
f. Tear Resistance-Propagation: ASTM D1938; minimum 5.0 lbf/in. width.
g. Permeance: ASTM E96-B; 0.03 perms maximum.
h. Water Absorption: ASTM D570; 0.1 percent maximum.

2. Product:
   a. Basis-of-Design: Blueskin TWF, Manufactured by Henry.

2.3 ACCESSORIES

A. Primer: As required by insulation manufacturer.

B. Transition Membrane - Compatible with the insulation manufacturer and in locations as detailed in the drawings and at the following:
   1. Grade - from face of wall, overlap below grade membrane where applicable.
   2. Parapet - from outside face of wall, over top of parapet and under roof membrane.
   3. Dissimilar materials.
   4. Masonry control joints.
   5. Head, jamb, and sills of windows, doors, and other wall openings.
   6. Basis-of-Design Product: Blueskin SA, Manufactured by Henry.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify work within construction spaces or crevices is complete prior to insulation application.

B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.

3.2 PREPARATION

A. Mask and protect adjacent surfaces from over spray or dusting.

B. Apply primer in accordance with manufacturer's instructions.

C. Provide transition membranes between dissimilar materials all instances.

3.3 APPLICATION

A. Apply insulation in accordance with manufacturer's instructions.

B. Apply insulation by spray method, to a uniform monolithic density without voids.

C. Thickness Tolerance: ± 1/4-inch.

D. Clear foam from masonry veneer anchors to permit free movement within full limit of tie slots.

E. Patch damaged areas.

3.4 FIELD QUALITY CONTROL

A. Field inspections and tests to be performed by an independent testing agency as specified in Section 01 40 00. Contractor is to coordinate with and provide full access to Work that the independent testing agency will be inspecting.

B. Inspection will include verification of insulation and overcoat thickness and density.

END OF SECTION

SECTION 07 42 13 - METAL WALL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes factory-formed and field-assembled, concealed-fastener, tongue-and-groove seam, insulated metal wall panels; smooth flush panels.

1.2 DEFINITION

A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight system.

B. Steel Sheet Thickness: Minimum thickness of base metal without metallic coatings or painted finishes.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide metal wall panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft.

C. Water Penetration: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.

D. Horizontal joint design shall demonstrate pressure equalization in accordance with AAMA 508-07, which includes static and dynamic testing with imperfect air barriers; a third party test indicating successful passing of this test must be submitted.

1. Panel systems that have not successfully passed AAMA 508-07 shall provide a backup system including a membrane that meets the air and water infiltration values as listed above.

E. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592.

F. Wind Loads: International Building Code 2015; Factory Mutual Global and ASCE 7.

G. Deflection Limits: Engineer metal wall panel assemblies to withstand test pressures with deflection no greater than 1/180 of the span and no evidence of material failure, structural distress, or permanent deformation exceeding 0.2 percent of the clear span, unless Code requires greater requirements.

H. Seismic Performance: International Building Code 2015; and comply with ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads.

I. Thermal Movements: Provide metal wall panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal wall panel and accessory.

B. Qualification Data: For installer, manufacturer and professional engineer; include 5 copies.

C. Shop Drawings: Include required sets prepared by or under the supervision of a qualified professional engineer licensed in the State of Maryland, detailing fabrication and assembly of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory and field-assembled work.
   1. Accessories: Include details of the flashing and trim, at a scale of not less than 1-1/2 inches per 12 inches.
   2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   3. Engineer to be employed by the manufacturer and licensed in the State of Maryland.

D. Coordination Drawings: Exterior elevations drawn to scale and coordinating penetrations and wall-mounted items. Show the following:
   1. Wall panels and attachments.
   2. Girts or framing.
   3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.

E. Samples for Verification:
   1. For each type of exposed finish required.
   2. Metal Wall Panels: Actual panel width; minimum 12 inch length. Include fasteners, closures, and other metal wall panel accessories.

F. Qualification Data: For installer and Professional Engineer.

G. Compatibility and Adhesion Test Reports: From sealant manufacturer indicating the following:
   1. Materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for the following:
   1. Metal Wall Panels: Include reports for air infiltration, water penetration, and structural performance.

I. LEED Submittals:
   1. Product data for Credit MR 5.1 and Credit 5.2: For products having regional material content, documentation indicating location of manufacture and location of extraction or recovery of primary raw materials.
      a. Include statement indicating cost of each product with regional material content.
   2. Product Data for Credit MR 4.1 and MR 4.2: For products having recycled content, documentation indicating percentages by weight of post-consumer and pre-consumer recycled content; include statement indicating costs of each product having recycled content.

J. Maintenance Data: For metal wall panels to include in maintenance manuals.

K. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Manufacturer Qualifications: Manufacturer capable of providing engineering and field service representation during construction and approving acceptable installer.
   1. Engineering Responsibility: Preparation of data for including the following:
      a. Shop Drawings and comprehensive engineering analysis by a qualified professional engineer licensed in the State of Maryland.
   2. Company with a minimum of ten years of continuous experience manufacturing panel material of the type specified and capable of providing the following information.
   3. List of five other projects of similar size, including approximate date of installation and name of Architect for each.

C. Source Limitations: Obtain each type of metal wall panel through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal wall panels and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
   2. Submit no fewer than nine pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
   3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

E. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects.
   1. Provide components for installation in mock-ups, as indicated in Section 04 20 00 and the Drawings.
   2. Approval of mockups is for other material and construction qualities specifically approved by Architect in writing.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.

F. Preconstruction Conference: Before starting wall framing, sheathing, or girt construction, conduct conference at Project site. Review methods and procedures related to wall construction and metal wall panels including, but not limited to, the following:
   1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal wall panel Installer, metal wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal wall panels including installers of doors, windows, and louvers.
   2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   3. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.

4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal wall panel assembly during and after installation.
8. Review wall panel observation and repair procedures after metal wall panel installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.

B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal wall panels from exposure to sunlight and high humidity, except to extent necessary for period of metal wall panel installation.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of girts, studs, soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures, including rupturing, cracking, or puncturing.
      b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Warranty Period: Five years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PANEL MATERIALS

A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755.
   1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90 coating designation; structural quality; having recycled content.
   2. Surface: Smooth finish as standard for manufacturer and gage.
   3. Exposed Finishes:
      a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
         1) Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
   5. Recycled Content: Provide steel 25 percent post-consumer recycled content.with minimum 30 percent total recycled content including at least

B. Panel Sealants:
   1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
   2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
   3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.2 MISCELLANEOUS METAL FRAMING

A. Steel Sheet Components, General: Complying with ASTM C 645 requirements for metal and with ASTM A 653, G60, hot-dip galvanized zinc coating and having recycled content.

B. Subgirts: Fabricated from minimum 16 gage zinc coated steel conforming to ASTM A 653 SQ Grade 37, G90 coating.

C. Zee Clips: 0.079-inch bare steel thickness, cold-formed, galvanized steel sheet.

D. Base or Sill Channels: 0.079-inch bare steel thickness, cold-formed, galvanized steel sheet.

E. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

F. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating.
   1. Fasteners for Wall Panels: 300 series stainless steel with 5/8-inch bonded neoprene or EPDM and stainless washers.
   2. Concealed fasteners to be cadmium plated carbon steel.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.4 FOAMED-INSULATION-CORE METAL WALL PANELS

A. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and insulation core extending into the joint, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.
   1. Panel Performance:
      a. Flatwise Tensile Strength: 33 psi when tested according to ASTM D 1623.
      b. Humid Aging: Volume increase not greater than 2.0 percent and no delamination or metal corrosion when tested for 1000 hours at 120 deg F and 100 percent relative humidity according to ASTM D 2126.
      c. Heat Aging: Volume increase not greater than 1.0 percent and no delamination, surface blistering, or permanent bowing when tested for 1000 hours at 180 deg F according to ASTM D 2126.
      d. Cold Aging: Volume decrease not more than 1.0 percent and no delamination, surface blistering, or permanent bowing when tested for 1000 hours at 0 deg F according to ASTM D 2126.
      e. Water Absorption Exposure: Percent weight change of no more than 0.5%, when exposed for two hours in accordance with ASTM C 209.
      f. Autoclave: No delamination when exposed to 2-psi pressure at a temperature of 212 deg F for 2-1/2 hours.
      g. Fire-Test-Response Characteristics: Class A according to ASTM E 108.
   2. Polyisocyanurate Foamed-in place Insulation-Core Performance:
      a. Density: 2.3 to 3.0 lb/cu. ft. when tested according to ASTM D 1622.
      b. Compressive Strength: Minimum 40 psi when tested according to ASTM D 1621.
      c. Shear Strength: 26 psi when tested according to ASTM C 273.
      d. Closed Cell Content: Minimum 90% closed cell content when tested to ASTM D 2856.

B. Concealed-Fastener, Foamed-Insulation-Core Metal Wall Panels: Formed with pressure equalized horizontal panel jointure; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.
   1. Products:
      a. Basis-of-Design: CENTRIA Architectural Systems; Formawall Dimension Series.
      b. Metl-Span; CF Architectural Insulated Metal Wall Panels.
   2. Thickness: 2 1/2 inches.
   3. Facings: Fabricate panel with exterior and interior facings of same material and thickness.
      a. Material: G-90 galvanized steel sheet, US 22 gage.

b. Exterior Facing Finish: 2-coat fluoropolymer.
1) Color: Match Valspar Fluropon Classic II HS, Champagne Bronze, 439ZZ095M.
c. Interior Facing Finish: Manufacturer's standard siliconized polyester.
d. Exterior Surface: Smooth, flat.
4. Panel Coverage: Varies; refer to Drawings.

2.5 ACCESSORIES

A. Provide components required for a complete metal wall panel assembly including trim, copings, fascia, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
1. Trimless End Closures: Provide trimless metal panel closures at the ends of all insulated metal wall panels. On flat panels the metal closure will extend a minimum of one inch from the face of the panel. Metal panel closures will allow for trimless condition at vertical panel joints. Formed trims and extrusions will not be acceptable at vertical joint conditions.

2.6 FABRICATION

A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
2. Fabricate wall panels with panel stiffeners as required to maintain fabrication tolerances and to withstand design loads.

B. Provide factory-fabricated mitered corners; field cut and joined corners will not be accepted.
1. Mitered corner assemblies shall match specified exterior profile panel in shape, general appearance, material and finish.
2. Mitered corner assemblies shall be factory coil coated to match adjacent panels; paint finish shall meet specified warranty requirements.

C. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
3. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
   1. Examine primary and secondary wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
   2. Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
   3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorage according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

3.3 METAL WALL PANEL INSTALLATION, GENERAL

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Commence metal wall panel installation and install minimum of 300 sq. ft. in presence of factory-authorized representative.
   2. Field cutting of metal wall panels by torch is not permitted.
   3. Shim or otherwise plumb substrates receiving metal wall panels.
   4. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction.
   5. Flash and seal metal wall panels with weather closures at eaves and at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
   6. Install screw fasteners in predrilled holes.
   7. Locate and space fastenings in uniform vertical and horizontal alignment.
   8. Install flashing and trim as metal wall panel work proceeds.
   9. Provide panel splices with structural support behind each joint. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
   10. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
   11. Align bottom of metal wall panels and fasten with fasteners as recommended by the metal wall panel manufacturer. Fasten flashings and trim around openings and similar elements with fasteners as recommended by the metal wall panel manufacturer.

12. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Fasteners: Stainless steel.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.
   1. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealers."
   2. Seal noninsulated metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.

3.4 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
   1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
   1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
   2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal wall panel units within installed tolerance of 1/4 inch in 20 feet, nonaccumulative, on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Contractor to engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Water-Spray Test: After completing the installation of 30-foot length by full height area of metal wall panel assembly, test assembly for water penetration according to AAMA 501.2.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect completed metal wall panel installation, including accessories. Report results in writing.

D. Remove and replace applications of metal wall panels where inspections indicate that they do not comply with specified requirements.

E. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 51 00 - BUILT-UP ASPHALT ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Infill of new built-up asphalt roofing system to match existing in locations indicated on the drawings.
      a. Existing system is believed to be a 5 ply built up roof system.
   2. Roofing insulation.
   3. White flood coat for new and existing built up roof.

B. NOTE: Pitch pockets NOT permitted unless indicated on the Drawings or accepted by the Architect during shop drawing submittals as an exception.

1.2 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 for definitions of terms related to roofing work not otherwise defined in this Section.

B. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt within a range of plus or minus 25 deg F measured at the mop cart or mechanical spreader immediately before application.

C. Cap Sheet: The uppermost ply of the built-up roof system.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Perform Work in accordance with NRCA Roofing and Waterproofing Manual, current edition; maintain one copy on site.

C. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

D. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
   1. Fire/Windstorm Classification: Class 1A-90.

E. Emergency Response Plan:
   1. Any damage to the building caused by the Work, leaks or accidents must be addressed immediately by the Contractor as an emergency.
   2. The Contractor must respond to leaks or problems at the site during construction with a repair crew within three hours of phone notification.
   3. Provide a complete emergency telephone list for at least three responsible company representatives that will be on call during the course of the Project; include cell phone numbers, pager numbers and home phone numbers.
   4. Designate one emergency contact in writing to Architect on a weekly basis.

F. Nuisance and Odors: Prohibit asphalt nuisance/odor entrainment to adjacent occupied buildings. Coordinate notification of residents, placement of asphalt/bitumen mixers and temporary outage of HVAC outside air louver(s) with Owner representatives.

G. Adhesives and Sealants (applied within the building waterproofing envelope): VOC content not to exceed 250 g/L.

1.4 SUBMITTALS

A. Product Data: Submit characteristics on membrane materials, adhesives, seaming materials and flashing materials.

B. Shop Drawings:
1. Indicate joint and termination detail conditions and conditions of interface with other materials.
2. Indicate membrane layout.
3. Indicate layout of tapered insulation, crickets, saddles and tapered edge strips; only manufacturer’s drawings will be acceptable.
4. Receive approval of details relating to the installation of the roof system from the roofing material manufacturer; system to be installed in a manner that the manufacturer will furnish the specified warranty for the installation.

C. Installer Certificates: Signed by roofing system manufacturer certifying that installer is approved, authorized, or licensed by manufacturer to install roofing system.

D. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
1. Submit evidence of meeting performance requirements.
2. Submit product and label data and certification with each load of bitumen asphalt to indicate flash point (FP) finished blowing temperature (FBT), softening point (SP), and equiviscous temperature (EVT).
3. Submit certification of compliance with high-albedo (reflectance) and high-emissivity requirements.

E. Associated Products Certificate: Provide a letter, on the roofing manufacturer's letterhead and signed by representative of the roofing manufacturer, accepting the products selected by the installer for prefabricated metal edge systems, prefabricated expansion joints, insulation and cover board to be covered within the total system warranty.

F. Qualification Data: For installer and manufacturer.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.
1. Indicate that bulk roofing asphalt materials delivered to Project comply with requirements. Include quantity and statistical and descriptive data for each product. Submit certificate with each load before it is used.
2. Include continuous log showing time and temperature for each load of bulk asphalt, indicating date obtained from manufacturer, where held, and how transported before final heating and application on roof.

H. LEED Report: Accurately document the use of recycled materials, as required by Section 01 35 15 and appropriate forms.
1. Provide documentation of recycled content type and percentage by cost, location of extraction/recovery/harvest of primary raw materials, steel mill process, location of mill, and location of fabrication.

I. LEED Submittals: Include certifications of solar reflectance (albedo) and emissivity, including test methods.

J. LEED Submittal: Product data for insulation installed within the building waterproofing envelope; comply with low-emitting requirements in Section 01 61 16.

K. Maintenance Data: For roofing system to include in maintenance manuals.

L. Warranties: Submit specimen copy of the manufacturer's standard roofing warranty modified as required by this Section and other Contract Documents; Work cannot start prior to the Architect's review and comment on this specimen copy.

M. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures and wind velocity during application; record time of technician's arrival and departure from site.

N. Contract Closeout Submittals:
1. Provide the original warranty to the Owner and a copy to the Architect.
2. Submit a copy of the manufacturer's roof inspection report to the Owner along with the warranty.
3. The warranty or an attachment to the warranty must specifically list the products covered by the warranty for this Project.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: A qualified manufacturer that has UL/FM listing for roofing system identical to that used for this Project.
1. Provide a warranty upon satisfactory installation of the roofing system.

B. Installer Qualifications:
1. Approved by the manufacturer prior to the bidding period and throughout the installation and able to submit roofing material manufacturer's certification of acceptance.
2. Installer must have installed at least five roofs of the same materials and methods specified for this Project.
3. Installer's Field Supervision: Maintain a full-time supervisor/foreman on job site during all phases of bituminous sheet roofing work and at any time roofing work is in progress; proper supervision of workmen must be maintained. A copy of the specification, pertinent details, and manufacturer's instructions to be in the possession of the supervisor/foreman and on the roof at all times.

C. Technical Representative Qualifications: An authorized full-time employee representative of manufacturer experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.
1. Factory Trained Technician Qualifications: An individual employed in the roofing industry for minimum of 7 years; provided inspection services on five similar projects within the past 12 months; received structured training by the manufacturer providing roofing for this project, and authorized by manufacturer to produce daily reports and decline work not in compliance with warranty requirements and Contract Documents.
2. If manufacturer does not employ full time technical inspectors, the roofing contractor must acquire a full time factory trained technician on the Project that is a full time employee of the manufacturer or an independent roofing consultant employed by the Contractor.
3. Under the Contractor's option to hire an independent roofing consultant, the consultant must have minimum 5 years experience as an independent consultant. And the independent consultant can not be an employee of any other roofing company or have been an employee of this roofing installer in the past.

4. Each day that production is being performed, the technical representative/inspector must be on the project for a minimum of 4 hours.
5. The technical representative will be responsible to determine and enforce the most stringent requirements between the warranty and Contract Documents.

D. Source Limitations:
1. Obtain roof system components through sources acceptable to roofing manufacturer providing total system warranty. Provide a letter, on the roofing manufacturer's letterhead and signed by representative of the roofing manufacturer, accepting the products selected by the installer.
2. The roofing manufacturer provided the total system warranty for the work of this section must also be the manufacturer providing the system required under Section 07556.

E. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

F. Preliminary Roofing Conference: Within 30 days of Notice-to-Proceed for construction, conduct conference at Project site. Comply with requirements for Preinstallation conferences in Division 1. Review methods and procedures related to roof deck construction and roofing system including, but not limited to, the following:
1. Meet with Owner, Architect, testing and inspecting agency representative, roofing installer, roofing system manufacturer’s representative, technical representative or inspector, deck installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review construction schedule and verify availability of materials, installer’s personnel and designated superintendent, equipment, and facilities needed to make progress and avoid delays.
3. Review governing regulations and requirements for roofing system during and after installation.
4. Review temporary protection requirements for roofing system during and after installation.

G. Preinstallation Conference: Conduct conference at Project site two weeks prior to commencement of roof construction. Comply with requirements in Division 1. Review methods and procedures related to roofing system including, but not limited to, the following:
1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing installer, roofing system manufacturer's representative, technical representative or inspector, deck installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review Emergency Action Plan.
3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
4. Review and finalize construction schedule and verify availability of materials, Installer's personnel and designated superintendent, equipment, and facilities needed to make progress and avoid delays.
5. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.

6. Review structural loading limitations of roof deck during and after roofing.
7. Review storage and protection requirements of insulation, cover board and roofing materials; cover board panels that become wet or stored in plastic wrapping must be removed and not used on the Project regardless of drying efforts.
8. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
9. Review governing regulations and requirements for insurance and certificates if applicable.
10. Review roof observation and repair procedures after roofing installation.

H. Should there be any deviation from the Contract Documents without the prior written consent of the roofing material manufacturer and the Architect; the Contractor must do all necessary corrective work to make the roof acceptable to the Architect at no additional cost to the Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.
1. Protect stored liquid material from direct sunlight.
2. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources; store in a dry location.
1. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
2. Remove and do not use cover board panels that become wet or stored in plastic wrapping from the project site regardless of drying efforts.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed according to manufacturers' written instructions and warranty requirements.

B. Environmental Requirements:
1. Never apply membranes during inclement weather, or when the forecast for rain is greater than 30 percent. (These days should be documented as "no work - rain days").
2. Ambient Air Temperatures:
   a. No cold adhesives should be applied on any vertical surfaces above 100 degrees F.
   b. Hot asphalt roofing should not be done below 45 degrees F.
3. Do not apply roofing membranes to wet, damp, or frozen deck surfaces, or when moisture (dew, snow, fog, ice or frost) is present in any amount in or on the materials.
4. Check with local weather during periods of high humidity, nighttime roofing, to ensure moisture is not being trapped in the system; no roofing should occur within 5 degrees of the dew point temperature based upon relative humidity.

5. Check with manufacturer for "special" installation instructions whenever application temperatures are questionable.
6. Never apply membranes in dusty, debris prone areas that can contaminate adhesion.
7. Keep all materials dry, warm, and covered immediately prior to use.
8. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

C. Remove wet or improperly stored insulation and cover from the job site.

D. Field Measurements and Material Quantities: Contractor has sole responsibility for accuracy of all measurements, estimates of material quantities and sizes, and site conditions that will affect Work.

E. Asphalt Heating: Use tankers to heat asphalt. No kettles allowed on the job site.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate Work with installing associated metal flashings as Work of this Section proceeds.

B. Verify the Work of other trades which is to be concealed by this Work; Work to be concealed, must be inspected and approved before proceeding with the installation.

1.9 WARRANTY

A. Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, cover boards, walkway products and other components of roofing system.
2. The warranty will be a total system warranty; no exclusion of any materials including perimeter metal, metal trim and expansion joints.
3. Warranty can not exclude damage resulting from wind; warranty must cover roof damage resulting from wind speeds up to and including 60 mph.
4. Warranty Period: 20 years No Dollar Limit (NDL) from date of Substantial Completion.

B. Special Project Warranty: Roofing installer's warranty, signed by installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, and walkway products, for the following warranty period:
1. Warranty Period:
   a. 2 years from date of Substantial Completion.
2. Under this Special Project Warranty, the installer is required to correct any Work discovered to maintain the warranty and weather tightness of the roofing system; corrective Work to be determined by an inspection of Technical Representative. Corrective Work to be performed with no additional cost to the Owner.
3. Warranty Conditions: Provided at end of this Section.

C. For 2 years from date of Substantial Completion, a Technical Representative (qualified per this Section) must inspect the entire roof area; report any discovered deficiencies required to maintain the warranty or weather tightness of the roofing system, to the installer for correction under Special Project Warranty. Services of the Technical Representative provided at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Match existing manufacturer.

2.2 ROOF MEMBRANE PLIES

A. Ply Sheets: ASTM D 2178, Type VI, asphalt-impregnated, glass-fiber felt.

2.3 FLASHING MATERIALS

A. Backer Sheet: Composite base sheet as specified under 2.2.A.

B. Bituminous Flashing Sheet: Cap sheet as specified under 2.2.C.

C. Flashing Mesh:
   1. Woven glass-fiber cloth, treated with asphalt, complying with ASTM D 1668, Type 1.

2.4 ASPHALT MATERIALS

A. Asphalt Primer:
   1. Primer must be applied on all dissimilar materials except insulation.
   2. Description: Black bituminous varnish.
   3. Composition: Asphalt modified bitumen with thermoplastic polymers and volatile solvents.

B. Roofing Asphalt:
   1. Asphalt must be certified by the manufacturer to be in full compliance with the requirements of FMRC 1-90, and Type IV asphalt listed in Table 1 of ASTM D312.
   2. Each container, or bulk, shipping ticket must indicate the equiviscous temperature (EVT), the finished blowing temperature (FBT), and the flash point (FP).

C. Flashing Asphalt - Base Ply and Cap Ply: One-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with specified roofing membranes and flashings.

2.5 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with built-up roofing. Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdiction.

B. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.

C. Mastic Sealant: Polyisobutylene, plain or modified bitumen, nonhardening, nonmigrating, nonskinning, and nondrying.

D. Fasteners: Fasteners and metal or plastic plates complying with corrosion-resistance provisions of FM 4470.
   1. General: Non-ferrous metal or galvanized steel, except hard copper nails must be used with copper; aluminum or stainless steel nails must be used with aluminum; and stainless steel nails must be used with stainless steel.
   2. Wood: Roofing nails of galvanized steel, long enough to penetrate the wood by at least 3/4 inch on flashings and parapet walls.
      a. Provide fasteners with hot-dip zinc coating complying with ASTM A 153 and thickness to prevent corrosion with chemical preservative or fire-resistive treatments; G-185 designation or heavier coating.

3. Masonry: Nail-in expansion type device with zinc body, plated steel nail, mushroom head and long enough to embed into the masonry a minimum of 1 inch.
4. Designed for fastening base sheets and base flashings and for backnailing ply felts to substrate and acceptable to roofing system manufacturer.

E. Wood Nailer Strips: Furnish wood nailer strips complying with requirements of Division 6.

F. Rubberized Asphalt Sheet Flashing: Manufacturer's standard composite flashing product consisting of a pliable and highly adhesive rubberized asphalt compound, 32 mils thick, bonded completely and integrally to a high-density, cross-laminated polyethylene film, 8 mils thick, to produce an overall thickness of 40 mils.
1. Representative Product: Perm-A-Barrier Wall Flashing; W.R. Grace & Co.
2. Subject to compliance with requirements, equal products manufactured by Johns Manville, GAF and Tamko will be acceptable.

G. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer for intended use.

H. Expansion Joint Cover: Flexible, weatherproof joint opening covers.
1. Basis-of-Design: Johns Manville; Expand-O-Flash, Cant to Wall type.
2. Membrane Type: EPDM, 1.52 mm thickness.
3. Flange: .032" Aluminum.

2.6 INSULATION MATERIALS

A. General: Provide preformed, roofing insulation boards that comply with requirements, selected from manufacturer's standard sizes and of thicknesses necessary to match existing.
1. Provide preformed, tapered insulation boards where indicated for sloping to drain. Fabricate with a taper of 1/4-inch per 12 inches, unless otherwise indicated.
2. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
3. Emissions: Meet testing requirements of Section 016116.

B. Rigid Polyisocyanurate Roof Insulation:
1. Available Manufacturers:
a. ENRGY 3 by Johns Manville.
b. H-Shield by Hunter Panels.
c. Hy-Therm AP-25 by DOW Chemical Company.
d. Roofing Manufacturer.
2. Physical Properties:
a. Long Term Thermal Resistance (ASTM C518): LTTR = 6.0 per 1 inch of thickness.
b. Board Size: 48 inches x 96 inches.
c. Nominal Product Thickness: base layer to match existing; areas of tapered insulation is an additional thickness of insulation; roof drains tapered as indicated.
d. Compressive Strength (ASTM D1621): Minimum 25 psi (170kPa).
e. Density (ASTM D1622): 2 pcf.
f. Edges: Square.
g. Dimensional Stability: Less than 2 percent linear change.
3. Provide tapered insulation as indicated on Drawings; 1/4 inch per running foot.

C. Cover Board: Product selection must be accepted by roof manufacturer within the roofing warranty.
1. 1/2-inch DENS-DECK Roof Board or 1/2-inch DENS-DECK Prime Roof Board (Contractor's choice) by G-P Gypsum Corp.

2. Performance Characteristics:
   a. Nonstructural, glass mat-embedded, water-resistant gypsum core panels.
   b. UL Classified Type DGG when tested in accordance with ASTM E119.
   c. ASTM C1177 compliance.
   d. Noncombustible core per ASTM E136.
3. Contractor Option - Provide any of the following products with acceptance within roofing manufacturer's warranty:
   a. Invinsa Roof Board by Johns Manville.
   b. SECUROCK by USG.

2.7 INSULATION ACCESSORIES

A. General: Furnish roofing insulation accessories recommended by insulation manufacturer for intended use and compatible with sheet roofing material.

B. Fasteners: Fasteners and metal or plastic plates complying with corrosion-resistance provisions of FM 4470.
   1. Underlayment, Insulation, Tapered Insulation and Cover Board:
      a. Mechanical fasteners for securement of insulation, tapered insulation, and cover board panels to decking must be approved by the insulation manufacturer for the system specified.
      b. The same brand fastener is to be used throughout the Work.
      c. Number of fasteners and layout must be as recommended by the manufacturer and as per FM Approval Guide for I-90 wind uplift.
      d. Length of fastener to be determined by the thickness of the decking and any fill, and will vary with the thickness of the insulation; fasteners must be of appropriate length to achieve a minimum of 1 inch penetration. Do not exceed depth of metal deck.
      e. Acoustical Deck Locations: Fasteners not to exceed length necessary to remain concealed in acoustical cells of steel deck.

C. Tapered Edge Strips: Rigid, cellulosic-fiber insulation board, complying with ASTM C 208, Type 2; coated on six sides.

2.8 COATING MATERIALS

A. Aggregate matching existing.

B. White Roof Coating - Basis-of-Design: Tremco, ICE Reflective Roof Coating: Water-based, Energy Star Certified, CRRC certified, elastomeric roof coating formulated for use on bituminous roof surfaces, with the following physical properties:
   1. Asbestos Content, EPA/600/R-93/116: None.
   2. Reflectance, minimum, ASTM E 903: 84 percent.
   3. SRI value: Minimum 78.
   4. Products of Other Named Manufacturer's:
      a. Top Guard 400 by Johns Manville.
      b. Seam Coat by GAF.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
2. Verify that cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck comply with requirements in Division 5.
4. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Install acoustical roof deck rib insulation strips, specified in Division 5 Section "Steel Deck," according to acoustical roof deck manufacturer's written instructions.

C. If building enclosed, temporarily seal penetrations to protect indoor air quality in accordance with Division 1 Section “Construction Indoor Air Quality Management” requirements.

D. Asphalt Primer Application:
1. Prime all dissimilar surfaces to which asphalt or membrane will come in contact.
2. Apply at the rate of 150-200 square feet per gallon.
3. Coat all metal flashings and fascia with primer which come in contact with membrane.

3.3 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Nailer Strips: Mechanically fasten 4-inch nominal-width wood nailer strips of same thickness as insulation perpendicular to sloped roof deck at the following spacing:
1. 20 feet apart for roof slopes greater than 1 inch per 12 inches but less than 3 inches per 12 inches.

C. Cant Strips: Install and secure preformed 45-degree cant strips at junctures of built-up roofing membrane system with vertical surfaces or angle changes greater than 45 degrees.

D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards.
1. Place layers of underlayment first, for area designated; stagger joints between layers as indicated for insulation; edges butted tight.
2. Place insulation boards parallel to deck flutes with edges over flute surface for bearing support.
3. Fill gaps exceeding 1/4 inch with insulation.
4. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

E. Install one or more layers of insulation under area of roofing to achieve required thickness; where overall insulation thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

F. Install tapered insulation to required slope pattern.

G. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

H. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

I. Mechanically Fastened and Adhered Insulation - Metal Deck: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
   1. Mechanically fasten insulation to deck; fastener spacing as required by roofing material manufacturer to satisfy the Contract Documents.
   2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
   3. At conditions where the underside of the metal deck will be exposed to view, limit length of screw exposure under deck to 3/4 to 1 inches.
   4. At acoustical deck locations, layout and install fasteners so that fasteners will be concealed in dovetail design of specified acoustical metal deck; exposed fasteners on underside of metal deck will not be accepted.
   5. Install subsequent layers of insulation in a solid mopping of hot roofing asphalt.

J. Adhere Insulation - Concrete Deck: Layer insulation as indicated for metal deck areas; all layers of insulation installed in a solid mopping of hot roofing asphalt over vapor barrier.

K. Cover Boards:
   1. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows.
   2. Stagger joints from joints in insulation below a minimum of 6 inches in each direction.
   3. Tape joints if required by roofing system manufacturer.
   4. Apply hot roofing asphalt to underside and immediately bond cover board to substrate.
   5. Fasten as necessary to resist uplift pressure at corners, perimeter, and field of roof.

3.4 ROOFING MEMBRANE INSTALLATION, GENERAL

A. Install built-up roofing membrane system according to roofing system manufacturer's written instructions or applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing" whichever is most stringent.

B. Temporarily seal exterior building and roof penetrations during and immediately following roofing installation to protect indoor air quality in accordance with Division 1 “Indoor Air Quality Management” requirements.

C. Start installation of built-up roofing membrane in presence of accepted technician responsible for inspections and reports.

D. Where roof slope exceeds 1 inch per 12 inches, install sheets of built-up roofing membrane parallel with slope; back nail roofing membrane sheets to substrate according to roofing system manufacturer's written instructions.

E. Coordinate installing roofing system components so insulation and roofing membrane sheets are not exposed to precipitation or left exposed at the end of the workday or when rain is forecast.
   1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation with a course of base sheet set in roofing cement or hot roofing asphalt with joints and edges sealed.
   2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.

3. Remove and discard temporary seals before beginning work on adjoining roofing.

F. Asphalt Heating: Heat roofing asphalt and apply within plus or minus 25 deg F of equiviscous temperature unless otherwise required by roofing system manufacturer. Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within 25 deg F of flash point. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than 4 hours.

G. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.5 ROOFING MEMBRANE INSTALLATION

A. Install base sheet, two ply sheets and cap sheet starting at low point of roofing system; align ply sheets without stretching; broom in each ply to assure full adhesion.

B. Shingle side laps of ply sheets uniformly to achieve required number of plies throughout thickness of roofing membrane; shingle in direction to shed water.

C. Extend ply sheets over and terminate beyond cants.

D. Embed each ply sheet in a solid mopping of hot roofing asphalt applied at rate required by roofing system manufacturer, to form a uniform membrane without ply sheets touching.

3.6 BASE FLASHING AND STRIPPING INSTALLATION

A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:
   1. Prime substrates with asphalt primer if required by roofing system manufacturer.

B. Flashing Base Ply Application: Install specified base sheet and adhere to substrate in a solid coating of cold adhesive.
   1. Lay base ply flashing membrane in strips 3 feet wide to the vertical surfaces, extending onto the flat surface of the roof a minimum 4 inches; side laps must be minimum 3 inches and must be staggered a minimum of 4 inches with the laps of the field base ply membrane.
   2. Begin 8 inches up on the parapet or at the roof edge; terminate the installation a minimum of 4 feet beyond the intersection of the field base ply membrane and the field edge metal detail or cant.
   3. Application must provide a smooth surface, free of air pockets, wrinkles, fishmouths or tears.
   4. Membrane overlaps must be rolled after the membrane has been set and broomed; a roller of approximately 20 pounds is brought down the seam in one pass.
   5. Run membrane tight up against any vertical surfaces such as curbs, parapets and vents; thoroughly seal all voids in the corners and seams.
   6. Seal laps by running a hot trowel along the edge of the seam.
   7. Run membrane tight up against any vertical surfaces such as curbs, parapets and vents; thoroughly seal all voids in the corners and seams.

C. Flashing Top Ply Application:
   1. Adhere flashing sheet to substrate in a solid coating of cold adhesive; apply adhesive to back of flashing sheet if recommended by roofing system manufacturer.
   2. Bond splices between top ply of flashing in three courses - adhesive-mesh-adhesive.

3. Bond splices between top ply of flashing and roofing membrane in three courses - adhesive-mesh-adhesive.
4. Lay top ply flashing membrane in strips 3 feet wide; side laps will be minimum 3 inches and will be staggered a minimum of 4 inches from field top plys.
5. Install top ply flashing in accordance with recommendations of the manufacturer, directly on its base ply, proceeding from bottom to top.
6. Using a chalk line, lay-out a straight line on the field top ply membrane surface, parallel to the roof edge, 6 inches inside the roof from the base of the cant strip or right angle to be flashed.
7. Apply flashing cement from the chalk line to the edge of the top ply, and to the top of the cant or right angle.
8. Extend the top ply flashing down the vertical surface and onto the flat roof at a minimum distance of 6 inches, to the extent of the area of embedded granules; for ease of application, cut roll into required lengths and use width of roll 3 feet down length of roof, maintaining minimum 3 inch laps.
9. Firmly press flashing into position using a damp sponge.
10. Thoroughly seal all voids in the corners and seams.
11. Application must provide a smooth surface, free of air pockets, wrinkles, fishmouths or tears.
12. During installation, avoid seepage greater than 1/4 inch at seams; cover seepage with a sprinkling of loose granules; color to match membrane.

D. Corner Flashing:
   1. Inside Corner:
      a. Pre-cut all flashing pieces and prime all surfaces prior to installation.
      b. Fabricate gusset 4 inch wide by 8 inch long with a 2 inch triangular tip.
         1) Install gusset into corner using mastic.
         2) Set gusset with triangular tip on base ply and wrapping the corner a minimum 2 inches on each side.
      c. Pre-cut base flashing membranes to provide 4 inch tie-in to roof surface and 3 inch return at corner.
      d. Set first base flashing sheet into corner over gusset pressing overlap and tie-in firmly into position.
      e. Set second base flashing sheet into position with edge tight into corner.
         1) Cut off base tie-in selvage at 45 degree from vertical.
         2) Seal all edges.
      f. Pre-cut top flashing membranes to provide a 6 inch tie-in to roof surface and 3 inch return at corner.
      g. Set first top flashing sheet into corner over second base ply pressing overlap and tie-in firmly into position; set all granules into membrane using a mastic where flashing overlap occurs.
      h. Set second top flashing sheet into position with edge tight into corner.
         1) Cut off base tie-in selvage at 45 degree from vertical.
         2) Press flashing firmly into position.
         3) Seal all edges and sprinkle granules to cover seepage.
   2. Outside Corners:
      a. Pre-cut all flashing pieces and prime all surfaces prior to installation.
      b. Fabricate gusset 4 inch wide by 8 inch long with a 2 inch triangular tip.
         1) Install gusset into corner using a mastic.

2) Set gusset with triangular tip on base ply and wrapping the corner a minimum of 2 inches on each side.

c. Pre-cut base flashing membranes to provide a 4 inch tie-in to roof surface and 3 inch return at corner.

d. Set first base flashing sheet into corner over gusset pressing overlap and tie-in firmly into position.

e. Set second base flashing sheet into position with returns wrapped around corners.
   1) Cut off base tie-in selvage at 45 degree from vertical.
   2) Seal all edges.

f. Pre-cut top flashing membranes to provide a 6 inch tie-in to roof surface and 3 inch return at corner.

g. Set first top flashing sheet into corner over second base ply pressing overlap and tie-in firmly into position.

h. Set second top flashing sheet into position with edge tight into corner.
   1) Cut off base tie-in at 45 degree from vertical.
   2) Press flashing firmly into position.
   3) Seal all edges and sprinkle granules to cover seepage.

E. Mechanically fasten at 6 inches o.c., top of base flashing securely at terminations and perimeter of roofing. Seal top termination of base flashing.

F. Install stripping, according to roofing system manufacturer's written instructions, where metal flanges and edgings are set on built-up roofing.
   1. Built-up Stripping: Install stripping of not less than two plies of roof membrane felt, setting each ply in continuous coating of asphalt roofing cement, cold adhesive or a solid mopping of hot roofing asphalt, extended onto roof membrane 4 inches and 6 inches respectively.

3.7 FLASHING ROOF PENETRATIONS

A. NOTE: Pitch pockets NOT permitted unless indicated on the Drawings or accepted by the Architect during shop drawings submittals as an exception.

B. Apply flexible sheet base flashings to seal membrane to vertical elements.

C. Install flashings as the membrane is being installed (same day); if the flashing cannot be completely installed in one day, complete the installation until the flashing is in a watertight condition, and provide temporary covers or seals.

D. Roof Drains:
   1. Coordinate installation of roof drains and related flashings.
   2. Taper insulation around drain to provide a positive drainage and smooth transition from roof surface to drain clamping ring.
   3. Set lead flashing (minimum 30 inch square) in 1/4 inch of mastic; run lead into drain a minimum of 2 inches; prime at a rate of 100 square feet per gallon and allow to dry.
   4. Prime all metal surfaces.
   5. Using a trowel, set a 6 inch wide layer of mastic around the drain bowl edge as water cut-off.
   6. Mop into place a reinforcing sheet of base ply material 3 feet square centered on drain.
   7. Extend membranes 1 inch beyond the inside edge of the drain bowl and temporarily secure with clamping ring.
   8. Install top ply as specified.
      a. Extend membrane 1 inch beyond the inside edge of the drain bowl.

b. Position membrane so as to avoid the occurrence of any seams at drains.
c. Seal off drain by running a hot trowel along the edge and firmly pressing against the rim.
d. Install clamping ring and drain covers supplied with drain.
e. Test all drains for proper flow and watertightness; correct defects.

E. Seal flashings and flanges of items penetrating or protruding through membrane.

F. Vent Stacks:
1. Inspect base ply installation and ensure tight seal around pipe.
2. Construct and install over base ply a lead sheet metal vent sleeve with soldered seams; provide a minimum 5 inch base flange.
3. Prime all metal surfaces.
4. Set metal flange in mastic, firmly pressing on flange to ensure even contact with roof surface.
5. Mop into place a reinforcing sheet of base ply material 3 feet square over the vent; seal all seams and edges.
6. Install top ply; cut membrane to fit tight against stack sleeve and seal.
7. Install metal vent cap.

G. Curbs:
1. Inspect and verify that all curbs are properly secured to deck, are level, a minimum 8 inches above finished roof, primed and ready to receive flashings.
2. Base ply membrane to run horizontally tight up against the vertical curb or cant as required; when base ply membrane is to act as temporary seal for an extended length of time, carry membrane up vertical surface a minimum of 1 inch.
3. Gusset to be fabricated 4 inch wide by 8 inch long with a 2 inch triangular tip.
a. Install gusset onto corner using adhesive.
b. Set gusset with triangular tip on base ply and wrapping the corner a minimum 2 inches on each side.
4. Install flashing base ply as specified.
a. Pre-cut flashing to the total sum of curb height, thickness plus 1 inch for inside curb securement and 4 inch tie-in along base with width to match that of curb plus 3 inch overlap on each end.
b. Secure along inside of curb with roofing nails.
c. Cut back corner base selvage at 45 degree angle from vertical.
5. Install flashing top ply as specified.
a. Pre-cut flashing to the total sum of curb height plus 6 inches for base tie-in with width to match that of curb plus 3 inch overlap at each end.
b. Cut flashing flush with the top of curb and seal edges with heated trowel.
c. Cut back corner base selvage at 45 degree angle from vertical.
d. Firmly press flashing into position using a damp sponge.
e. Install metal counter flashing.

H. Roof Edge:
1. Install base ply membrane as specified; carry membrane over roof edge a minimum 3 inches and temporarily fasten using galvanized roofing nails.
2. Install a continuous metal cleat (material) and edge as detailed.
a. Prime all dissimilar surfaces prior to membrane or flashing installation.
3. Cover edge with a reinforcing strip of base membrane; membrane to carry beyond the metal flange onto base ply a minimum of 4 inches.

4. Hold the reinforcing strip back from outside edge of metal by 3/4 inch.
   a. Seal all edges.
5. Install top of membrane with the edge tight against the metal and sealed.

I. Parapets: Cover top-of-wall construction with rubberized asphalt sheet flashing; extend over edges and conceal under continuous cleat of pre-finished aluminum; roof-side shall overlap base flashing of roofing.

3.8 COATING INSTALLATION

A. Allow hot asphalt adhesive bleed-through to cure 60 days, then prime with aluminum coating; follow with coat of white coating.

B. Apply over new and existing built up roofing.

3.9 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's personnel and technical representative to inspect roofing installation before flood coat is applied an upon completion and submit report to Architect.
   1. Notify Architect or Owner 48 hours in advance of date and time of inspection.
   2. There will be no deviation from this Section, without prior written consent of the Architect and manufacturer, who will have the option of refusing to accept the installation.
   3. Confirm that the manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.
   4. Repair of Deficiencies:
      a. Installations or details noted as deficient during Final Inspection must be repaired and corrected by applicator, and made ready for reinspection, within five working days.
      b. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
   5. Warranty will be issued upon approval of the installation.

3.10 PROTECTING AND CLEANING

A. Protect built-up roofing membrane from damage and wear during remainder of construction period.

B. For roof areas that are to remain intact and that are subject to foot traffic and damage, provide temporary wood walkways with notches in sleepers to permit free drainage. Provide fiberboard cover over roofing membrane under temporary wood walkways and adjacent areas; round all edges and corners of wood bearing on roof surface. Receive approval from roofing material manufacturer technician before any traffic is permitted over any new roofing.

C. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

D. Correct deficiencies in or remove built-up roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair base flashings to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

E. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

F. Protect building surfaces against damage from roofing Work.

G. Prevent materials from entering or clogging drains and conductors.

H. Replace or restore other Work damaged by installations of the roofing system.

I. Protection of Property:
   1. Provide protection of property during course of roofing Work.
   2. Protect lawns, shrubbery, paved areas, and building from damage; necessary repair of damages will be at no extra cost to Owner.

PART 4 - INSTALLER'S WARRANTY CONDITIONS

4.1 WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

A. Owner:

B. Address:

C. Building Name/Type:

D. Address:

E. Area of Work:

F. Acceptance Date:

G. Warranty Period:

H. Expiration Date:

4.2 AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

4.3 NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

4.4 This Warranty is made subject to the following terms and conditions:

A. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
   1. lightning;
   2. peak gust wind speed exceeding __ mph;
   3. fire;
   4. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
   5. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work not installed by this installer;
   6. vapor condensation on bottom of roofing; and
   7. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

B. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

C. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

D. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

E. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.

F. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

G. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

4.5 IN WITNESS THEREOF, this instrument has been duly executed this _____day of _____, 201__.

A. Authorized Signature:

B. Name:

END OF SECTION

SECTION 07 54 16 - ADHERED TPO SHEET ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Adhered membrane roofing system for all building addition roofs.
   2. See section 07 51 00 for modifications to existing roof.

1.2 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," before multiplication by a safety factor.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

C. Roofing System Design: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist the design uplift pressures calculated according to building code.
   1. Field-of-Roof Design Uplift Pressure: 60 lbf/sq. ft. or as required by code, whichever is most stingent.

1.4 SUBMITTALS

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

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.
   1. Base flashings and membrane terminations.

C. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

D. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
   1. Submit evidence of meeting performance requirements.

E. Qualification Data: For Installer and manufacturer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.

G. Research/Evaluation Reports: For components of membrane roofing system.

H. Maintenance Data: For roofing system to include in maintenance manuals.

I. Warranties: Special warranties specified in this Section.

J. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.
   1. Provide qualifications of manufacturer's field representative, as required under Field Quality Control.
   2. Indicate procedures followed, ambient temperatures and wind velocity during application.

K. Professional Engineers Certification:
   1. System manufacturer shall supply Contractor signed and sealed ASCE 7-02 Design Velocity Pressure Calculation for Project with complimentary roof plan delineating field, perimeter and corner area dimensions.
   2. System manufacturer shall also provide signed and sealed written certificate from a Professional Engineer verifying that manufacturers system meets and/or exceeds the Design Velocity Pressure Calculation for all areas of the roof. NOTE: submit roof plan with exact system attachment and assembly per each area.

L. Emergency Response Plan:
   1. Any damage to the building caused by the Work, leaks or accidents must be addressed immediately by the Contractor as an emergency.
   2. The Contractor must respond to leaks or problems at the site during construction with a repair crew within three hours of phone notification.
   3. Provide a complete emergency telephone list for at least three responsible company representatives that will be on call during the course of the Project; include cell phone numbers, pager numbers and home phone numbers.
   4. Designate one emergency contact in writing to Owner on a weekly basis.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
   1. Installer’s Field Supervision: Maintain a full-time supervisor/foreman on job site during all phases of bituminous sheet roofing work and at any time roofing work is in progress; proper supervision of workmen must be maintained. A copy of the specification, pertinent details, and manufacturer's instructions to be in the possession of the supervisor/foreman and on the roof at all times.

B. Manufacturer Qualifications: A qualified manufacturer that has UL listing for membrane roofing system identical to that used for this Project.
   1. Provide a factory trained technician for participation in the pre-installation conference, with weekly site visits and a final inspection of the roofing system.
   2. Provide a warranty upon satisfactory installation of the roofing system.

C. Source Limitations: Obtain components for membrane roofing system from roofing membrane manufacturer or manufacturer-approved sources.

D. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
   1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.

E. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site. Comply with requirements for preinstallation conferences in Division 1 Section "Administrative Requirements." Review methods and procedures related to roof deck construction and roofing system including, but not limited to, the following:
   1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
   5. Review structural loading limitations of roof deck during and after roofing.
   6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
   7. Review governing regulations and requirements for insurance and certificates if applicable.
   8. Review temporary protection requirements for roofing system during and after installation.
   9. Review roof observation and repair procedures after roofing installation.

F. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Administrative Requirements." Review methods and procedures related to roofing system including, but not limited to, the following:
   1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
   5. Review structural loading limitations of roof deck during and after roofing.
   6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
   7. Review governing regulations and requirements for insurance and certificates if applicable.
   8. Review temporary protection requirements for roofing system during and after installation.
   9. Review roof observation and repair procedures after roofing installation.

G. Observation and Review of Roofing Installation by Roofing Manufacturer: Following preinstallation conference, the roofing manufacturer's representative is to make periodic site visits to ensure installation complies with manufacturer's warranty requirements.

1. A minimum of one visit at the start up of the work, the midpoint of the work, and at completion of the work is required.
2. Roofing manufacturers representative is to submit site visit reports for each site visit.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.7 PROJECT CONDITIONS

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

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, and other components of membrane roofing system.
2. Warranty Period: 20 years from date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty signed by Installer, covering Work of this Section, including all components of membrane roofing system, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 THERMOPLASTIC POLYOLEFIN ROOFING MEMBRANE

A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: Uniform, flexible sheet formed from a thermoplastic polyolefin, internally fabric or scrim reinforced and as follows:
1. Available Manufacturers:
a. Firestone Building Products Company. (Basis-of-Design).
b. Carlisle SynTec Incorporated; Sure-Weld.
c. Dow Roofing Systems.
2. Thickness: 60 mils, nominal.
3. Exposed Face Color:
a. White.
4. Physical Properties:
a. Breaking Strength: Minimum 225 lbf; ASTM D 751, grab method.
b. Elongation at Break: Minimum 25 percent; ASTM D 751.

c. Tearing Strength: Minimum 55 lbf minimum; ASTM D 751, Procedure B.
d. Brittleness Point: Minus 40 deg F.
e. Ozone Resistance: No cracks after sample, wrapped around a 3-inch- diameter mandrel, is exposed for 166 hours to a temperature of 104 deg F and an ozone level of 100 pphm; ASTM D 1149.
f. Resistance to Heat Aging: 90 percent minimum retention of breaking strength, elongation at break, and tearing strength after 166 hours at 240 deg F; ASTM D 573.
g. Water Absorption: Less than 4 percent mass change after 166 hours' immersion at 158 deg F; ASTM D 471.
h. Linear Dimension Change: Plus or minus 0.5 percent; ASTM D 1204.

2.2 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 55 mils thick, minimum, of same color as sheet membrane.

C. Bonding Adhesive: Manufacturer's standard solvent-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.

D. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

E. Metal Battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.

F. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

2.3 INSULATION MATERIALS

A. General: Provide preformed, roofing insulation boards that comply with requirements, selected from manufacturer's standard sizes and of thicknesses indicated.
1. Provide preformed, tapered insulation boards where indicated for sloping to drain. Fabricate with a taper of 1/4-inch per 12 inches, unless otherwise indicated.
a. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
2. Rigid Polyisocyanurate Roof Insulation:
a. Qualities: Polyisocyanurate board to ASTM C1289, Type II, Class I, Grade 3; rigid, closed cell type, with specially formulated organic/inorganic facers.
b. Available Manufacturers:
1) ENRGY 3 by Johns Manville.
2) H-Shield by Hunter Panels.
3) Hy-Therm AP-25 by DOW Chemical Company.
4) Roofing Manufacturer.
c. Physical Properties:
1) Long Term Thermal Resistance (ASTM C518): R = 6.0 per 1 inch of thickness.

2) Board Size: 48 inches x 96 inches.
3) Nominal Product Thickness: 4.5 inches in two layers; areas of tapered insulation is an additional thickness of insulation; roof drains tapered as indicated.
4) Compressive Strength (ASTM D1621): Minimum 25 psi (170kPa).
5) Density (ASTM D1622): 2 pcf.
6) Edges: Square.
7) Dimensional Stability: Less than 2 percent linear change.

d. Provide tapered insulation as indicated on Drawings; 1/4 inch per running foot.

3. Cover Board:
   a. Project Standard: 1/4-inch DENS-DECK Roof Board by G-P Gypsum Corp. or 1/4-inch DENS-DECK Prime Roof Board by G-P Gypsum Corp.
   b. Performance Characteristics:
      1) Nonstructural, glass mat-embedded, water-resistant gypsum core panels.
      2) UL Classified Type DGG when tested in accordance with ASTM E119.
      3) ASTM C1177 compliance.
      4) Noncombustible core per ASTM E136.
   c. Contractor Option - Provide any of the following products with acceptance within roofing manufacturer's warranty:
      1) Invinsa Roof Board by Johns Manville.
      2) SECUROCK by USG.

2.4 INSULATION ACCESSORIES

A. General: Furnish roofing insulation accessories recommended by insulation manufacturer for intended use and compatible with sheet roofing material.

B. Fasteners: Fasteners and metal or plastic plates complying with corrosion-resistance provisions of FM 4470.
   1. Insulation, Tapered Insulation and Cover Board:
      a. Mechanical fasteners for securement of insulation, tapered insulation, and cover board panels to decking must be approved by the insulation manufacturer for the system specified.
      b. The same brand fastener is to be used throughout the Work.
      c. Number of fasteners and layout must be as recommended by the manufacturer and as per FM Approval Guide for I-90 wind uplift.
      d. Length of fastener to be determined by the thickness of the decking and any fill, and will vary with the thickness of the insulation; fasteners must be of appropriate length to achieve a minimum of 1 inch penetration.
      e. Acoustical Deck Locations: Fasteners not to exceed length necessary to remain concealed in acoustical cells of steel deck.

C. Tapered Edge Strips: Rigid, cellulosic-fiber insulation board, complying with ASTM C 208, Type 2; coated on six sides.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with conditions affecting performance of roofing system.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 INSTALLATION - INSULATION

A. Lay insulation with longest dimension perpendicular to direction of membrane seams, with joints staggered and tightly butted.

B. Install insulation to fit tightly around projections.
   1. Insulation joints shall be 1/4" or less in width; joints wider than 1/4" shall be filled in with appropriate insulation.
   2. All joints shall be staggered; stagger joints within layers at least 6"; offset joints of overlaying layers, at least 6" in both directions, from joints of previous layer.

C. Secure insulation in place with screw and plate type fastener, according to FM guidelines.

D. Install insulation fasteners with depth-sensing screw fastening tool to prevent overdriving.

E. Replace broken insulation with undamaged pieces, 6” by 6” minimum, properly fastened in place.

F. Do not install more insulation than can be covered and made watertight with roofing membrane by end of same working day.

G. Taper insulation around roof drains to prevent membrane from bridging.

3.4 ADHERED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.

B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel.

C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply solvent-based bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

E. Mechanically or adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

G. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.
   1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
   2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.

3. Repair tears, voids, and lapped seams in roofing membrane that does not meet requirements.

3.5 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply solvent-based bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with sheet flashing.

D. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.6 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
   1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

B. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following sheet metal flashing and trim:
   1. Manufactured reglets.
   2. Formed wall flashing and trim.
   3. Exposed trim not part of other assemblies.
   4. Parapet wall covering.

1.2 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

C. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.3 SUBMITTALS

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

B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
   1. Identify material, thickness, weight, and finish for each item and location in Project.
   2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
   3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
   4. Details of expansion-joint covers, including showing direction of expansion and contraction.

C. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.
   1. Include similar samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
   1. Sheet Metal Flashing: 12 inches long. Include fasteners, closures, and other attachments.
   2. Trim: 12 inches long. Include fasteners and other exposed accessories.
   3. Accessories: Full-size Sample.

1.4 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

B. Mockups: Demonstrate aesthetic effects and set quality standards for fabrication and installation, as appropriate within wall construction mockups required under other sections.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements.
   1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, and roof-mounted equipment.
   2. Review methods and procedures related to sheet metal flashing and trim.
   3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
   4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.6 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 PRODUCTS

2.1 SHEET METALS

A. Aluminum Sheet: ASTM B 209, Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:
   1. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604.
      b. Color: Match Architect's samples.
   2. Aluminum Thickness: Fabricate components not specified under other Sections or indicated on Drawings, from coil stock minimum thickness 0.040 inch.

B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.

1. Finish: No. 2D (dull, cold rolled).
2. Through-wall: Minimum 0.0156 inch thick.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
   1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
   2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
   3. Blind Fasteners: High-strength stainless-steel rivets.

C. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

D. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

E. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions.
   1. Available Manufacturers:
      a. Fry Reglet Corporation.
         1) Heckmann Building Products Inc.
         2) Hickman, W. P. Company.
         3) Keystone Flashing Company, Inc.
         4) Sandell Manufacturing Company, Inc.
      b. Material: Stainless steel, 0.0187 inch thick.
      c. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
      d. Masonry Type: Provide with top flange to set in mortar joint; bent leg to resist pull-out.

e. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

2.5 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12 foot long, sections, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings. Form with 2-inch- high end dams. Fabricate from the following material:
1. Stainless Steel: 0.0156 inch thick.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
   1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
   1. Coat side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
   2. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
   1. Aluminum: Use aluminum or stainless-steel fasteners.
   2. Stainless Steel: Use stainless-steel fasteners.

H. Seal joints sealant as required for watertight construction.
   1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for

installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches except where pretinned surface would show in finished Work.

1. Do not solder prepainted, metallic-coated steel and aluminum sheet.
2. Stainless-Steel Soldering: Pretin edges of uncoated sheets to be soldered using solder recommended for stainless steel and phosphoric acid flux. Promptly wash off acid flux residue from metal after soldering.
3. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

J. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

3.3 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.4 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 71 00 - MANUFACTURED ROOF SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following manufactured roof specialties:
   1. Copings.
   2. Roof edge flashings.
   3. Prefabricated through wall scupper.

1.2 PERFORMANCE REQUIREMENTS

A. General: Manufacture and install manufactured roof specialties to resist thermally induced movement and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. FMG Listing: Manufacture and install copings and roof edge flashings that are listed in FMG's "Approval Guide" and approved for Windstorm Classification; Wind Zone 2 ratings. Identify materials with FMG markings.
   1. FM tested and approved means of fastening.

C. Thermal Movements: Provide manufactured roof specialties that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Water Infiltration: Provide manufactured roof specialties that do not allow water infiltration to building interior.

1.3 SUBMITTALS

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

B. Qualification data for manufacturer and qualified professional engineer licensed in the State of Maryland.

C. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer (licensed in Maryland); show layouts of manufactured roof specialties, including plans and elevations. Identify factory- vs. field-assembled work. Include the following:
   1. Details for fastening, joining, supporting, and anchoring manufactured roof specialties including fasteners, clips, cleats, and attachments to adjoining work.
   2. Details for expansion and contraction.

D. Fabrication Samples: For copings and roof edge flashings made from 12-inch lengths of full-size components including fasteners, cover joints, accessories, and attachments.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, verifying compliance of copings and roof edge flashings with performance requirements.

F. LEED Submittals:

1. Credit MR 4.1 and 4.2: Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   a. Contributions to this Credit include recycled content of steel and aluminum.
2. Credit MR 5.1 and 5.2: List of proposed regionally manufactured and extracted, harvested or recovered materials.
   a. Identify each regionally manufactured material, and each regionally extracted, harvested or recovered material by source and material cost.

G. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

B. Manufacturer Qualifications: Manufacturer capable of providing engineering and field service representation during construction.
   1. Engineering Responsibility: Preparation of data for including the following:
      a. Shop Drawings and comprehensive engineering analysis by a qualified professional engineer licensed in the State of Maryland.
   2. Company with a minimum of ten years of continuous experience manufacturing perimeter metal systems of the type specified and capable of providing the following information.
   3. List of five other projects of similar size, including approximate date of installation and name of architect for each.

C. Product Qualifications: Products must be accepted by roofing manufacturer within the total system warranty and listed by name on the roofing manufacturer's letterhead, as described under submittals for Section 07 54 00.10 and 07 54 00.20.

1.5 COORDINATION

A. Coordinate installation of manufactured roof specialties with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

1.6 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace manufactured roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

B. Special Warranty for Wind Resistance:

1. Manufacturer shall guarantee that a standard size roof edge system, when installed per manufacturer's instructions, will not blow off, leak, or cause membrane failure, even in wind conditions up to 110 mph, or the manufacturer shall at their option repair or replace their materials.
2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
   2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
   3. Basis-of-Design Product: The designs for copings and roof edge flashings are based on the products named. Subject to compliance with requirements, provide either the named products or comparable products by one of the other manufacturers specified.

2.2 EXPOSED METALS

A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for use and finish indicated, finished as follows:
   1. Surface: Smooth, flat finish.
   2. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      a. Exterior Finish: Fluoropolymer 2-Coat Coating System - Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color coat containing not less than 70 percent polyvinylidene fluoride resin by weight. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.

B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:
   1. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      a. Exterior Finish: Fluoropolymer 3-Coat Coating System - Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color coat containing not less than 70 percent polyvinylidene fluoride resin by weight. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.

2.3 CONCEALED METALS

A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for use and structural performance indicated, mill finished.

B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

C. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, separators, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
   1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.

C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

D. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 COPINGS

A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet, concealed anchorage, concealed splice plates with same finish as coping caps, one-piece corner units, and end cap units.
   1. Available Products - Typical:
      a. Permasnap Plus by OMG Edge Systems.
      b. PerformaEdge Coping by Imetco.
      c. Perma-Tite Coping by Metal-Era.
      d. Roofing Manufacturer.
   2. Coping Caps: Snap-on, fabricated from the following exposed metal:
      a. Aluminum: 0.063 inch thick.
   3. Coping Cap Color: Match Valspar Fluropon Classic II HS, Champagne Bronze, 439ZZ095M.
   4. Corners: Continuously welded; field verify actual constructed angles for factory-fabricated project-specific prefabricated corners.
   5. Transitions: Provide project-specific factory-fabricated continuously welded transitions including, but not limited to, transition miters, "z"-miters (steps in exterior wall 18 inches or less), tee miters, end terminations and end caps.
   6. Snap-on Coping Anchor Plates: Concealed, galvanized steel sheet, 12 inches wide, 0.028 inch thick, with integral cleats.
   7. Face Leg Cleats: Concealed, 16 gauge galvanized steel sheet.

2.6 ROOF EDGE FLASHINGS

A. Canted Roof Edge Fascia: Manufactured, two-piece, roof edge fascia consisting of snap-on compression-clamped metal fascia cover in section lengths not exceeding 12 feet and a formed galvanized steel sheet cant dam, 16 gauge, minimum, with integral drip edge cleat.
   1. Available Products - Typical:

a. Safeguard NP by OMG Edge Systems.
b. PerformaEdge Fascia by Imetco.
c. System 300 Perma-Tite Fascia by Metal-Era.
d. Roofing Manufacturer.

2. Fascia Cover Color: Match Valspar Fluropon Classic II HS, Champagne Bronze, 439ZZ095M.
3. Provide matching mitered and welded corner units; field verify actual constructed angles for factory-fabricated project-specific prefabricated corners.
4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.

2.7 THROUGH-WALL SCUPPERS

A. Prefabricated box scupper with flush conductor head, formed from minimum 0.063 inch thick aluminum.

B. Fabrication:
1. Welded construction.
2. Conductor box design to provide a 3 inch wide front frame (box full width of outside front frame edges); backside picture frames to be 3 inches and shipped loose.
3. 3 inch slotted nailing flange for anchoring to roof deck.
4. Basis-of-Design Product: Thru-Wall Scupper by Metal-Era, Inc. or a comparable product by perimeter metal manufacturer.
5. Color: Match Valspar Fluropon Classic II HS, Champagne Bronze, 439ZZ095M.

2.8 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.
1. Examine walls, roof edges, and parapets for suitable conditions for manufactured roof specialties.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install manufactured roof specialties according to manufacturer's written instructions. Anchor manufactured roof specialties securely in place and capable of resisting forces

specified in performance requirements. Use fasteners, separators, sealants, and other miscellaneous items as required to complete manufactured roof specialty systems.

1. Install manufactured roof specialties with provisions for thermal and structural movement.
2. Torch cutting of manufactured roof specialties is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

C. Install manufactured roof specialties level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil-canning, buckling, or tool marks.

D. Install manufactured roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.

E. Expansion Provisions: Provide for thermal expansion of exposed manufactured roof specialties. Space movement joints at a maximum of 12 feet with no unplanned joints within 18 inches of corners or intersections.

F. Fasteners: Use fasteners of type and size recommended by manufacturer but of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

G. Seal joints with elastomeric sealant as required by manufacturer of roofing specialties.

3.3 ROOF EDGE FLASHING INSTALLATION

A. Install cleats, cant dams, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings to resist uplift and outward forces according to performance requirements.

3.4 CLEANING AND PROTECTION

A. Clean off excess sealants.

B. Remove temporary protective coverings and strippable films as manufactured roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings and pieces of flashing. Maintain in a clean condition during construction.

C. Replace manufactured roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 71 23 - CONDUCTOR HEADS AND DOWNSPOUTS

PART1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pre-fabricated aluminum conductor heads and downspouts.

B. Related Sections include the following:
   1. Division 7 Section "Sheet Metal Flashing and Trim" for flashings and other sheet metal work.
   2. Division 7 Section "Manufactured Roof Specialties" for fasciae and copings.
   3. Division 7 Section "Metal Roof Panels" for metal roofing systems.
   4. Division 7 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

1.2 REFERENCES

A. American Architectural Manufacturers Association:
   1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
   2. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. ASTM International: ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. Federal Specification Unit: FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.

D. Sheet Metal and Air Conditioning Contractors' National Association, Inc.: SMACNA - Architectural Sheet Metal Manual.

1.3 SUBMITTALS

A. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.

B. Product Data: Submit data on manufactured components, materials, and finishes.

C. Samples: Submit two samples, 24 inches long illustrating component design, finish, color, and configuration.

D. LEED Submittals:
   1. Credit MR 4.1 and 4.2: Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
      a. Contributions to this Credit include recycled content aluminum.
   2. Coordinate with Construction Waste Management requirements.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with SMACNA Manual; maintain one copy of manual on site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack products to prevent twisting, bending, and abrasion, and to provide ventilation; slope to drain.

B. Prevent contact with materials during storage capable of causing discoloration, staining, or damage.

PART 2 PRODUCTS

2.1 CONDUCTOR HEADS AND DOWNSPOUTS

A. Available Manufacturers:
   1. Berger Building Products Corp.
   2. Metal-Era.
   3. OMG Edge Systems.

B. Product Description:
   1. Conductor Heads: SMACNA Figure 1-25, Style F.
   2. Downspouts: SMACNA square profile; Figure 1-32, Style B.

2.2 COMPONENTS

A. Pre-Finished Aluminum Sheet:
   1. ASTM B209, manufacturer's standard alloy and temper for specified finish; shop pre-coated with three coat PVDF (polyvinylidene fluoride) coating.
      a. Conductor Heads: 0.050 inch thick.
      b. Downspouts: 0.050 inch thick.
   2. Color: Match Valspar Fluropon Classic II HS, Champagne Bronze, 439ZZ095M.

2.3 ACCESSORIES

A. Anchors and Supports: Profiled to suit gutters and downspouts.
   1. Anchoring Devices: In accordance with SMACNA requirements.
   2. Downspout Supports - Typical: Brackets; SMACNA Figure 1-35B.

B. Strainers: 15 gage stainless steel wire baskets.

C. Fasteners: Aluminum or Stainless steel, with EPDM washers.

D. Protective Backing Paint: FS TT-C-494, Bituminous.

2.4 FABRICATION

A. Form gutters and downspouts of profiles and sizes indicated.

B. Fabricate with required connection pieces.

C. Form sections to shape indicated on Drawings, square, 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.

2.5 FACTORY FINISHING

A. PVDF (polyvinylidene fluoride) Coating: Two coat, thermally cured, fluoropolymer system conforming to AAMA 2605.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify surfaces are ready to receive gutters and downspouts.

3.2 PREPARATION

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

3.3 INSTALLATION

A. Join lengths with formed seams sealed watertight.

B. Support Spacing:
   1. Downspouts: SMACNA Figure 1-35.

C. Flash and seal conductor heads to downspouts and accessories.

D. Set downspouts plumb and not less than 1 inch from the wall.

E. Fit leaders over the outlet tube in conductor head bottom riveted to the downspout; rivet spacing shall be not more than 2 inches.

F. Set strainers loosely in the outlet tube opening in conductor head.

G. Make joints between lengths of downspouts by telescoping the end of the upper lengths at least 3/4 inch into the lower length.

END OF SECTION

SECTION 07 72 00 - ROOF ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Roof curbs.
   2. Equipment supports.

1.2 SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes and compliance with OSHA regulations.

B. Shop Drawings: Show fabrication and installation details for roof accessories. Show layouts of roof accessories including plans and elevations. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other work.

C. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
   1. Size and location of roof accessories specified in this Section.
   2. Method of attaching roof accessories to roof or building structure.
   3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.

1.3 QUALITY ASSURANCE

A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Pack, handle, and ship roof accessories properly labeled in heavy-duty packaging to prevent damage.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify required openings for each type of roof accessory by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers listed in other Part 2 articles.

2.2 METAL MATERIALS

A. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by hot-dip process and prepainted by coil-coating process to comply with ASTM A 755.
   1. Galvanized Steel Sheet: ASTM A 653, G90 coated.
   2. Exposed Finishes:
      a. Roof Curbs, Equipment Curbs and Pipe Supports: Manufacturer's standard powder coat.

B. Steel Shapes: ASTM A 36, hot-dip galvanized to comply with ASTM A 123, unless otherwise indicated.

2.3 MISCELLANEOUS MATERIALS

A. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, complying with AWPA C2; not less than 1-1/2 inches thick.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

C. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by roof accessory manufacturer. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.

D. Gaskets: Manufacturer's standard tubular or fingered design of EPDM, or PVC; or flat design of foam rubber.

E. Elastomeric Sealant: ASTM C 920, polyurethane sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

2.4 ROOF CURBS

A. Roof Curbs: Provide metal roof curbs, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Fabricate with welded or sealed mechanical corner joints, with stepped integral metal cant raised the thickness of roof insulation and integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.
   1. Available Manufacturers:
      a. Custom Curb, Inc.
      b. LM Curbs.
      c. Pate Company (The).
      d. Roof Products & Systems Corporation.
      e. Roof Products, Inc.
      f. ThyCurb; Div. of Thybar Corporation.
   2. Load Requirements: Indicated on Drawings.
   3. Material: Galvanized steel sheet, 14 gage thick.
      a. Finish: High-performance organic coating.
   4. Liner: Same material as curb, of manufacturer's standard thickness and finish.
   5. Factory install wood nailers at tops of curbs.
   6. Factory insulate curbs with 1-1/2-inch thick, glass-fiber board insulation.

7. Curb height to be 12 inches above surface of adjacent finished roof, unless otherwise indicated.
8. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

2.5 EQUIPMENT SUPPORTS

A. Equipment Supports: Provide metal equipment supports, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported. Fabricate with welded or sealed mechanical corner joints, with stepped integral metal cant raised the thickness of roof insulation and integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.
   1. Available Manufacturers:
      a. Custom Curb, Inc.
      b. LM Curbs.
      c. Pate Company (The).
      d. Roof Products & Systems Corporation.
      e. Roof Products, Inc.
      f. ThyCurb; Div. of Thybar Corporation.
   2. Load Requirements: Indicated on Drawings.
   3. Material: Galvanized steel sheet, 14 gage thick.
      a. Finish: High-performance organic coating.
   4. Factory-install continuous wood nailers at tops of equipment supports.
   5. Metal Counterflashing: Manufacturer's standard removable counterflashing, fabricated of same metal and finish as equipment support.
   6. Fabricate units to minimum height of 12 inches above adjacent roof surface, unless otherwise indicated.
   7. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.
   1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored and is ready to receive roof accessories.
   2. Verify dimensions of roof openings for roof accessories.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Install roof accessories to fit substrates and to result in watertight performance.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
   1. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.
   2. Bed flanges in thick coat of asphalt roofing cement where required by roof accessory manufacturers for waterproof performance.

D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.

E. Roof Curb Installation: Set roof curb so top surface of roof curb is level.

F. Equipment Support Installation: Set equipment support so top surface of equipment support is level.

G. Seal joints with elastomeric sealant as required by manufacturer of roof accessories.

3.3 CLEANING

A. Clean exposed surfaces according to manufacturer's written instructions.

END OF SECTION

SECTION 07 84 00 - FIRESTOPPING

PART 1 GENERAL

1.1 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, and other openings indicated.

C. Firestopping of all joints and penetrations in non-rated assemblies.

1.2 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.3 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2012.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.

C. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

D. FM 4991 - Approval Standard for Firestop Contractors; Factory Mutual Research Corporation; 2013.

E. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

F. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations.

D. LEED Report: Submit VOC content documentation for all adhesives, sealants and primers.
   1. Comply with VOC content limits of Section 01 61 16.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Installer Qualification: Submit qualification statements for installing mechanics.

1.5 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the specified fire ratings when tested in accordance with ASTM E 814 and ASTM E 119.
   1. Listing in the current-year classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
   2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.

B. Installer Qualifications: Company specializing in performing the work of this section and:
   1. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:.
   2. With minimum 3 years documented experience installing work of this type.
   3. Able to show at least 5 satisfactorily completed projects of comparable size and type.
   4. Approved by firestopping manufacturer.

C. Installing Mechanic's Qualifications: Trained by firestopping manufacturer and able to provide evidence thereof.

1.6 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.1 FIRESTOPPING - GENERAL REQUIREMENTS

A. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

2.2 FIRESTOPPING SYSTEMS

A. F-Rated (Flame Rated) Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated as determined per ASTM E814, UL 1479 but not less than that equaling or exceeding the fire resistance rating of the construction penetrated.

B. T-Rated (Temperature Rated) Through-Penetration Firestop Systems: Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas; T-rated assemblies are required where specified by codes or where the following conditions exist:
   1. Where firestop systems protect penetrations located outside of wall cavities.
   2. Where firestop systems protect penetrations located outside fire resistive shaft enclosures.
   3. Where firestop systems protect penetrations located in construction containing doors required to have a temperature rise rating.
   4. Where firestop systems protect penetrating items larger than a 4 inch diameter nominal pipe or 16 square inches in overall cross sectional area.

C. Non-Rated Through-Penetraiton Requirements: At all penetrations in non-rated assemblies, fill the annular space around penetrating object with mineral wool and secure in place to resist the free passage of flame and the products of combustion.
   1. All unused penetrations shall be sealed closed with materials matching the material penetrated.

D. Fire Resistive Joint Sealants: Provide joint sealants with fire resistance ratings indicated, as determined per UL 2079 or (ASTM E1399, E1966 and E2307), but not less than that equaling or exceeding the fire resistance rating of the construction in which the joint occurs.

E. Firestopping Sealants: Comply with low-emitting requirements specified in Section 01 61 16.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to arrest liquid material leakage.

3.3 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 authority having jurisdiction.

C. Install labelling required by code. Identify penetration firestopping wiht preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visibe to anyone seeking to remove penetrating itmes or firestopping. Use mechanical fasteners or self-adhering type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
   1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
   2. Contractor's name, address, and phone number.
   3. Designation of applicable testing and inspecting agency, UL system, F-rating, T-rating, and the houly rating of the wall.
   4. Date of installation.
   5. Manufacturer's name, and product number.
   6. Installer's name.

3.4 FIELD QUALITY CONTROL

A. Provide independent third-party inspection of the installed firestopping after application and prior to its concealment.

B. Repair or replace any damaged areas of firestopping.

3.5 PROTECTION

A. Clean adjacent surfaces of firestopping materials.

B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 84 46 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes fire-resistive joint systems for the following:
   1. Floor-to-floor joints.
   2. Floor-to-wall joints.
   3. Head-of-wall joints.
   4. Wall-to-wall joints.
   5. Perimeter fire-resistive joint systems consisting of floor-to-wall joints between perimeter edge of fire-resistance-rated floor assemblies and exterior curtain walls.
   6. Smoke seals.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed.

B. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join, and with movement capabilities indicated as determined by UL 2079.

C. Perimeter Fire-Resistive Joint Systems: For joints between edges of fire-resistance-rated floor assemblies and exterior curtain walls, provide systems of type and with ratings indicated below and those indicated on Drawings, as determined by NFPA 285 and UL 2079.
   1. UL-Listed, Perimeter Fire-Containment Systems: Integrity ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.

D. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 SUBMITTALS

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

B. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed; also show relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.
   1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.

C. Product Certificates: For each type of fire-resistive joint system, signed by product manufacturer.

D. Qualification Data: For Installer.

E. LEED Submittals:
   1. Credit EQ 4.1: Manufacturers' product data for interior sealants, including printed statement of VOC content in g/L.
   2. Credit EQ 4.6: Manufacturer’s product data for insulation in compliance with Section 01 61 16.

1.4 QUALITY ASSURANCE

A. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.

B. Source Limitations: Obtain fire-resistive joint systems, for each kind of joint and construction condition indicated, through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
   1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.
   2. Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:
      a. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
      b. Fire-resistive joint systems correspond to those indicated by referencing system designations of the qualified testing and inspecting agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

C. VOC content not to exceed 250 g/L.

1.7 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

C. Notify Owner's inspecting agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

PART 2 PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.

B. Accessories:
   1. Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article.
   2. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.
   3. Holding Clips: Minimum 30 gage by 1 inch wide galvanized sheet steel Z-shaped clips to support safing insulation.

2.2 SLAG-WOOL-FIBER/ROCK-WOOL-FIBER BOARD INSULATION

A. Available Manufacturers:
   1. Fibrex Insulations Inc.
   2. Owens Corning.
   3. Thermafiber.

B. Unfaced, Slag-Wool-Fiber/Rock-Wool-Fiber Board Insulation: ASTM C 612, maximum flame-spread and smoke-developed indexes of 15 and 0, respectively; passing ASTM E 136 for combustion characteristics.
   1. Nominal minimum density of 4 lb/cu. ft.
   2. Fiber Color: Regular color, unless otherwise indicated.
   3. Fiber Color: Darkened, where indicated.
   4. Uses: Where indicated and as fire safing insulation.

C. Foil-Faced, Slag-Wool-Fiber/Rock-Wool-Fiber Board Insulation: ASTM C 612; faced on 1 side with foil-scrim or foil-scrim-polyethylene vapor retarder; with maximum flame-spread and smoke-developed indexes of 25 and 5.
   1. Nominal minimum density of 4 lb/cu. ft.

D. Insulation installed within the waterproofing envelope: comply with low-emitting requirements specified in Section 01 61 16.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of work.
   1. Proceed with installatin only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
   1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.

2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates or damaging adjoining surfaces.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.

B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION

SECTION 07 90 05 - JOINT SEALERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sealants and joint backing.

B. Precompressed foam sealers.

1.2 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.3 SUBMITTALS

A. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

E. Qualification Data: For Installer.

F. LEED Product data for Credit IEQ 4.1: For sealants and sealant primers applied within the building water proofing envelope, documentation including printed statement of VOC content in g/L.

1.4 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.5 COORDINATION

1.6 WARRANTY

A. Correct defective work within a five year period after Date of Substantial Completion.

B. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Sealants:
   1. Bostik Inc: www.bostik-us.com.
   2. Pecora Corporation: www.pecora.com.
   3. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
   4. Dow Corning Corporation.
   5. GE Silicones .
   6. Tremco.

B. Preformed Compressible Foam Sealers:

1. EMSEAL Joint Systems, Ltd: www.emseal.com.
2. Sandell Manufacturing Company, Inc: www.sandellmfg.com.
3. Dayton Superior Corporation: www.daytonsuperior.com.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants:
1. As selected by Architect from manufacturer's full range.
2. Allow custom colors for masonry joints.
3. Allow for four custom exterior custom colors including masonry joints.

C. Comply with low-emitting requirements specified in Section 01 61 16.

2.3 SEALANTS

A. Sealants and Primers - General: Provide products having volatile organic compound (VOC) content as specified in Section 01 61 16.

B. Type LS-1 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
1. Color: Standard colors matching finished surfaces.

C. Type AS-1 - Acoustical Sealant for Concealed Locations: Permanently tacky non-hardening butyl sealant.
1. Applications: Use for concealed locations only:
a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
b. Sealant between acoustical ceiling perimeter track and wall.

D. Single-Component Neutral- and Basic-Curing Silicone Sealant ES-1:
1. Products:
a. Dow Corning Corporation; 790.
b. Tremco; Spectrem 1 (Basic).
c. GE Silicones; SilPruf SCS2000.
d. Pecora Corporation; 864.
e. Polymeric Systems Inc.; PSI-641.
f. Sonneborn, Division of ChemRex Inc.; Omniseal 50.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 100/50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
a. Use O Joint Substrates: color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, and brick.
6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

E. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant ES-2:
1. Products:
a. Pecora Corporation; 898.
b. Tremco; Tremsil 600 White.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
    a. Use O Joint Substrates: color anodic aluminum aluminum coated with a high-performance coating galvanized steel and ceramic tile.

F. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant ES-3:
1. Products:
    a. Dow Corning Corporation; 786 Mildew Resistant.
    b. GE Silicones; Sanitary SCS1700.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
    a. Use O Joint Substrates: color anodic aluminum, aluminum coated with a high-performance coating, and ceramic tile.

G. Multicomponent Nonsag Urethane Sealant ES-4:
1. Products:
    a. Pecora Corporation; Dynatrol II.
    b. Tremco; Dymeric 240/240FC.
    c. Tremco; Vulkem 921.
2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
    a. Use O Joint Substrates: Color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick, ceramic tile, and wood.

H. Multicomponent Nonsag Urethane Sealant ES-5:
1. Products:
    a. Sonneborn, Division of ChemRex Inc.; MasterSeal NP 2.
    b. Tremco; Vulkem 116 + Accelorator-72.
2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
6. Use O Joint Substrates: Color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, and brick.

2.4 PREFORMED JOINT SEALERS

A. Type PS-1 - Exterior Expansion Joint Sealer: Precompressed foam sealer; factory-applied and cured silicone facing.
1. Face color: Coordinated with veneer; to be selected by Architect.
2. Size as required to provide weathertight seal when installed.
3. Provide product recommended by manufacturer for traffic-bearing use.
4. Product: Colorseal manufactured by EMSEAL.
5. Applications: Use for:

a. Exterior wall expansion joints.
b. Interior joints between columns and walls.

2.5 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.

D. Secondary Joint Backing: Precompressed foam sealer; urethane with water-repellent.
1. Size as required to provide weathertight seal when installed.
2. Product: Backerseal manufactured by EMSEAL.

E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Protect elements surrounding the work of this section from damage or disfigurement.

3.3 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 where joint backing is not used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Tool joints concave.

3.4 CLEANING

A. Clean adjacent soiled surfaces.

3.5 PROTECTION

A. Protect sealants until cured.

3.6 SCHEDULE

A. Joint-Sealant Application JS-1: Exterior vertical and horizontal nontraffic construction joints in cast-in-place concrete.
   1. Joint Sealant: ES-1 or ES-4.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

B. Joint-Sealant Application JS-2: Exterior horizontal traffic isolation and contraction joints in cast-in-place concrete slabs.
   1. Joint Sealant: ES-5.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

C. Joint-Sealant Application JS-3: Exterior vertical control and expansion joints in unit masonry.
   1. Joint Sealant: ES-1 or ES-4.
   2. Joint-Sealant Color: Maximum of two custom colors.

D. Joint-Sealant Application JS-5: Exterior vertical joints between different materials listed above.
   1. Joint Sealant: ES-1 or ES-4.
   2. Joint-Sealant Color: Maximum of two custom colors.

E. Joint-Sealant Application JS-6: Exterior perimeter joints between masonry and frames of doors, windows, and louvers.
   1. Joint Sealant: ES-1 or ES-4.
   2. Joint-Sealant Color: Maximum of two custom colors.

F. Joint-Sealant Application JS-7: Vertical control and expansion joints on exposed interior surfaces of exterior walls.
   1. Joint Sealant: ES-4.
   2. Joint-Sealant Color: To be field painted.

G. Joint-Sealant Application JS-8: Interior perimeter joints of exterior openings.
   1. Joint Sealant: ES-2 or ES-3.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

H. Joint-Sealant Application JS-9: Interior ceramic tile expansion, control, contraction, and isolation joints in horizontal traffic surfaces.
   1. Joint Sealant: ES-2 or ES-3.
   2. Joint-Sealant Color: Maximum of two custom colors.

I. Joint-Sealant Application JS-10: Interior joints between plumbing fixtures and adjoining walls, floors, and counters.
   1. Joint Sealant: ES-2 or ES-3.
   2. Joint-Sealant Color: White.

J. Joint-Sealant Application JS-11: Vertical joints on exposed surfaces of interior unit masonry and concrete walls.
   1. Joint Sealant: ES-4.
   2. Joint-Sealant Color: To be field painted.

K. Joint-Sealant Application JS-12: Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.
   1. Joint Sealant: LS-1.
   2. Joint-Sealant Color: To be field painted.

L. Joint-Sealant Application JS-13: Preformed exterior expansion joints without cover.

1. Location: Where designated on drawings.
2. Joint Sealant: PS-1, where indicated to produce a finished color.

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-fire-rated steel doors and frames.

B. Steel frames for wood doors.

C. Fire-rated steel doors and frames.

D. Thermally insulated steel doors.

E. Steel glazing frames.

1.2 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.

B. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.

1.3 REFERENCE STANDARDS

A. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

B. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.

D. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014. (ANSI/BHMA A156.115)

E. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2007.

F. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.

G. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

H. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

D. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.

1.5 QUALITY ASSURANCE

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

B. Maintain at the project site a copy of all reference standards dealing with installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Assa Abloy Ceco, Curries, or Fleming: www.assaabloydss.com.

B. Steelcraft: www.steelcraft.com.

C. Pioneer Industries.

D. Security Metal Partitions Corporation.

2.2 DOORS AND FRAMES

A. Requirements for All Doors and Frames:
   1. Door Top Closures: Flush with top of faces and edges.
   2. Door Edge Profile: Beveled on both edges.
   3. Door Texture: Smooth faces.
   4. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
   5. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   6. Galvanizing for Exterior Units and Units in Wet Areas: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness
   7. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all 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.

2.3 STEEL DOORS

A. Exterior Doors:
   1. Grade: ANSI/SDI A250.8 (SDI-100); Level 3 - Extra Heavy-Duty, Physical Performance Level A, Model 2 - Seamless.
   2. Core: Polyurethane.
   3. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
   4. Weatherstripping: Separate, see Section 08 71 00.
   5. Close to and bottom edges with galvanized, inverted steel channels; seal joints in top edges of doors against water penetration.

B. Interior Doors, Non-Fire-Rated:
   1. Grade: ANSI/SDI A250.8 (SDI-100); Level 3 - Extra Heavy-Duty, Physical Performance Level A, Model 2 - Seamless.

C. Interior Doors, Fire-Rated:

1. Grade: ANSI/SDI A250.8 (SDI-100); Level 3 - Extra Heavy-Duty, Physical Performance Level A, Model 2 - Seamless.
2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
    a. Rate of Temperature Rise Across Door Thickness : 450 degrees F.
    b. Provide units listed and labeled by UL (Underwriters Laboratories) - UL (BMD).
    c. Attach fire rating label to each fire rated unit.

2.4 STEEL FRAMES

A. General:
1. Comply with the requirements of grade specified for corresponding door, except:
    a. ANSI/SDI A250.8 (SDI-100), Level 2 and 3 Door Frames: 14 gage, 0.067 inch, minimum thickness.
    b. Frames for Wood Doors: Comply with frame requirements in accordance with ANSI/SDI A250.8 (SDI-100), Level 4, 14 gage, 0.067 inch, minimum thickness.
    c. Frames for Sound-Rated Wood Doors: Comply with frame requirements in accordance with ANSI/SDI A250.8 (SDI-100), Level 4, 14 gage, 0.067 inch, minimum thickness.
2. Finish: Same as for door.
3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
4. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

B. Exterior Door Frames: Full profile welded, seamless.
1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
2. Weatherstripping: Separate, see Section 08 71 00.

C. Interior Door Frames, Non-Fire-Rated: Full profile welded type.

D. Interior Door Frames, Fire-Rated: Full profile welded type.
1. Fire Rating: Same as door, labeled.

E. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.

F. Mullions and Transom Bars: Join to adjacent members by welding.

2.5 FRAME ANCHORS

A. Jamb Anchors:
1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 ACCESSORY MATERIALS

A. Glazing: As specified in Section 08 80 00 .

B. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.

C. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

D. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

E. Ceiling Struts: Minimum 1/4 inch thick by 1 inch wide steel.

2.7 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.1 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.2 INSTALLATION

A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.

B. In addition, install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Install door silencers in frames before grouting.

E. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

F. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.

G. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.

H. Coordinate installation of hardware.

I. Coordinate installation of glazing; install frames with removable glazing stops located on secure side of opening.

J. Coordinate installation of electrical connections to electrical hardware items.

K. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.

L. Touch up damaged factory finishes.

M. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.

b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

3.3 TOLERANCES

A. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

B. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

C. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

D. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

3.4 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

C. Remove grout and other bonding material from hollow metal work immediately after installation.

D. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

E. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flush wood doors; flush configuration; fire rated and non-rated.

1.2 RELATED REQUIREMENTS

A. Section 08 80 00 - Glazing.

1.3 REFERENCE STANDARDS

A. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.

B. ASTM E413 - Classification for Rating Sound Insulation; 2010.

C. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.

D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.

E. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.4 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. Specimen warranty.

D. Test Reports: Show compliance with specified requirements for the following:
   1. Sound-retardant doors and frames; sealed panel tests are not acceptable.

E. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing and louvers.

F. Samples: Submit two samples of door veneer, 12 x 12 inch in size illustrating wood grain, stain color, and sheen.

G. LEED Submittals:
   1. Credit MR 5.1 and 5.2: List of proposed regionally manufactured and extracted, harvested or recovered materials.
      a. Identify each regionally manufactured material, and each regionally extracted, harvested or recovered material by source and material cost.
   2. Certificates for Credit MR 7: Chain-of-custody certificates certifying that flush wood doors comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
   3. Include statement indicating costs for each certified wood product.
   4. Product Data for Credit EQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no added urea formaldehyde.

H. Warranty, executed in Owner's name.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.6 PROJECT CONDITIONS

A. Coordinate the work with door opening construction, door frame and door hardware installation.

1.7 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wood Veneer Faced Doors:

B. Eggers Industries: www.eggersindustries.com.

C. Marshfield DoorSystems, Inc: www.marshfielddoors.com.

D. Algoma Hardwoods, Inc..

E. Oshkosh Architectural Door Company.

F. VT Industries, Inc.

2.2 DOORS

A. All Doors: See drawings for locations and additional requirements.
   1. Quality Level: Custom Grade, in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Section 1300.
      a. Grade A faces.
   2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
   3. Faces are bonded to core using a hot press.
   4. Provide wood doors made from wood harvested from forests certified by an FSC-accredited certification body.
   5. Provide doors assembled with glues containing no added urea-formaldehyde.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at all locations.
   2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc. (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
   3. Sound Retardant Doors: Minimum STC of 42 or better, calculated in accordance with ASTM E413, tested in accordance with ASTM E90.
      a. Provide doors specifically designed for sound transmission control with a high density core and damping.

b. Refer to hardware specification for required hardware items.

4. Wood veneer facing with factory transparent finish .

2.3 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.

2.4 DOOR FACINGS

A. Veneer Facing for Transparent Finish: White Maple, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face; unless otherwise indicated.
   1. Vertical Edges: Any option allowed by quality standard for grade.
   2. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.
   3. Room Match: Match door faces within each separate room or area of building. Corridor door faces do not need to match where they are separated by 20 feet or more.

2.5 ACCESSORIES

A. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

2.6 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with Bonded Stiles and Rails:
   1. Provide solid blocks at lock edge for hardware reinforcement.
   2. Provide solid blocking for other throughbolted hardware.

C. Fit door edge trim to edge of stiles after applying veneer facing.

D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

F. Provide edge clearances in accordance with the quality standard specified.

2.7 FACTORY FINISHING - WOOD VENEER DOORS

A. Factory finish doors in accordance with specified quality standard:
   1. Transparent Finish: Transparent catalyzed polyurethane, Premium quality, TR-6, satin sheen.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

3.2 TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.3 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

END OF SECTION

SECTION 08 31 00 - ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Floor access door and frame units, interior.

B. Access door and frame units, in ceiling and wall locations.

1.2 REFERENCE STANDARDS

A. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

B. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.3 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. Shop Drawings: Indicate exact position of all access door units.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Nystrom/Babcock-Davis.

B. Karp Associates, Inc: www.karpinc.com.

C. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.

D. J. L. Industries, Inc. .

E. Larsen's Manufacturing Company.

F. Williams Bros. Corporation of America (The).

2.2 ACCESS DOORS AND PANELS

A. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.

B. Units in Fire Rated Assemblies: Fire rating equivalent to the fire rated assembly in which they are to be installed.

1. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated.

2.3 ACCESS DOOR UNITS - WALLS AND CEILINGS

A. Door and Frame Units: Formed steel.

1. Door: Minimum 16 gage thick sheet metal, set flush with exposed face flange of frame.
2. Frame: Minimum 16 gage thick sheet metal with 1 inch wide, surface-mounted trim.
3. Hinges: Concealed pivot rod.
4. Lock: Provide door panel with cylinder keyed to building masterkey program.

B. Fire-Rated, Insulated, Flush Access Doors and Frames with Exposed Trim: Formed steel.

1. Fire-Resistance Rating: Not less than that of adjacent construction.
2. Temperature Rise Rating: 250 deg F at the end of 30 minutes.

3. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 20 gage.
4. Frame: Minimum 16 gage thick sheet metal with 1-inch wide, surface-mounted trim.
5. Hinges: Concealed-pin type.
6. Automatic Closer: Spring type.
7. Lock: Self-latching device with cylinder lock.

2.4 FLOOR UNITS

A. Floor Door and Frame Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.
   1. Size: As indicated on the drawings.
   2. Hardware: Stainless steel, Type 316.
      a. Hinges: Removable pin.
      b. Lock: Cylinder lock with latch, two keys for each unit.

B. Interior Units: Aluminum, minimum 1/4 inch thick.
   1. Design Load: Design to support live load of 300 lb/sq ft with deflection not to exceed 1/180 of span.
   2. Operation: Manual opening, dampened self-closing.
   3. Cover Pattern: Diamond tread plate.
   4. Lift Handle: Removable.
   5. Finish: Mill finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.2 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings. Secure rigidly in place.

C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION

SECTION 08 43 13 - ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Aluminum doors and frames.

C. Weatherstripping.

D. Perimeter sealant.

1.2 RELATED REQUIREMENTS

A. Section 07 90 05 - Joint Sealers: Perimeter sealant and back-up materials.

B. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.3 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.

B. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; American Architectural Manufacturers Association; 2009 (part of AAMA 501).

C. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; American Architectural Manufacturers Association; 2009.

D. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

E. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2011.

F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

G. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.

H. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

I. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

J. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.

K. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

L. 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).

M. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.4 PERFORMANCE REQUIREMENTS

A. Design and size components to withstand the following load requirements without damage or permanent set, when tested in accordance with ASTM E 330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
   1. Design Wind Loads: Comply with requirements of IBC 2015 - International Building Code.
   2. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

B. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.

C. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E 283.

D. Condensation Resistance Factor: CRF of not less than 57 (exterior frames) when measured in accordance with AAMA 1503.1.

E. Thermal Resistance of Exterior Framing: Thermal transmittance U value not more than 0.44 BTU/HR/FT²/°F when measured in accordance with AAMA 1503.1.

F. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 12 lbf/sq ft.

G. 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.

H. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
   1. Shop drawings must be prepared by the manufacturer under the supervision of a Professional Structural Engineer.
   2. Shop drawings must be signed and sealed by the supervising Professional Structural Engineer.

D. Design Data: Provide framing member structural and physical characteristics, engineering calculations, dimensional limitations, including the impact of the frame mounted sunshades.
   1. Must be signed and sealed by the supervising Professional Structural Engineer.

E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

F. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.

G. LEED Submittals: Provide VOC content documentation for field-applied sealants and primers; comply with VOC content limits of Section 01 61 16.

H. Report of field testing for water leakage.

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

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the State of Maryland.

B. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum five years of documented experience.

1.7 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.9 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a ten year period after Date of Substantial Completion.

C. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. EFCO, a Pella Company (Basis-of-Design); Product System 403 (T) Wall (exterior) and Product System 402 (interior): www.efcocorp.com.

B. Kawneer North America; TriFab VG 451T (exterior) and TriFab VG 451 (interior): www.kawneer.com.

C. Oldcastle BuildingEnvelope; Series 3000 (exterior) and Product FG-3000 (interior): www.oldcastlebe.com.

D. YKK AP America; Product System YES 45 TU (exterior) and Product System YES 45 FI (interior): www.ykkap.com.

2.2 STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Position: Centered (front to back).

2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
3. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
4. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
5. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
6. Sill Flashing: Provide manufacturers full height high performance sill flashing.

2.3 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Glazing stops: Flush.
   3. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.

B. Swing Doors: Glazed aluminum.
   1. Thickness: 2 inches.
   2. Glazing Stops: Square.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Sheet Aluminum: ASTM B209 (ASTM B209M).

C. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.

D. Fasteners: Stainless steel.

E. Exposed Flashings: Aluminum sheet, 14 gage, 0.064 inch minimum thickness; finish to match framing members.

F. Concealed Flashings: 0.018 inch thick stainless steel.

G. Perimeter Sealant: Type ES-1 or ES-4 specified in Section 07 90 05.

H. Glass: As specified in Section 08 80 00.

I. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

J. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.5 FINISHES

A. Superior Performance Organic Coating System: AAMA 2605 two coat, thermally cured polyvinylidene fluoride system; Color: Match Valspar Fluropon Classic II HS, Champagne Bronze, 439ZZ095M.

2.6 HARDWARE

A. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.

B. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.

2.7 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Construct with shear block system of assembly.

D. Prepare components to receive anchor devices. Fabricate anchors.

E. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

F. Arrange fasteners and attachments to conceal from view.

G. Reinforce framing members for imposed loads.

H. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
   1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.2 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Coordinate attachment and seal of perimeter air and vapor barrier materials.

I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

J. Install operating sash.

K. Set thresholds in bed of sealant and secure.

L. Install hardware using templates provided.

M. Install glass and infill panels in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.

N. Install perimeter sealant in accordance with Section 07 90 05.

O. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 FIELD QUALITY CONTROL

A. Test installed storefront for water leakage in accordance with AAMA 501.2.
   1. Test a minimum area of 75 feet by 1 story of aluminum-framed systems designated by Architect, before installation of interior finishes; test area may not show evidence of water penetration.

3.5 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

3.6 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by method acceptable to sealant manufacturer.

3.7 PROTECTION

A. Protect installed products from damage during subsequent construction.

END OF SECTION

SECTION 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum-framed curtain wall, with vision glazing and glass infill panels.

B. Column covers.

C. Perimeter sealant.

1.2 PROJECT REQUIREMENTS

A. Mullion depths must remain constrained to depths within 1/2-inch as indicated on Drawings; provide engineering and internal reinforcement as required to remain no greater than these constraints; coordinate allowed variation from Drawing depths with related trades.

B. System to be factory prepared with the components factory cut for the Project; cutting within the installers shop will not be accepted. Contractor has the option of having the framing fully fabricated by the manufacturer for field glazing.

1.3 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping: Firestop at system junction with structure.

B. Section 07 90 05 - Joint Sealers: Perimeter sealant and back-up materials.

1.4 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.

B. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; American Architectural Manufacturers Association; 2009 (part of AAMA 501).

C. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; American Architectural Manufacturers Association; 2009.

D. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

E. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2011.

F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

G. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.

H. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

I. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

J. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

K. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

L. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2010.

M. ASTM C1184 - Standard Specification for Structural Silicone Sealants; 2014.

N. 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).

O. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.5 PERFORMANCE REQUIREMENTS

A. Design and size components to withstand the following load requirements without damage or permanent set:
   1. Design Wind Loads: Comply with requirements of IBC 2015 - International Building Code.
   2. Member Deflection: Limit member deflection to flexure limit of glass in any direction, and maximum of 3/4 inch, with full recovery of glazing materials.
   3. Measure performance by testing in accordance with ASTM E 330, using test loads equal to 1.5 times the design wind loads and 10 second duration of maximum pressure.

B. Movement: Accommodate the following movement without damage to components or deterioration of seals:
   1. Movement of curtain wall relative to perimeter framing.
   2. Deflection of structural support framing, under permanent and dynamic loads.

C. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E 283.

D. Condensation Resistance Factor: CRF of 67 when measured in accordance with AAMA 1503.1.

E. Water Leakage: None, when measured in accordance with ASTM E 331 at a test pressure difference of 15 lbf/sq ft.

F. 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.

G. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

H. Design system to eliminate noises caused by wind and thermal movement, to prevent vibration harmonics, and to prevent "stack effect" in internal spaces.

1.6 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing, and infill.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

1. Shop drawings must be prepared by the manufacturer, under the supervision of a Professional Structural Engineer.
2. Shop drawings must be signed and sealed by the supervising Professional Structural Engineer.

D. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.

E. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations. Accommodate impact by attached sun shades in design.
1. Engineering calculations ust be signed and sealed by the supervising Professional Structural Engineer.

F. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

G. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.

H. LEED Submittals: Provide VOC content documentation for field-applied sealants and primers; comply with VOC content limits of Section 01 61 16.

I. Field Quality Control Submittals: Report of field testing for water leakage.

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

1.7 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the State of Maryland.

B. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum five years of documented experience.

1.8 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.10 FIELD CONDITIONS

A. Contractor is responsible for coordination of dimensions and field measurements required by trade contractors.

B. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.11 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a 10 year period after Date of Substantial Completion.

C. Provide 10 year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

D. Warranty for all components must be direct from the manufacturer (non pass-through) and non pro-rated for the entire term.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. EFCO, a Pella Company; Product System 5600 (Basis-of-Design).

B. Kawneer North America; 1600 Wall System: www.kawneer.com.

C. Vistawall Architectural Products www.oldcastlebe.com.

D. YKK AP America; Product YCW 750 OG: www.ykkap.com.

2.2 CURTAIN WALL

A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Finish: High performance organic coatings.
      a. Factory finish surfaces that will be exposed in completed assemblies.
      b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
      c. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
   2. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   3. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   4. 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. Air Leakage: Maximum of 0.06 cu ft/min/sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 pounds per square foot pressure differential across assembly.

C. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.

2.3 COMPONENTS

A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Outside glazed, with pressure plate and mullion cover.
   2. Include several profiles for exterior covers as indicated; no variation in snap cover design is permitted.

B. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
   1. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.

C. Glazing: As specified in Section 08 80 00.

D. Prefabricated Adjustalble Partition Closures:
   1. Basis-of-Design: Mullion Mate by Gordon Ceilings, Interior Specialties Division.
   2. Description: Factory spring loaded assembly to fit opening.
      a. Pre-assembled.
      b. Factory cut to height; multiple units preassembled or spliced as required for heights not possible with single unit.
      c. Contact faces to have gasket with adhesive.
      d. Sound attenuation: STC of 38 or better.
   3. Location: Closure of vertical junctions at partitions and window walls.
   4. Finish: Match aluminum framing.

E. Column Covers: Aluminum, 14 gage, 0.064 inch minimum thickness, finish to match curtain wall framing members.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Sheet Aluminum: ASTM B209 (ASTM B209M).

C. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.

D. Structural Supporting Anchors Attached to Structural Steel: Design for bolted attachment.

E. Fasteners: Stainless steel; type as required or recommended by curtain wall manufacturer.

F. Exposed Flashings: 0.063 inch thick aluminum sheet; finish to match framing members.

G. Concealed Flashings: 0.018 inch thick stainless steel.

H. Firestopping: As specified in Section 07 84 00.

I. Structural Glazing Adhesive: Silicone, neutral cure; formulated specifically for structural sealant glazing and complying with ASTM C1184.
   1. Ultraviolet radiation resistant for 2000 to 4000 micro-watts minimum for 21 days.
   2. Adhesion when subjected to ultraviolet radiation through glass in accordance with ASTM C794 without failure.
   3. Minimum adhesion tensile strength of 100 psi.
   4. Tested for compatibility with glazing accessories and weatherseal sealant.
   5. Adhesives applied within the building waterproofing envelope: Comply with low-emitting requirements specified in Section 01 61 16.

J. Weatherseal Sealant: Silicone, with adhesion in compliance with ASTM C794; compatible with glazing accessories.

K. Perimeter Sealant: Type ES-1 or ES-4 specified in Section 07900 and Section 01 61 16.

L. Glazing: As specified in Section 08 80 00.

M. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

N. Glazing Accessories: As specified in Section 08 80 00.

O. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.5 FINISHES

A. Superior Performance Organic Coating System: AAMA 2605 two-coat, thermally cured polyvinylidene fluoride system; Color: Match Valspar Fluropon Classic II HS, Champagne Bronze, 439ZZ095M.

2.6 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

E. Arrange fasteners and attachments to conceal from view.

F. Reinforce framing members for imposed loads.

G. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
   1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other related work.

B. Verify that curtain wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

C. Verify that anchorage devices have been properly installed and located.

3.2 INSTALLATION

A. Install curtain wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Coordinate attachment and seal of perimeter air and vapor barrier materials.

H. Install firestopping at each floor slab edge.

I. Install operating sash.

J. Pressure Plate Framing: Install glazing and infill panels in accordance with Section 08 80 00, using exterior dry glazing method.

K. Install perimeter sealant in accordance with Section 07 90 05.

L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.4 FIELD QUALITY CONTROL

A. Test installed curtain wall for water leakage in accordance with AAMA 501.2.
   1. Test a minimum area of 75 feet by 1 story of aluminum-framed systems designated by Architect, before installation of interior finishes; test area may not show evidence of water penetration.

B. Replace curtain wall components that have failed field testing and retest until performance is satisfactory.

3.5 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by method acceptable to sealant manufacturer.

3.6 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 62 70 - TUBULAR SKYLIGHTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Tubular daylighting device, consisting of roof dome, reflective tube, and diffuser assembly; configuration as indicated on the drawings.

B. Accessories.

1.2 REFERENCES

A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. ASTM A 463 - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process.

C. ASTM A 653 - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process.

D. ASTM E 283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

E. ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System.

F. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors.

G. ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference.

H. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position.

I. ASTM D-1929 - Test Method for Ignition Properties of Plastics.

J. UL 181 - Factory Made Air Ducts and Air Connectors.

K. UL 790 - Standard for Tests for Fire Resistance of Roof Covering Materials.

L. ICBO/ICC AC-16 - Acceptance Criteria for Plastic Skylights.

1.3 PERFORMANCE REQUIREMENTS

A. Completed tubular daylighting device assemblies shall be capable of meeting the following performance requirements:

1. Air Infiltration Test: Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.
2. Water Resistance Test: No uncontrolled water leakage at 10.5 psf pressure differential with water rate of 5 gallons/hour/sf when tested in accordance with ASTM E 547.
3. Uniform Load Test:
    a. No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf or Negative Load of 70 psf.
    b. All units shall be tested with a safety factor of 3 for positive pressure and 2 for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.
4. Fire Testing:
    a. When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the 2015 International Building Code.

b. Self-Ignition Temperature - Greater than 650 degrees F Per: U.B.C. Standard 26-6. See ASTM D-1929.
c. Smoke Density - Rating no greater than 450 Per U.B.C. 8-1 (See ASTM Standard E 84) in way intended for use. Classification C.
d. Rate of Burn and/or Extent - Maximum Burning Rate: 2.5 inches/min Classification CC-2: U.B.C. Standard 26-7. See ASTM D 635.
e. Rate of Burn and/or Extent - Maximum Burn Extent: 1 inch (25 mm) Classification CC-1: U.B.C. Standard 26-7. See ASTM D 635.

5. Thermal Performance:
   a. U-Factor: 0.47.
   b. R-Value: Minimum of 2.0.
   c. SHGC: 0.20.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

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. Shop Drawings. Submit shop drawings showing layout, profiles and product components, including anchorage, flashings and accessories.

D. Verification Samples: As requested by Architect.

E. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

F. LEED Submittal: Credit EQ 4.1: Manufacturer’s product data for field-applied sealants and sealant primers in compliance with Section 01 61 16.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.7 WARRANTY

A. Daylighting Device: Manufacturer's standard warranty for 10 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: Solatube International, Inc: www.solatube.com

B. ODL, Inc.

C. All Canadian Tubular Skylight.

2.2 TUBULAR DAYLIGHTING DEVICES

A. Tubular Daylighting Devices General : Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICBO/ICC AC-16.

B. Project Standard: Solatube Model 750 DS-C Penetrating Ceiling, 21 inch Daylighting System:
   1. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
      a. Outer Dome Glazing: Type DA, 0.125 inch minimum thickness injection molded acrylic classified as CC2 material; UV inhibited, impact modified acrylic blend.
      b. Inner Dome Glazing: 0.115 inch minimum thickness acrylic classified as CC2 material.
   2. Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
   3. Roof Flashing Base: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.
      a. Base Style: Type FC, Curb cap, with inside dimensions of 27 inches by 27 inches (685 mm x 685 mm) to cover curb.
      b. Flashing Insulator: Type FI, Thermal isolation material for use under flashing.
   4. Tube Ring: Attached to top of base section; 0.090 inch nominal thickness injection molded high impact PVC; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
   5. Dome Seal: Adhesive backed weatherstrip 0.63 inch tall by 0.28 inch.
   6. Reflective Tubes: Aluminum sheet, thickness 0.018 inch.
      a. Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Specular reflectance for visible spectrum greater than 99 percent. Total solar spectrum reflectance less than 93 percent.
      b. Top Tube Angle Adapter and Bottom Top Tube Angle Adapter Kit:
         1) Reflective 30 degree adjustable top and bottom angle adapters (one each), 16 inches long.
      c. Reflective 90 degree Adjustable tube: As required by location and design.
   7. Diffuser Assemblies for Tubes Penetrating Ceilings: Ceiling mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube; 23.8 inches by 23.8 inches square frame to fit standard suspended ceiling grids or hard ceilings.
      a. Round to square transition box made of opaque polymeric material, classified as CC2, Class C, 0.110 inch thick.
      b. Natural Effect Lens made of acrylic, classified as CC2, Class C, 0.060 inch thick, with open cell foam seal to minimize condensation and bug, dirt, and air-infiltration per ASTM E283.
      c. Lens: Optiview Type L1 lens design to maximize light output and diffusion with extruded aluminum frame. Visible Light Transmission shall be greater than 90 percent at 0.100 inches thick. Classified as CC2.
   8. Accessories:
      a. Local Dimmer Control: Provided with dimmer switch and cable.
         1) Daylight Dimmer: Electro-mechanically actuated daylight valve; for universal input voltages ranging between 90 and 277 V at 50 or 60 Hz; maximum current draw of 50 ma per unit; controlled by low voltage, series Type T02: circuited, 4

conductor, size 22 cable; providing daylight output between 2 and 100 percent. Provided with dimmer switch and cable.

2) Switch: Manufacturer-specific low voltage DC DP/DT switch (white) required to operate Daylight Dimmer. Note: only one switch is required per set of synchronously controlled dimmers.

3) Cable: Two conductor low voltage cable (500 ft.) for multiple unit DC connection.

b. Wire Suspension Kit: Type E, Use the wire suspension kit when additional bracing to the structure is required.

c. Security Kit: Type SK Dome Security Kit, rivets with nylon spacers to replace dome screws.

2.3 ACCESSORIES

A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.

B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.

C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

1. Sealants and Sealant Primers applied within the building waterproofing envelope: Comply with Section 01 61 16.

PART 3 EXECUTION

3.1 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.

3.2 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.

3.3 INSTALLATION

A. Install in accordance with manufacturer's printed instructions.

B. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 08 71 00 – DOOR HARDWARE

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. Mechanical and electrified door hardware for:

    a. Swinging doors.

2. Electronic access control system components, including:

    a. Electronic access control devices.

3. Field verification, preparation and modification of existing doors and frames to receive new door hardware.

B. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 Section “Alternates” for alternates affecting this section.
2. Division 07 Section “Joint Sealants” for sealant requirements applicable to threshold installation specified in this section.
3. Division 09 sections for touchup finishing or refinishing of existing openings modified by this section.
4. Division 26 sections for connections to electrical power system and for low-voltage wiring.
5. Division 28 sections for coordination with other components of electronic access control system.

1.3 REFERENCES

A. UL - Underwriters Laboratories

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Key Systems and Nomenclature

C. ANSI - American National Standards Institute

1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties

1.4 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 requirements.
2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.

B. Action Submittals:

1. Product Data: Product data including manufacturers’ technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:

    a. Wiring Diagrams: For power, signal, and control wiring and including:
        1) Details of interface of electrified door hardware and building safety and security systems.
        2) Schematic diagram of systems that interface with electrified door hardware.
        3) Point-to-point wiring.
        4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.

a. Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:

   a. Door Index; include door number, heading number, and Architects hardware set number.
   b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
   c. Type, style, function, size, and finish of each hardware item.
   d. Name and manufacturer of each item.
   e. Fastenings and other pertinent information.
   f. Location of each hardware set cross-referenced to indications on Drawings.
   g. Explanation of all abbreviations, symbols, and codes contained in schedule.
   h. Mounting locations for hardware.
   i. Door and frame sizes and materials.
   j. Name and phone number for local manufacturer's representative for each product.
   k. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include how door will operate on egress, ingress, and fire and smoke alarm connection.
      1) Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work that is critical in Project construction schedule.

5. Key Schedule:

   a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
   b. Use ANSI/BHMA A156.28 “Recommended Practices for Keying Systems” as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
   c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
   d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
   e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
      1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.

   f. Prepare key schedule by or under supervision of supplier, detailing Owner’s final keying instructions for locks.

6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.

C. Informational Submittals:

1. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant.
2. Product Certificates for electrified door hardware, signed by manufacturer:

   a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.

3. Certificates of Compliance:

   a. Certificates of compliance for fire-rated hardware and installation instructions if requested by Architect or Authority Having Jurisdiction.
   b. Installer Training Meeting Certification: Letter of compliance, signed by Contractor, attesting to completion of installer training meeting specified in "QUALITY ASSURANCE" article, herein.
   c. Electrified Hardware Coordination Conference Certification: Letter of compliance, signed by Contractor, attesting to completion of electrified hardware coordination conference, specified in "QUALITY ASSURANCE" article, herein.

4. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by qualified testing agency, for door hardware on doors located in accessible routes.
5. Warranty: Special warranty specified in this Section.

D. Closeout Submittals:

1. Operations and Maintenance Data : Provide in accordance with Division 01 and include:

   a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
   b. Catalog pages for each product.
   c. Name, address, and phone number of local representative for each manufacturer.
   d. Parts list for each product.
   e. Final approved hardware schedule, edited to reflect conditions as-installed.
   f. Final keying schedule
   g. Copies of floor plans with keying nomenclature
   h. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
   i. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.5 QUALITY ASSURANCE

A. Product Substitutions: Comply with product requirements stated in Division 01 and as specified herein.

1. Where specific manufacturer's product is named and accompanied by "No Substitute," including make or model number or other designation, provide product specified. (Note:

Certain products have been selected for their unique characteristics and particular project suitability.)

a. Where no additional products or manufacturers are listed in product category, requirements for "No Substitute" govern product selection.

2. Where products indicate "acceptable manufacturers" or "acceptable manufacturers and products", provide product from specified manufacturers, subject to compliance with specified requirements and "Single Source Responsibility" requirements stated herein.

B. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
4. Coordination Responsibility: Coordinate installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.

a. Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.

C. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.

D. Architectural Hardware Consultant Qualifications: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:

1. For door hardware, DHI-certified, Architectural Hardware Consultant (AHC).
2. Can provide installation and technical data to Architect and other related subcontractors.
3. Can inspect and verify components are in working order upon completion of installation.
4. Capable of producing wiring diagrams.
5. Capable of coordinating installation of electrified hardware with Architect and electrical engineers.

E. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.
2. Manufacturers that perform electrical modifications and that are listed by testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

F. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door

hardware that are listed and are identical to products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

G. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

H. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

I. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release latch. Locks do not require use of key, tool, or special knowledge for operation.

J. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbf (22.2 N).
2. Maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
4. Adjust door closer sweep periods so that, from open position of 70 degrees, door will take at least 3 seconds to move to 3 inches (75 mm) from latch, measured to leading edge of door.

K. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01.

1. Attendees: Owner, Contractor, Architect, Installer, Owner's security consultant, and Supplier's Architectural Hardware Consultant.
2. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:

a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
b. Preliminary key system schematic diagram.
c. Requirements for key control system.
d. Requirements for access control.
e. Address for delivery of keys.

L. Pre-installation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
3. Inspect and discuss electrical roughing-in for electrified door hardware.
4. Review sequence of operation for each type of electrified door hardware.
5. Review required testing, inspecting, and certifying procedures.

M. Coordination Conferences:

1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.

   a. Attendees: Door hardware supplier, door hardware installer, Contractor.
   b. After meeting, provide letter of compliance to Architect, indicating when meeting was held and who was in attendance.

2. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

   a. Attendees: electrified door hardware supplier, doors and frames supplier, electrified door hardware installer, electrical subcontractor, Owner, Owner’s security consultant, Architect and Contractor.
   b. After meeting, provide letter of compliance to Architect, indicating when coordination conference was held and who was in attendance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

1. Deliver each article of hardware in manufacturer’s original packaging.

C. Project Conditions:

1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
2. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

D. Protection and Damage:

1. Promptly replace products damaged during shipping.
2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.

3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

E. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

F. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.7 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

F. Direct shipments not permitted, unless approved by Contractor.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Years from date of Substantial Completion, for durations indicated.

a. Closers:
   1) Mechanical: 25 years.

b. Automatic Operators: 2 years.
c. Exit Devices:
   1) Mechanical: 3 years.
   2) Electrified: 1 year.

d. Locksets:
   1) Mechanical: 3 years.
   2) Electrified: 1 year.

e. Continuous Hinges: Lifetime warranty.
f. Key Blanks: Lifetime

2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

1.9 MAINTENANCE

A. Extra Materials:

1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

B. Maintenance Tools:

1. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and particular project suitability to insure continuity of existing and future performance and maintenance standards. After investigating available product offerings Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: “No Substitute.”

1. Where “No Substitute” is noted, submittals and substitution requests for other products will not be considered.

B. Approval of manufacturers and/or products other than those listed as ”Scheduled Manufacturer ” or “Acceptable Manufacturers” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.

C. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.

D. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

E. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

A. Fasteners

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
4. Install hardware with fasteners provided by hardware manufacturer.

B. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.

1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
2. Use materials which match materials of adjacent modified areas.
3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.

C. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.3 HINGES

A. Provide five-knuckle, ball bearing hinges.

1. Manufacturers and Products:

a. Scheduled Manufacturer and Product: Ives 5BB series
b. Acceptable Manufacturers and Products: Hager BB series, Stanley FBB Series

B. Requirements:

1. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:

a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high

2. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:

a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
b. Interior: Heavy weight, steel, 5 inches (127 mm) high

3. 2 inches or thicker doors:

    a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
    b. Interior: Heavy weight, steel, 5 inches (127 mm) high

4. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
5. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
6. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

    a. Steel Hinges: Steel pins
    b. Non-Ferrous Hinges: Stainless steel pins
    c. Out-Swinging Exterior Doors: Non-removable pins
    d. Out-Swinging Interior Lockable Doors: Non-removable pins
    e. Interior Non-lockable Doors: Non-rising pins

7. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
8. Doors 36 inches (914 mm) wide or less furnish hinges 4-1/2 inches (114 mm) high; doors greater than 36 inches (914 mm) wide furnish hinges 5 inches (127 mm) high, heavy weight or standard weight as specified.
9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component.
10. Provide mortar guard for each electrified hinge specified, unless specified in hollow metal frame specification.
11. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.

2.4 CONTINUOUS HINGES

A. Aluminum Geared

1. Manufacturers:

    a. Scheduled Manufacturer: Ives.
    b. Acceptable Manufacturers: Select, Stanley.

2. Requirements:

    a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.25, Grade 2.
    b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum, with 0.25-inch (6 mm) diameter Teflon coated stainless steel hinge pin.
    c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.

d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
e. On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
f. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware.
g. Install hinges with fasteners supplied by manufacturer.
h. Provide hinges with symmetrical hole pattern.

2.5 ELECTRIC POWER TRANSFER

A. Manufacturers:

a. Scheduled Manufacturer: Von Duprin
b. Acceptable Manufacturers: Falcon, ABH

B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.

C. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.6 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Burns, Trimco

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.7 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Burns, Trimco

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.

2.8 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Best 45H, No Substitutions

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1 Operational, Grade 1 Security, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
2. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
3. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
4. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide a request to exit (RX) switch that is actuated with rotation of inside lever.
5. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.

    a. Lever Design: Schlage 15H.
    b. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

2.9 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Von Duprin 98/35 series
2. Acceptable Manufacturers and Products: Sargent 80 series, Precision Apex series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1, and UL listed for Panic Exit or Fire Exit Hardware. Cylinders: Refer to "KEYING" article, herein.
2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
3. Touchpad: Extend minimum of one half of door width. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other

finishes, provide compatible finish to exit device. Provide compression springs in devices, latches, and outside trims or controls; tension springs also acceptable.
4. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
5. Provide exit devices with manufacturer's approved strikes.
6. Provide exit devices cut to door width and height. Locate exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
7. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
8. Provide cylinder hex-key dogging at non-fire-rated exit devices, unless specified less dogging.
9. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion that is removed by use of a keyed cylinder, which is self-locking when re-installed.
10. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.

    a. Lever Style: Match lever style of locksets.
    b. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

11. Provide UL labeled fire exit hardware for fire rated openings.
12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
13. Provide electrified options as scheduled.

2.10 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage or Von Duprin PS900 series
2. Acceptable Manufacturers and Products: Dynalock 5000 series, Folger Adam FABPS series, Security Door Controls 600 series

B. Requirements:

1. Provide power supplies, recommended and approved by manufacturer of electrified locking component, for operation of electrified locks, electrified exit devices, magnetic locks, electric strikes, and other components requiring power supply.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply , and UL class 2 listed.
4. Options:

a. Provide power supply, where specified, with internal capability of charging sealed backup batteries 24 VDC, in addition to operating DC load.
b. Provide sealed batteries for battery back-up at each power supply where specified.
c. Provide keyed power supply cabinet.

5. Provide power supply in an enclosure, complete, and requiring 120VAC to fused input.
6. Provide power supply with emergency release terminals, where specified, that allow release of all devices upon activation of fire alarm system complete with fire alarm input for initiating "no delay" exiting mode.

2.11 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer: Best, No Substitutions

B. Requirements:

1. Provide cylinders/cores, from the same manufacturer of locksets, compliant with ANSI/BHMA A156.5; latest revision, Section 12, Grade 1; permanent cylinders; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.

a. Conventional cylinder with **i**nterchangeable core (SFIC) core with open keyway.
b. Keying: Manufacturer-keyed permanent cylinders/cores, configured into keying system per "KEYING" article herein.
c. Features: Cylinders/cores shall incorporate the following features.

3. Nickel silver bottom pins.
4. Replaceable Construction Cores.

a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
1) 12 construction change (day) keys.

b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2.12 KEYING

A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.

a. Match Owner's existing key system.

2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features.

    a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)

4. Identification:

    a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Blind code marks shall not include actual key cuts.
    b. Identification stamping provisions must be approved by the Architect and Owner.
    c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
    d. Failure to comply with stamping requirements shall be cause for replacement of keys involved at no additional cost to Owner.
    e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.

5. Quantity: Furnish in the following quantities.

    a. Change (Day) Keys: 3 per cylinder/core.
    b. Master Keys: 6.
    c. Unused balance of key blanks shall be furnished to Owner with the cut keys.
    d. Extra Keys:
        1) 12 Presentation Keys
        2) 12 Construction Keys

2.13 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer: Telkee
2. Acceptable Manufacturers: HPC, Lund

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.

    a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
    b. Provide hinged-panel type cabinet for wall mounting.

2.14 KEY MANAGEMENT SOFTWARE

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage SITEMASTER 200
2. Acceptable Manufacturers and Products: Best Keystone 600N, Corbin-Russwin KeyWizard.

B. Requirements:

1. Software: Provide tracking, issuing, collecting and transferring information regarding keys. Provide customized query, reporting, searching capability, comprehensive location hardware listings, display key holder photos and signature for verification, and provide automatic reminders for maintenance, back-ups and overdue keys.
2. Provide training for Owner's personnel on proper operation and application of key management software.

2.15 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 4050 series
2. Acceptable Manufacturers and Products: Norton 7500 series, Sargent 351 series.

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
3. Closer Body: 1-1/2 inch (38 mm) diameter with 11/16 inch (17 mm) diameter heat-treated pinion journal and full complement bearings.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and all weather requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide stick on templates, special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
9. Pressure Relief Valve (PRV) Technology: Not permitted.
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.16 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 1450 series
2. Acceptable Manufacturers and Products: Norton 8501/8501BF series, Sargent 1331 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory.
2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
3. Closer Body: 1-1/4 inch (32 mm) diameter, with 5/8 inch (16 mm) diameter heat-treated pinion journal and full complement bearings.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
7. Pressure Relief Valve (PRV) Technology: not permitted.
8. Provide stick on and special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.17 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN Senior Swing
2. Acceptable Manufacturers and Products: Besam Swingmaster MP, Horton 4000LE series

B. Requirements:

1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.

    a. Opening: Powered by DC motor working through reduction gears.
    b. Closing: Spring force.
    c. Manual, hydraulic, or chain drive closers: Not permitted.
    d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
    e. Cover: Aluminum.

2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 2 to 30 seconds, and logic terminal to interface with accessories, mats, and sensors.
3. Provide drop plates, brackets, or adapters for arms as required to suit details.

4. Provide hard-wired motion sensors and/or actuator switches for operation as specified. Provide weather-resistant actuators at exterior applications.
5. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.
6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
7. Provide units with inputs for smoke evacuation doors, where specified, which allow doors to power open upon fire alarm activation and hold open indefinitely or until fire alarm is reset, presence detector input, which prevents closed door from opening or door that is fully opened from closing, hold open toggle input, which allows remote activation for indefinite hold open and close second time input is activated, vestibule inputs, which allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.18 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Burns, Trimco

B. Requirements:

1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.19 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer: Ives

2. Acceptable Manufacturers: Burns, Trimco

B. Requirements:

1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes of plates:

a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.20 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers: Glynn-Johnson
2. Acceptable Manufacturers: Rixson, Sargent

B. Requirements:

1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

2.21 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Burns, Trimco

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.

3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.22 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer: Zero International
2. Acceptable Manufacturers: NGP, Reese

B. Requirements:

1. Provide thresholds, weatherstripping (including door sweeps, seals, astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
2. Size of thresholds::

   a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
   b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width

3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.23 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Burns, Trimco

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.24 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer: Schlage
2. Acceptable Manufacturers: GE-Interlogix, Sargent

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.

2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.25 FINSHES

A. Finish: BHMA 626/652 (US26D); except:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Continuous Hinges: BHMA 628
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Existing Door and Frame Compatibility: Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.

C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Where on-site modification of doors and frames is required:

1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
2. Field modify and prepare existing door and frame for new hardware being installed.
3. When modifications are exposed to view, use concealed fasteners, when possible.
4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:

a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

H. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as indicated in keying section.

I. Wiring: Coordinate with Division 26, ELECTRICAL sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Testing and labeling wires with Architect's opening number.

J. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

K. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.

L. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

1. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.

M. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

N. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

O. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

P. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

Q. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

A. Architectural Hardware Consultant: Engage qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately six (6) months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.8 DOOR HARDWARE SCHEDULE

A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

B. Hardware Sets:

Hardware Set No. 01

Door #(s):

200A

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	KEYED REMOVABLE MULLION	KR4954	689	VON
1	EA	ELEC PANIC HARDWARE	RX-35A-EO	626	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-35A-NL	626	VON
1	EA	RIM CYLINDER	1E-72	626	BES
1	EA	MORTISE CYLINDER	1E-74	626	BES
2	EA	SURFACE CLOSER	4050 CUSH	689	LCN
1	EA	RAIN DRIP	142A	AL	ZER
1	EA	PERIMETER GASKET	BY DOOR/FRAME MANUFACTURER		
2	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	545A-MSLA-10	A	ZER
1	EA	CREDENTIAL READER	BY SECURITY SECTION		
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-BBK 900-2RS KL900	LGR	VON

Operational Description:

Doors normally closed and secure.
Free Egress at all times.
Access by presentation of a valid credential to the reader or key override.
Doors remain secure with loss of power or activation of fire alarm system (Fail Secure).
DPS monitors door position, RX shunts DPS signaling legal exit to security systems.

Hardware Set No. 02

Door #(s):

231

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	KEYED REMOVABLE MULLION	KR4954	689	VON
1	EA	ELEC PANIC HARDWARE	RX-35A-EO	626	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-35A-NL	626	VON
1	EA	RIM CYLINDER	1E-72	626	BES
1	EA	MORTISE CYLINDER	1E-74	626	BES
1	EA	SURFACE CLOSER	4050 CUSH	689	LCN
1	EA	SURF. AUTO OPERATOR	9542 HL/D MS	ANCLR	LCN
1	EA	WEATHER RING	8310-801	PLA	LCN
1	EA	ROCKER SWITCH	8310-806R	689	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-853T	630	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-855	630	LCN
1	EA	FLUSH MOUNT BOX	8310-867F	689	LCN
1	EA	RAIN DRIP	142A	AL	ZER
1	EA	PERIMETER GASKET	BY DOOR/FRAME MANUFACTURER		
2	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	545A-MSLA-10	A	ZER
1	EA	CREDENTIAL READER	BY SECURITY SECTION		
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-BBK 900-2RS KL900	LGR	VON

Operational Description:

Doors normally closed and secure.
Free Egress at all times by push pad or ADA operator.
Access by presentation of a valid credential to the reader or key override.
Doors remain secure with loss of power or activation of fire alarm system (Fail Secure).
8310-855 actuator mounted in Vestibule and wired to give independent control of exterior & vestibule operator.
DPS monitors door position, RX shunts DPS signaling legal exit to security systems.

Hardware Set No. 03

Door #(s):

232

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
2	EA	DUMMY PUSH BAR	350 X DT	626	VON
1	EA	SURFACE CLOSER	4050 CUSH	689	LCN
1	EA	SURF. AUTO OPERATOR	9542 HL/D MS	ANCLR	LCN
1	EA	ROCKER SWITCH	8310-806R	689	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-853T	630	LCN
1	EA	FLUSH MOUNT BOX	8310-867F	689	LCN
1	EA	PERIMETER GASKET	BY DOOR/FRAME MANUFACTURER		

Operational Description:

Free Egress/Access at all times by push pad/door pull or ADA operator.
Operator wired to work with ADA actuator (8310-855) in Set 02.

Hardware Set No. 04

Door #(s):

200B

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	628	IVE
2	EA	DUMMY PUSH BAR	350 X DT	626	VON
2	EA	SURFACE CLOSER	4050 CUSH	689	LCN
1	EA	PERIMETER GASKET	BY DOOR/FRAME MANUFACTURER		

Hardware Set No. 05

Door #(s):

242

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	STOREROOM LOCK	45H-7-D-15H	630	BES
1	EA	SURFACE CLOSER	4050 CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142A	AL	ZER
1	EA	GASKETING	188S-BK	S-Bk	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	545A-MSLA-10	A	ZER

Hardware Set No. 06

Door #(s):

220B

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	FIRE EXIT HARDWARE	98-L-NL-F-06	626	VON
1	EA	RIM CYLINDER	1E-72	626	BES
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	8150S-BK	S-Bk	ZER

Hardware Set No. 07

Door #(s):
236

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQ'D	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	ELECTRIFIED MORTISE	45HW-7-DEU-15H	626	BES
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	GASKETING	8150S-BK	S-Bk	ZER
1	EA	CREDENTIAL READER	BY SECURITY SECTION		
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-BBK 900-2RS KL900	LGR	VON

Operational Description:
Doors normally closed and secure.
Free Egress at all times.
Access by presentation of a valid credential to the reader or key override.
Doors remain secure with loss of power or activation of fire alarm system (Fail Secure).
DPS monitors door position, RX shunts DPS signaling legal exit to security systems.

Hardware Set No. 08

Door #(s):
220A

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELECTRIFIED MORTISE	45HW-7-DEU-15H	626	BES
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	8150S-BK	S-Bk	ZER
1	EA	CREDENTIAL READER	BY SECURITY SECTION		
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-BBK 900-2RS KL900	LGR	VON

Operational Description:
Doors normally closed and secure.
Free Egress at all times.
Access by presentation of a valid credential to the reader or key override.
Doors remain secure with loss of power or activation of fire alarm system (Fail Secure).
DPS monitors door position, RX shunts DPS signaling legal exit to security systems.

Hardware Set No. 09

Door #(s):

226A 227 230

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELECTRIFIED MORTISE	45HW-7-DEU-15H	626	BES
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	8150S-BK	S-Bk	ZER
1	EA	DOOR SWEEP	39WA	A	ZER
1	EA	CREDENTIAL READER	BY SECURITY SECTION		
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-BBK 900-2RS KL900	LGR	VON

Operational Description:

Doors normally closed and secure.
Free Egress at all times.
Access by presentation of a valid credential to the reader or key override.
Doors remain secure with loss of power or activation of fire alarm system (Fail Secure).
DPS monitors door position, RX shunts DPS signaling legal exit to security systems.

Hardware Set No. 10

Door #(s):

235

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQ'D	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	45H-7-D-15H	626	BES
2	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	8150S-BK	S-Bk	ZER
1	EA	MEETING STILE	8217S-BK	S-Bk	ZER

Hardware Set No. 11

Door #(s):

228

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	45H-7-D-15H	626	BES
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	8150S-BK	S-Bk	ZER
1	EA	DOOR SWEEP	39WA	A	ZER

Hardware Set No. 12

Door #(s):

210B 237

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	45H-7-D-15H	626	BES
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	8150S-BK	S-Bk	ZER

Hardware Set No. 13

Door #(s):

212 213 214 215 216 217
218 219 238

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	45H-7-AT-15H	626	BES
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Set No. 14

Door #(s):

208 209 210A 211

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	45H-7-AT-15H	626	BES
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Set No. 15

Door #(s):

201 202 205A 205B 206

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	45H-7-R-15H	626	BES
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Set No. 16

Door #(s):

225

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	45H-7-R-15H	626	BES
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Set No. 17

Door #(s):

229A 229B

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	45H-7-R-15H	626	BES
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	8150S-BK	S-Bk	ZER
1	EA	DOOR SWEEP	39WA	A	ZER

Hardware Set No. 18

Door #(s):

239

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY SET	45H-0-N-15H	626	BES
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Set No. 19

Door #(s):

226B

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	COMMUNICATING LOCK	45H-7-G-15H	626	BES
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Set No. 20

Door #(s):

221 222

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	630	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302 10" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 6" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Set No. 21

Door #(s):

204 207 223

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	45H-7-D-15H	626	BES
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	8150S-BK	S-Bk	ZER

Hardware Set No. 22

Door #(s):

220

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	STOREROOM LOCK	45H-7-D-15H	626	BES
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	870AA	AA	ZER
1	EA	DOOR BOTTOM	365AA6	AA	ZER
1	EA	THRESHOLD	564A-MSLA-10	A	ZER
1	EA	MOUNTING BRACKET	870SPB		ZER

End of Section

SECTION 08 80 00 - GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Glass.

B. Glazing compounds and accessories.

1.2 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

D. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

G. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

H. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 2009.

I. GANA (SM) - GANA Sealant Manual; Glass Association of North America; 2008.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Samples: Submit two samples 12 by 12 inch in size of glass units.

E. Certificates: Certify that products meet or exceed specified requirements.

F. LEED Report: Report recycled content, location of manufacture and VOC content of sealants.
   1. Comply with VOC content limits of Section 01 61 16.

G. LEED Submittals:
   1. Credit MR 5.1 and 5.2: List of proposed regionally manufactured and extracted, harvested or recovered materials.
      a. Identify each regionally manufactured material, and each regionally extracted, harvested or recovered material by source and material cost.

H. LEED Submittal: Product data indicating visible light transmittance of insulating glass units (Credit EQ 8.1).

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.

1.5 MOCK-UP

A. Locate within framing set in masonry mockup.

1.6 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.7 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.8 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Sealed Insulating Glass Units: Provide a ten (10) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

C. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.1 EXTERIOR GLAZING ASSEMBLIES

A. Performance Criteria: Select type and thickness of glass to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of glass calculated in accordance with IBC 2015 - International Building Code.
   1. Glass thicknesses listed are minimum.

2.2 GLASS MATERIALS

A. Float Glass Manufacturers:
   1. AGC Flat Glass North America: www.afgglass.com.
   2. Oldcastle Glass.
   3. Pilkington North America Inc: www.pilkington.com/na.
   4. PPG Industries, Inc: www.ppgideascapes.com.

B. Float Glass: Provide float glass based glazing unless noted otherwise.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and Kind FT.
   3. Tinted Types: ASTM C1036, Class 2 - Tinted, color and performance characteristics as indicated.
   4. Thicknesses: As indicated; for exterior glazing comply with requirements indicated for wind load design regardless of thickness indicated.

C. Laminated Glass (Type G-4): Float glass laminated in accordance with ASTM C1172.
   1. Thickness: 5/16 inch.
   2. Translucent interlayer; one layer 0.030 translucent polyvinyl butyral with a proven record of no tendancy to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation equivalent to CNRS-365 (65 Percent White) by Bendheim.

D. Laminated Glass (Type G-5): Float glass laminated in accordance with ASTM C1172.
   1. Thickness: 1/4 inch.

2. Printed graphic interlayer; one layer 0.030 polyvinyl butyral with a proven record of no tendancy to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
3. Graphic: Custom grid pattern, 1.5 inches by 1.5 inches.

E. Laminated Glass (Type G-6 - Canopy Glass):
1. Heat-Treated Laminated-Glass Units: Kind LT, consisting of two fully tempered lites subject to requirements:
a. 13/16-inch Clear Laminated Glass: Thickness of each lite: 6 mm, 1/4-inch nominal.
b. Interlayer Thickness:
1) Laminated Glazing - Exterior Canopies and related Vestibules: Minimum 0.060 inch total thickness; four interlayers.

F. Safety Glass (Type G-3): Clear; fully tempered with horizontal tempering.
1. Comply with 16 CFR 1201 test requirements for Category II.
2. 6 mm minimum thick.
3. Provide this type of glazing in the locations indicated on the drawings.

2.3 SEALED INSULATING GLASS UNITS

A. Manufacturers:
1. Any of the manufacturers specified for float glass.
2. Cardinal Glass Industries: www.cardinalcorp.com.
3. Guardian Industries Corp: www.guardian.com.
4. Viracon, Apogee Enterprises, Inc: www.viracon.com.

B. Sealed Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Edge Spacers: Aluminum, bent and soldered corners.
3. Edge Seal: Glass to elastomer with supplementary silicone sealant.
4. Purge interpane space with dry hermetic air.

C. Insulated Glass Units (Type G-1): Double pane with glass to elastomer edge seal.
1. Durability: Certified by an independent testing agency to comply with ASTM E 2190.
2. Purge interpane space with dry hermetic air.
3. Total unit thickness of 1 inch .
4. Basis-of-Design - Clear Insulating Units: Guardian SuperNeutral 54 or equal or better product of other named manufacturers.
a. Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm.
b. Interspace Content: Air.
c. Outdoor Lite: Class 1 (clear) float glass; Kind FT (fully tempered).
d. Indoor Lite: Class 1 (clear) float glass; Kind FT (fully tempered).
e. Low-E Coating: Second or third surface.
f. Visible Light Transmittance: 54 percent minimum.
g. Winter Nighttime U-Factor: 0.28 or better.
h. Summer Daytime U-Factor: 0.27 or better.
i. Solar Heat Gain Coefficient: 0.28 maximum.
j. Outdoor Visible Reflectance: 13 percent maximum.

D. Insulated Glass Units (Type G-2): Double pane with glass to elastomer edge seal.
1. Durability: Certified by an independent testing agency to comply with ASTM E 2190.
2. Purge interpane space with dry hermetic air.
3. Total unit thickness of 1 inch .

4. Basis-of-Design - Clear Insulating Units: Guardian SuperNeutral 54 or equal or better product of other named manufacturers.
    a. Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm.
    b. Interspace Content: Air.
    c. Outdoor Lite: Class 1 (clear) float glass; Kind FT (fully tempered).
    d. Indoor Lite: Class 1 (clear) laminated glass; Kind FT (fully tempered).
        1) Translucent interlayer; one layer 0.030 translucent polyvinyl butyral with a proven record of no tendancy to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation equivalent to Colored Laminated Glass by Bendheim
    e. Low-E Coating: Second or third surface.
    f. Visible Light Transmittance: 54 percent minimum.
    g. Winter Nighttime U-Factor: 0.28 or better.
    h. Summer Daytime U-Factor: 0.27 or better.
    i. Solar Heat Gain Coefficient: 0.28 maximum.
    j. Outdoor Visible Reflectance: 13 percent maximum.

E. Glass Canopy Spider Fittings:
    1. Basis-of-Design: Innovative Structural Glass (ISG), 100 Series Flange Mount Spider Fittings, other approved spider fitting manufacturers as follows:
        a. C.R. Laurence Co., CRL Heavy-Duty Spider Fittings
        b. Sadev.
    2. Mounting: Structure Mounted
    3. Finish: Brushed Stainless

F. Sealing System: Dual seal, with primary and secondary sealants as follows:
    1. Primary seal shall be extruded polyisobutylene continuously bonded to glass surfaces and desiccant filled metal spacer, including corners.
    2. Minimum width of primary seal shall be 0.125 inch (3.2 mm). Secondary seal shall be General Electric IGS 3723 or Dow Corning 982.
    3. Secondary seal shall completely cover spacer with no gaps or voids, and shall be continuously bonded to both plates of glass.
    4. Where insulating glass is supported by structural silicone, secondary seal shall be designed to transfer specified pressures from outdoor glass to indoor glass.

G. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
    1. Spacer Material: Stainless steel or thermally jacketed stainless steel.
    2. Desiccant: Molecular sieve or silica gel, or blend of both.
    3. Corner Construction: Manufacturer's standard corner construction.

2.4 GLAZING COMPOUNDS

A. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

B. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

C. Sealants applied within the building waterproofing envelope: Comply with low-emitting requirements specified in Section 01 61 16.

2.5 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option I. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

C. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products as follows:
   1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
   2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

D. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
   1. Type 1, for glazing applications in which tape acts as the primary sealant.
   2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

E. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option I; black color.

F. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

E. Install sealants in accordance with manufacturer's instructions.

3.3 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

A. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.4 INSTALLATION - EXTERIOR DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

E. Trim protruding tape edge.

3.5 INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE)

A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

D. Place glazing tape on free perimeter of glazing in same manner described above.

E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

F. Knife trim protruding tape.

3.6 FIELD QUALITY CONTROL

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.7 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.8 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

SECTION 08 91 00 - LOUVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Louvers, frames, and accessories.

1.2 RELATED REQUIREMENTS

A. Section 07 90 05 - Joint Sealers.

1.3 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; Air Movement and Control Association International, Inc.; 2012.

C. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices; 2013.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.

C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.

D. Samples: Submit two samples 2 by 2 inches in size illustrating finish and color of exterior surfaces.

E. Test Reports: Independent agency reports showing compliance with specified performance criteria.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.

1.5 QUALITY ASSURANCE

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

1.6 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide twenty year manufacturer warranty against distortion, metal degradation, and failure of connections.

1. Finish: Include coverage against degradation of exterior finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Airolite Company, LLC: www.airolite.com.

B. Construction Specialties, Inc; RS-7315 (basis-of-design): www.c-sgroup.com.

C. Industrial Louvers, Inc..

D. Ruskin Company.

2.2 LOUVERS

A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
   1. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft water penetration at calculated intake design velocity based on design air flow and actual free area, when tested in accordance with AMCA 500-L.
   2. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
   3. Screens: Provide bird screens.

B. Deep Storm Resistant Fixed Horizontal Louver:
   1. Material: Heads, sills, jambs and mullions to be one-piece structural aluminum members with integral caulking slot and retaining beads.
   2. Design: Architectural line drainable sightproof storm resistant fixed-blade; designed to collect and drain water to exterior at sill by means of multiple gutters in blades and channels in jambs and mullions.
   3. Louvers to be supplied with 4 inches high by full depth sill flashings formed from minimum 0.050 inch thick aluminum; sill flashings to have welded side panels.
   4. Frame: 7 inches deep, channel profile; corner joints mitered and welded.
   5. AMCA Performance: (48 inches wide by 48 inches high test unit)
      a. Free Area: Minimum 8.0 sq. ft.
      b. Intake pressure drop at 900 fpm free area velocity: Minimum 0.32 in. H2O.
      c. Exhaust pressure drop at 900 fpm free area velocity: Minimum 0.44 in. H2O.
   6. Wind Driven Rain Performance:
      a. The louver test based on a 1.00m by 1.00m core area; unit tested at a rainfall rate of 3.0 inches per hour and with a wind directed to the face of the louver at a velocity 29.1-mph.
      b. The test data to show the water penetration effectiveness rating at each corresponding ventilation rate.

2.3 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), .

B. Polyvinylidene Fluoride Coating: Minimum 70 percent Kynar 500/Hylar 500 resin, three coat finish, complying with AAMA 2605.
   1. Color: Match Valspar Fluropon Classic II HS, Champagne Bronze, 439ZZ095M.

2.4 ACCESSORIES

A. Blank-Off Panels: Same material as louver, painted black on exterior side.
   1. Provide where indicated and where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.
   2. Uninsulated Panels: Provide at unconditioned spaces; minimum 0.050 inch thick aluminum sheet.
   3. Insulated Panels: Provide at conditioned spaces or where indicated.
      a. 1 inch thick and faced on both sides with minimum 0.032 inch thick aluminum sheet.
      b. Fabricated with an expanded polystyrene (EPS) core.

c. Panel perimeter frame to be 0.050 inch thick-formed aluminum channels; panel frame mitered at the corners.

4. Finish: Same quality as louvers.

B. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.

1. Bird screens to be minimum 5/8 inch mesh, 0.050 inch thick expanded and flattened aluminum bird screen secured within minimum 0.055 inch thick extruded aluminum frames; frames to have mitered corners and corner locks.

C. Glazing Adapter: Provide where louvers are glazed into storefront or curtainwall frames; minimum 0.090 inch thick extruded aluminum.

D. Fasteners and Anchors: Stainless steel.

E. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.

F. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

G. Sealant: ES-1 or ES-4 type, as specified in Section 07 90 05.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared openings and flashings are ready to receive work and opening dimensions are as indicated on shop drawings.

B. Verify that field measurements are as indicated.

3.2 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.

B. Install louvers level and plumb.

C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

D. Secure louver frames in openings with concealed fasteners.

E. Install perimeter sealant and backing rod in accordance with Section 07 90 05.

3.3 CLEANING

A. Strip protective finish coverings.

B. Clean surfaces and components.

END OF SECTION

SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Fire rated area separation walls.

C. Acoustic insulation.

D. Gypsum sheathing.

E. Gypsum wallboard.

F. Glass mat faced gypsum board.

G. Moisture and mold resistant wallboard.

H. Joint treatment and accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.3 REFERENCE STANDARDS

A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2012.

B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

C. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

D. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2014a.

E. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing; 2013.

F. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.

G. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

H. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2013.

I. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 2008.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

C. Product Data: Provide data on gypsum board, glass mat faced gypsum board, accessories, and joint finishing system.

D. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.

E. LEED Submittals: Provide documentation of VOC content in g/L for adhesives and acoustical sealants applied within the building waterproofing envelope; comply with VOC limits of Section 01 61 16.

F. Submit drawings indicating proposed location of control joints for Architect's review; locations to be approved by Architect and may be adjusted for aesthetic reasons.

1.5 QUALITY ASSURANCE

A. Maintain one copy of all installation standards at project site.

B. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
   1. Maintain one copy of standards at project site.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

B. Fire Rated Assemblies: Provide completed assemblies identical to those tested in assembly indicated.

2.2 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. CertainTeed Corporation: www.certainteed.com.
   2. Georgia-Pacific Gypsum: www.gpgypsum.com.
   3. Lafarge North America: www.lafarge.com.
   4. National Gypsum Company: www.nationalgypsum.com.
   5. USG Corporation: www.usg.com.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Regular Type:
      a. Application: Use for vertical surfaces, unless otherwise indicated.
      b. Edges: Tapered.
   2. Fire Resistant Type: Complying with Type X requirements; UL or WH rated.
      a. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X.
      b. Edges: Tapered.
   3. Ceiling Board: Special sag-resistant type.
      a. Application: Ceilings, except areas with showers or otherwise indicated.
      b. Thickness: 1/2 inch.
      c. Edges: Tapered.

C. Moisture and Mold Resistant Wallboard: Wallboard installed at building perimeter, and any wallboard furred to concrete or masonry construction.
   1. Characteristics:
      a. ASTM C 1396 (Section 5) regular type except where Type X fire-resistant type is indicated or required by to meet UL assembly types.
      b. Edges: Tapered.
      c. Resists the growth of mold when tested, as manufactured, according to ASTM D 3273.
   2. Available Products:
      a. SHEETROCK® Brand Mold Tough® Gypsum Panels by USG.
      b. Gold Bond® BRAND XP® Wallboard by National Gypsum.

c. Mold Defense Products by LaFarge.

2.3 FIBERGLASS REINFORCED BOARD MATERIALS

A. Glass Mat Gypsum Board: Gypsum panels with moisture-resistant core and coated inorganic fiberglass mat back surface designed to resist growth of mold and mildew, per ASTM D 3273.
   1. Glass Mat Board: Comply with performance requirements of ASTM C 1396/C 1396M for water-resistant gypsum backing board and ASTM C 1177/C 1177M for sheathing; tapered long edges.
   2. Application: High-humidity or wet locations; walls or ceilings; high-humidity or wet locations include kitchen areas and adjacent service areas, areas with showers, janitor basins, gang toilets, mechanical penthouses and mechanical spaces with steam, hot water or condensation generating equipment.
      a. Available Products:
         1) DensArmor Plus Interior Guard by G-P Gypsum.
         2) EXP Extreme by National Gypsum.
   3. Application: Sheathing.
      a. Basis-of-Design: Dens-Glass Gold Exterior Guard by G-P Gypsum; Type X.
      b. Other Available Product: CertainTeed GlasRoc Brand Sheathing; Type X.
   4. Application: Exterior soffits.
      a. Available Products:
         1) Dens-Glass Gold Exterior Guard by G-P Gypsum.
         2) CertainTeed GlasRoc Brand Sheathing.
      b. Core: 5/8 inch, Type X.
      c. Finish: G-P Setting Compound followed by G-P Finish Coat.

B. Sheathing Joint and Penetration Treatment:
   1. Silicone Emulsion Sealant: ASTM C 834, compatible with sheathing tape and sheathing, recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

2.4 ACCESSORIES

A. Acoustic Insulation: 1; preformed glass fiber, friction fit type, unfaced. Thickness to be full depth of wall.
   1. Comply with low-emitting requirements specified in Section 01 61 16.

B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
   1. Comply with low-emitting requirements specified in Section 01 61 16.

C. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
   1. Types: As detailed or required for finished appearance.
   2. Available products include the following:
      a. Grabber Construction Products: No-Coat Prefinished Corners.
      b. US Gypsum Company; Beadex Paper-Faced Metal Drywall Bead and Trim.
   3. Architectural Reveal Beads:
      a. Reveal Depth: 1/2 inch.
      b. Reveal Width: 1/2 inch.
      c. Products:
         1) Fry Reglet, DA.1, or approved equal.

D. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.

1. Joint Tape: Paper for interior applications; 10-by-10 glass mesh for exterior locations and glass mat gypsum wallboard; 2 inch wide.
2. Ready-mixed vinyl-based joint compound.

E. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

F. Screws: ASTM C 1002; self-piercing tapping type; cadmium-plated for exterior locations.

G. Adhesives Applied within the Building Waterproofing Envelope: Comply with low-emitting requirements specified in Section 01 61 16.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 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.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.3 BOARD INSTALLATION

A. Comply with ASTM C 840 and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
1. Exception: Tapered edges to receive joint treatment at right angles to framing.

C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.

D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

E. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
1. Cut boards at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
   a. Install boards with a 3/8-inch setback where non-load-bearing construction abuts structural elements.
   b. Install boards with a 1/4-inch setback where they abut masonry or similar materials that might retain moisture, to prevent wicking.
2. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed exterior wall assembly.
3. Apply fasteners so screw heads bear tightly against face of sheathing boards but do not cut into facing.
4. Do not bridge building expansion joints with sheathing; cut and space edges to match spacing of structural support elements.

5. Screw-attach boards at perimeter and within field of board to each steel stud; space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
6. Seal sheathing joints according to sheathing manufacturer's written recommendations.
   a. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed sealant in entire face of tape.
   b. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered.
   c. Seal other penetrations and openings.

F. Exterior Soffits: Install exterior soffit board perpendicular to framing, with staggered end joints over framing members or other solid backing.
1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.
3. Apply glass-fiber tape to glass mat faced gypsum board joints, and apply and trowel silicone emulsion sealant to embed sealant in entire face of tape.
4. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered.
5. Seal other penetrations and openings.
6. Prepare for specified finish according to manufacturer's instructions.

G. Glass Mat Faced Gypsum Board: Install in strict accordance with manufacturer's instructions.

H. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

I. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

3.4 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
2. At exterior soffits, not more than 30 feet apart in both directions.

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.

3.5 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based 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 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
4. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
5. Level 0: Temporary partitions.

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.

D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.6 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

1.1 SECTION INCLUDES

A. Metal partition, ceiling, and soffit framing.

B. Framing accessories.

1.2 REFERENCE STANDARDS

A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.

B. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.

D. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2013.

E. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.

G. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007 (Reapproved 2013).

H. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:
   1. Indicate prefabricated work, component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.
   2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.

C. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, limitations, and head to structure connectors, showing compliance with requirements.

D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

E. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.

F. LEED Submittals: Provide documentation of VOC content in g/L for acoustical sealant applied within the building waterproofing envelope; comply with VOC limits of Section 01 61 16.

1.4 PROJECT CONDITIONS

A. Coordinate the placement of components to be installed within stud framing system.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Metal Framing, Connectors, and Accessories:
   1. ClarkDietrich Building Systems LLC: www.clarkdeitrich.com.
   2. Marino: www.marinoware.com.
   3. Telling Industries: www.buildstrong.com.

B. Firestop Tracks:
   1. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
   2. Metal-Lite, Inc.; The System.
   3. Clark Western; Brady's Sliptrack within UL assembly.

C. Metal Back-up Plates:
   1. Metal Lite, Inc., Anaheim, CA.

D. Grid Suspension System for Gypsum Board Ceilings and Bulkheads:
   1. Armstrong World Industries, Inc.; Drywall Grid Systems.
   2. Chicago Metallic Corporation; Drywall Furring System.
   3. USG Corporation; Drywall Suspension System.

2.2 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 flat or formed webs with knurled faces.
      a. Typical: Minimum 0.0283 inch, 22 gage (27 mil) except when reference standard states a more stringent requirement.
      b. At door and glazed opening jambs, and framing supporting ceramic tile: Minimum 0.0312 inch, 20 gage (30 mil) except when reference standard states a more stringent requirement.
      c. (Equivalent Gauge Thickness) Steel Studs and Runners: Members that can show certified third party testing with gypsum board in accordance with ICC ES AC86 need not meet the minimum thickness limitation or minimum section properties set forth in ASTM C 645-09. The submission of a recognized evaluation report is acceptable to show conformance to this requirement.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C shaped.
   4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.

B. Loadbearing Studs: As specified in Section 05 40 00.

C. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

D. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
   1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.

2. Material: ASTM A653/A653M steel sheet, SS Grade 50, with G60/Z180 hot dipped galvanized coating.
3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
4. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.

E. Tracks and Runners: Same material and thickness as studs, bent leg retainer notched to receive studs .

F. Furring and Bracing Members: Of same material as studs; thickness to suit purpose; complying with applicable requirements of ASTM C754.

G. Fasteners: ASTM C1002 self-piercing tapping screws.

H. Sheet Metal Backing: 0.036 inch thick, galvanized.

I. Anchorage Devices: Powder actuated.

J. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced.
1. Comply with low-emitting requirements specified in Section 01 61 16.

K. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
1. Comply with low-emitting requirements specified in Section 01 61 16.

L. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic.

2.3 FABRICATION

A. Fabricate assemblies of framed sections to sizes and profiles required.

B. Fit, reinforce, and brace framing members to suit design requirements.

PART 3 EXECUTION

3.1 INSTALLATION OF STUD FRAMING

A. Comply with requirements of ASTM C754.

B. Extend partition framing to structure where indicated and to ceiling in other locations.

C. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

D. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

E. Align and secure top and bottom runners at 24 inches on center.

F. Place one bead of acoustic sealant between runners and substrate, studs and adjacent construction.

G. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

H. Install studs vertically at spacing indicated on drawings.

I. Align stud web openings horizontally.

J. Install bridging in the following locations at 48 inches on center veritcal:
1. All partitions or chase walls that have gypsum wall board on one side only.
2. All partitions that do not extend to deck.

3. All partitions that are installed to deck, but where gypsum wall board does not run to deck; bridging is required in the portion of the wall that does not have gypsum wall board on it.

K. Secure studs to tracks using crimping method. Do not weld.

L. Stud splicing is not permissible.

M. Fabricate corners using a minimum of three studs.

N. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.

O. Coordinate erection of studs with requirements of door frames; install supports and attachments.

P. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.

Q. Provide metal backup plates as required to accommodate the wall hung casework, millwork, railings or other items mounted to metal stud and wallboard walls and partitions; provide plates up to 8 feet in length as one-piece units.

3.2 CEILING AND SOFFIT FRAMING

A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.

B. Install furring independent of walls, columns, and above-ceiling work.

C. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.

D. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.

E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.

F. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

G. Reinforce openings in suspension system that interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 24 inches past each opening.

H. Laterally brace suspension system.

I. Contractor Option - Grid Suspension System for Gypsum Board Ceilings and Bulkheads: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

3.3 TOLERANCES

A. Maximum Variation From True Position: 1/8 inch in 10 feet.

B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 30 00 - TILING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Cementitious backer board as tile substrate.

D. Stone thresholds.

E. Porcelain trim.

F. Waterproofing and crack isolation membrane.

1.2 REFERENCE STANDARDS

A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile - Version; 2013.1.

1. ANSI A108.1A - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2013.1.
2. ANSI A108.1B - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 2013.1.
3. ANSI A108.1C - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement Mortar; 2013.1.
4. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2013.1.
5. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2013.1.
6. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 2013.1.
7. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 2013.1.
8. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2013.1.
9. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2013.1.
10. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2013.1.
11. ANSI A108.12 - American National Standard Specifications for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 2013.1.
12. ANSI A108.13 - American National Standard Specifications for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2013.1.
13. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2013.1.
14. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2013.1.

15. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2013.1.
16. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2013.1.
17. ANSI A137.1 - American National Standard Specifications for Ceramic Tile - Version; 2013.1.

B. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation - Version; 2013.1.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

D. Samples: Mount tile and apply grout on two plywood panels, minimum 18 x 18 inches in size illustrating pattern, color variations, and grout joint size variations.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Extra Tile: 2 percent of each size, color, and surface finish combination, but not less than one box of each type.

H. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.

I. LEED Submittals: Provide documentation of VOC content in g/L for fluid membranes, adhesives and sealants applied within the building waterproofing envelope; comply with VOC limits of Section 01 61 16.

1.4 QUALITY ASSURANCE

A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.

1.5 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.7 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

1.8 EXTRA MATERIALS

A. Furnish quantity of one full box of each tile type and color selected.

B. Turn over any cut tile exceeding 50 percent of a full tile, as extra materials.

PART 2 PRODUCTS

2.1 TILE

A. Porcelain Tile: ANSI A137.1, and as follows:
   1. Moisture Absorption: 0 to 0.5 percent.
   2. Breaking Strength: 250 pounds or better.
   3. Scratch Hardness: 8 MOHS or better.
   4. Thickness: 3/8 inch.
   5. Face: Matte stone appearance.
   6. Edges: Cushioned.
   7. Surface Finish: Matte glazed.
   8. Basis-of-Design:
      a. Wall Tile (PT-4): Daltile Consulate Antique Concierge, Linear Mosaic; color Sand CS06.
      b. Floor Tile (PT-1): Daltile Consulate Antique Concierge, 12 by 24 inches; color Sand CS06.
   9. Basis-of-Design for Toilet Rooms:
      a. Wall Tile (PT-3): Daltile Continental Slate, 6 by 6, Persian Gold CS54.
      b. Floor Tile (PT-2): Daltile Continental Slate, 6 by 6, Moroccan Brown CS55.

2.2 TRIM AND ACCESSORIES

A. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
   1. Applications:
      a. Open Edges: Bullnose.
      b. Inside Corners: Jointed.
      c. Floor to Wall Joints: Cove base.
   2. Manufacturers: Same as for tile.

2.3 SETTING MATERIALS

A. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4 or ANSI A118.15.
   1. Products:
      a. ARDEX Engineered Cements: www.ardexamericas.com.
      b. Custom Building Products: www.custombuildingproducts.com.
      c. Bonsal American, Inc: www.sakrete.com.
      d. Bostik Inc: www.bostik-us.com..
      e. MAPEI Corporation.
      f. TEC Specialty Products, Inc.

2.4 GROUTS

A. Manufacturers:
   1. ARDEX Engineered Cements: www.ardexamericas.com.
   2. Bonsal American, Inc: www.sakrete.com
   3. Bostik Inc: www.bostik-us.com.

4. Custom Building Products: www.custombuildingproducts.com.
5. MAPEI Corporation.
6. TEC Specialty Products, Inc.

B. Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
3. Color(s): As selected by Architect from manufacturer's full line.

2.5 GROUT SEALER

A. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
1. Composition: Water-based colorless silicone.
2. Location: All floor grout joints.

2.6 ACCESSORY MATERIALS

A. Waterproofing and Crack Isolation Membrane: Fluid-applied acrylic-based membrane with reinforcing mesh, complying with ANSI A118.10.
1. Basis-of-Design: Mapei Corporation; Mapelastic HPG with Fiberglass Mesh.
2. Equivalent product of listed setting and grouting material manufacturers.
3. Location: All tile floors; full coverage.

B. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.
1. Product: Durock Brand Cement Board manufactured by United States Gypsum Company.
2. Location: Wet walls and high-humidity areas.

C. Metal Edge Strips:
1. Open Edge of Tile with Adjacent Finish of Similar Height:
a. General: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, stainless steel; ASTM A 666, 300 Series exposed-edge material.
b. Basis-of-Design: 1.1 Schluter-SCHIENE Edge-protecting Profile; stainless steel.
2. Open Edge of Tile with Adjacent Finish of Different Height:
a. General: ADA-compliant profile, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, stainless steel; ASTM A 666, 300 Series exposed-edge material.
b. Basis-of-Design:
1) 1.2 Schluter-RENO-U Reducer Profile, where tile surface is higher than adjacent finish; stainless steel.
2) 1.5 Schluter-RENO-UK Sloped Transition Profile, where tile surface is lower than adjacent finish; stainless steel.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

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 tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.3 INSTALLATION - GENERAL

A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Sound tile after setting. Replace hollow sounding units.

G. Keep control and expansion joints free of mortar, grout, and adhesive.

H. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

J. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

L. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

M. After all tile is installed, apply grout sealer to floor grout joints per manufacturers instructions.

3.4 INSTALLATION - FLOORS - THIN-SET METHODS

A. Provide specified waterproofing and crack isolation membrane for all tile floor areas; install in accordance with TCA Method F122, with latex-portland cement grout.

3.5 INSTALLATION - WALL TILE

A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

B. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.6 CLEANING

A. Clean tile and grout surfaces.

3.7 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

B. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.

C. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION

SECTION 09 51 00 - ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.2 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.3 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 E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

C. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items; show the following:

1. Ceiling suspension system members.
2. Method of attaching suspension system hangers to building structure.
3. Ceiling-mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.
4. Minimum Drawing Scale: 1/8 inch = 1 ft.

C. Product Data: Provide data on suspension system components.

D. Samples: Submit two full size samples illustrating material and finish of acoustical units.

E. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.

F. LEED Submittals: Provide documentation of VOC content in g/L for acoustical sealants applied within the building waterproofing envelope; comply with VOC limits of Section 01 61 16.

1.5 QUALITY ASSURANCE

A. Fire-Resistive Assemblies: Complete assembly listed and classified by UL (FRD) for the fire resistance indicated.

1.6 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.7 PROJECT CONDITIONS

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. Install acoustical units after interior wet work is dry.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
   1. Acoustical Ceiling Units: Full-size units equal to 12 cases.
   2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of amount installed.

PART 2 PRODUCTS

2.1 ACOUSTICAL UNITS

A. Manufacturers:
   1. Basis-of-Design - Armstrong World Industries, Inc: www.armstrong.com.
   2. CertainTeed Corporation: www.certainteed.com.
   3. USG: www.usg.com.

B. Acoustical Units - General: ASTM E1264, Class A.
   1. Units for Installation in Fire-Rated Suspension System: Listed and classified for the fire-resistive assembly as part of suspension system.

2.2 SUSPENSION SYSTEM(S)

A. Manufacturers:
   1. Basis-of-Design - Armstrong World Industries, Inc: www.armstrong.com.
   2. CertainTeed Corporation: www.certainteed.com.
   3. Chicago Metallic Corporation: www.chicagometallic.com.
   4. USG: www.usg.com.

B. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
   1. Profile: Tee; 9/16 inch wide face.
   2. Construction: Double web.
   3. Finish: As scheduled.

2.3 EXTRUDED PERIMETER TRIM

A. Manufacturers:
   1. Basis-of-Design - Armstrong World Industries, Inc; Product Axiom: www.armstrong.com.
   2. Chicago Metallic Corporation; Product Infinity: www.chicagometallic.com.
   3. USG; Product Compasso: www.usg.com.
   4. CertainTeed Ceilings, Cloud Perimeter Trim

B. Location:
   1. Edge trim system for transitions between drywall and suspended ceilings.

2. Boundry trim system for isolated hung areas of suspended ceilings.
3. Provide curved trim where indicated on the drawings.

C. Components:
1. Extruded aluminum alloy 6063 trim channel.
2. Attachment to grid system is provided by tee-bar connection clips which lock into bosses on the trim channel and are screw-attached to the web of the intersecting suspension system members.
3. Sections of trim are joined together using the splice plate.

2.4 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.
1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

C. Acoustical Sealant For Perimeter Moldings: Specified in Section 07900 and low-emitting requirements as specified in Section 01 61 16.

D. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.1 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C 636, ASTM E 580, 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. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. 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.

J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
1. Install in bed of acoustical sealant.
2. Use longest practical lengths.
3. Overlap and rivet corners.

K. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

3.2 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. Lay directional patterned units with pattern parallel to longest room axis.

D. Fit border trim neatly against abutting surfaces.

E. Install units after above-ceiling work is complete.

F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

G. 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.

H. Where round obstructions occur, provide preformed closures to match perimeter molding.

I. Install hold-down clips on panels within 20 ft of an exterior door.

3.3 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.

3.4 SCHEDULE

A. Type ACT:
1. Product: “Calla” item #2824PC as manufactured by Armstrong World Industries, Inc.
2. Classification: ASTM E1264 - Type IV, Form 2, Pattern E
3. Material: Wet-formed mineral fiber with acoustically transparent membrane
4. Finish: Acoustically transparent membrane with factory-applied latex paint
5. Color: Moss (#2824MS)
6. Noise Reductions Coefficient NRC: Not less than 0.85
7. Ceiling Attenuation Coefficient CAC: Not less than 35
8. Articulation Class AC: Not less than 170
9. Flame Spread: Class A
10. Dimensional Stability: HumiGuard Plus
11. Antimicrobial Protection: BioBlock Plus - resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria
12. Edge detail: Square tegular for interface with Suprafine XL 9/16” suspension system
13. Thickness: 1 inch
14. Size: 24 by 24 inches
15. Suspension System: Suprafine XL 9/16” exposed tee grid system, color Moss (#2824MS).

B. Type ACT-2:
1. Basis-of-Design Product: “Ultima” item #1912 as manufactured by Armstrong World Industries, Inc.
2. Classification: ASTM E1264 - Type IV, Form 2, Pattern E

3. Material: Wet-formed mineral fiber with DuraBrite acoustically transparent membrane
4. Finish: DuraBrite with factory-applied latex paint
5. Color: White
6. Light Reflectance LR: Not less than 0.90
7. Noise Reductions Coefficient NRC: Not less than 0.75
8. Ceiling Attenuation Coefficient CAC: Not less than 35
9. Flame Spread: Class A
10. Dimensional Stability: HumiGuard Plus
11. Antimicrobial Protection: BioBlock Plus - resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria
12. Edge detail: Beveled tegular for interface with Suprafine XL 9/16" suspension system
13. Thickness: ¾ inch
14. Size: 24 by 24 inches
15. Suspension System: Suprafine XL 9/16" grid system, color white

END OF SECTION

SECTION 09 65 00 - RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Installation accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.3 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 F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012)e1.

C. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2011.

1.4 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. Verification Samples: Submit two samples, 12 by 12 inch in size illustrating color and pattern for each resilient flooring product specified.

E. Certification: Submit written certification by manufacturer declaring products do not contain asbestos.

F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

G. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.

H. LEED Submittals: Provide documentation of VOC content in g/L for adhesives and sealants; comply with VOC limits of Section 01 61 16.

1.5 FIELD CONDITIONS

A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.1 TILE FLOORING

A. Resilient Vinyl Enhanced Tile Flooring

1. Basis-of-Design: Azrock Color Essence by Johnsonite.
2. Resilient Vinyl Enhanced Tile Flooring with the following physical characteristics:
    a. Complies with requirements for ASTM F 1066, Class 3 (Surface Pattern) Standard Specification for Vinyl Composition Floor Tile
    b. Wear layer/Overall thickness: 1/8" (3.2 mm)
    c. Tile size: 12" x 12" (30.5 x 30.5 cm)
    d. Slip Resistance: ADA Compliant
    e. Polyurethane Reinforced wear surface with Tritonite Finish
    f. ASTM F 970, Standard Test Method for Static Load Limit - 400 PSI (modified for higher load)
    g. ASTM E 648, Standard Test method for Critical Radiant Flux of 0.45 watts/cm2 or greater, Class I
    h. Warranty: 10 year Manufacturer's Warranty
    i. Color: As selected by the Architect from manufacturers full range.
    j. Vinyl Enhanced Tiles contain 23% pre-consumer and 6% post-consumer recycled content
    k. Phthalate-free
    l. 100% Recyclable
    m. SCS FloorScore® Certified and meets California Specifications Section 01350
    n. Johnsonite facilities are ISO 9001 and ISO 14001 Certified

2.2 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
    1. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
    2. Height: 4 inch.
    3. Thickness: 0.125 inch thick.
    4. Finish: Satin.
    5. Length: Roll.
    6. Color: Color as selected from manufacturer's standards.
    7. Manufacturers:
        a. Burke Flooring: www.burkemercer.com.
        b. Johnsonite, a Tarkett Company: www.johnsonite.com.
        c. Roppe Corp: www.roppe.com.
        d. Nora Systems, Inc.: www.nora.com.
        e. NPlus: www.nplusrubber.com

2.3 ACCESSORIES

A. Subfloor Filler: Latex-modified, portland cement based or blended hydraulic cement based formulation; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.
    1. Comply with low-emitting requirements specified in Section 01 61 16.

C. Moldings, Transition and Edge Strips: Metal.

D. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.1 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 sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive resilient flooring.

C. 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.

D. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.

E. Verify that concrete sub-floor surfaces are ready for resilient flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within the following limits:
   1. Moisture emission rate: Not greater than 3 lb per 1000 sq ft per 24 hours when tested using calcium chloride moisture test kit for 72 hours.
   2. Alkalinity: pH range of 5-9.

F. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

B. Prohibit traffic until filler is cured.

C. Clean substrate.

D. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.3 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Fit joints tightly.

E. Set flooring in place, press with heavy roller to attain full adhesion.

F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.4 TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise.

B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
   1. Lay tiles in pattern indicated.

C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
   1. Lay tiles in pattern of colors and sizes indicated.

D. Where floor finishes 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. Before installation of flooring, secure metal strips with stainless steel screws.

F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

G. Install flooring in recessed floor access covers. Maintain floor pattern.

H. At movable partitions, install flooring under partitions without interrupting floor pattern.

3.5 RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.6 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's instructions.

C. Vinyl Composition Tiles: Apply protective floor polish to horizontal surfaces that are free from soil, visible adhesive, and surface blemishes if recommended in writing by manufacturer.
   1. Use commercially available product acceptable to manufacturer.
   2. Coordinate selection of floor polish with Owner's maintenance service; first application by Contractor.
   3. Vinyl floors to be given two coats of high water-emulsion polish; after each polish coat, buff floors to an even luster with an electric polishing machine; final polish coat application must be completed minimum 48 hours prior to Owner's occupancy.

3.7 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

B. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.

C. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION

SECTION 09 68 13 - TILE CARPETING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Carpet tile, fully adhered.

1.2 REFERENCE STANDARDS

A. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2011.

B. CRI 104 - Standard for Installation of Commercial Textile Floorcovering Materials; Carpet and Rug Institute; 2002.

C. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute; Current Edition.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate layout of joints.

C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

E. Submit two, 12 inch long samples of edge strip.

F. LEED Submittals:
   1. Submit data documenting VOC content in g/L of carpet tile adhesives; copy of current CRI Approved Products Listing is acceptable.
   2. Credit EQ 4.3: Certification of compliance with the Carpet and Rug Institute "Green Label Plus" Indoor Air Quality Testing requirements for carpet.

G. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 60 00.
   1. Credit MR 4.1 and 4.2: Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Credit MR 5: Product Data indicating location of manufacture and location of extraction or recovery of primary raw materials. Include statement indicating costs for each product having regional content.

H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Carpet Tiles: Quantity equal to 10 percent of total installed of each color and pattern installed, with a minimum of 1 full box of each type, color, and pattern.

1.4 INSTALLER QUALIFICATIONS

A. Company specializing in performing Work of this Section with minimum five years experience.

B. Installers trained, accepted and certified by the carpet manufacturer, or FCIB, IFCI or CRI certified carpet installers.

1.5 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

B. Coordinate with requirements of Section 01 57 21.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Interface, Inc: www.interfaceinc.com.

B. Milliken & Company: www.milliken.com.

C. Mannington Commercial

2.2 MATERIALS

A. Carpet Tiles - Provide the following:
   1. CPT 1: Milliken Planks, Color Field, Color 96-70-33 Iron Oxide.
   2. CPT 2: Milliken Planks, Color Field, Color 53-40-96 Granite Moss.
   3. CPT 3: Interface, Style 14600250, Cartera Colores Pattern Library 18Z, Color 101507 Mesa..
   4. CPT 4: Mannington Commercial, Recoarse II 38 oz, Color 8413Traverse Tan.

B. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.

C. Smoke Density: Less than 450 per NBS Smoke Density Chamber, NFPA 258.

2.3 ACCESSORIES

A. Sub-Floor Filler: Cementitious type; type recommended by flooring material manufacturer.

B. Edge Strips: Rubber, color as selected by Architect.

C. Adhesives: Acceptable to carpet tile manufacturer, compatible with materials being adhered; maximum VOC of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

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 carpet tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.

D. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

B. Vacuum clean substrate.

3.3 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install carpet tile in accordance with manufacturer's instructions and CRI (CIS).

C. Install carpet tile in accordance with manufacturer's instructions and CRI 104.

D. Blend carpet from different cartons to ensure minimal variation in color match.

E. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

F. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.

G. Locate change of color or pattern between rooms under door centerline.

H. Fully adhere carpet tile to substrate.

I. Trim carpet tile neatly at walls and around interruptions.

J. Complete installation of edge strips, concealing exposed edges.

3.4 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
   1. Concrete masonry unites (CMU).
   2. Steel.
   3. Galvanized metal.
   4. Wood.
   5. Gypsum board.
   6. Cotton or canvas insulation coverings.
   7. Exposed PVC piping.

1.2 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.

1.3 DEFINITIONS

A. Gloss Ranges:
   1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
   2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
   3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
   4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

B. ASTM D 3359 - Standard Test Methods for Mearsuring Adhesion by Tape.

C. SSPC (PM1) - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for each type of product submitted.

C. LEED Submittal: Product data for Credit IEQ 4.2: For paints and coatings applied within the building waterproofing envelope, documentation including printed statement of VOC content in g/L.

D. Samples for Initial Selection: Submit each type of topcoat product indicated.

E. Samples for Verification: Submit each type of paint system and each color and gloss of topcoat indicated.
   1. Submit Samples on rigid backing, minimum 8 inches square.
   2. Step coats on Samples to show each coat required for system.

3. Label each coat of each Sample.
4. Label each Sample for location and application area.

F. Product List: Submit each product indicated, include the following:
1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

G. Maintenance Materials: Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
1. Quantity: Furnish an additional 5 percent, but not less than 2 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

1.7 MOCK-UP

A. Benchmark Samples (Mock-ups): Provide benchmark finish sample (all coats) for each coating type and substrate.
1. Architect will select several rooms or surfaces to represent surfaces and conditions, for application of each paint system type and substrate; colors will be provided for Benchmark Samples.
a. Wall Surfaces: Complete minimum 100 square feet.
b. Small Areas and Items: Apply systems to items designated by the Architect.
2. Complete Benchmark Samples per the requirements of this Section.
a. Provide required sheen, color and texture for each surface.
b. Architect-accepted Benchmark Samples to establish level of quality for remainder of Work.
3. Architect to provide final color approvals from Benchmark Samples and intermediate coat wall colors; refer to subsection 3.3 of this Section.
4. Benchmark samples to be prepared by individuals performing the remaining Work for this Project.

1.8 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. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F and a maximum 90 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.9 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Benjamin Moore & Co.

B. Glidden Professional.

C. PPG Industries.

D. Sherwin-Williams Company.

E. McCormick Paints.

2.2 PAINT, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:
   1. Flat Paints: VOC content of not more than 50 g/L.
   2. Nonflat Paints and Paint Primers: VOC content of not more than 150 g/L.

C. Colors:
   1. As selected by Architect from manufacturer's full range.
   2. Different colors may be used in the same room.
   3. Colors of frames may be different than doors.
   4. Colors for ceilings and trim may be different from walls, and walls may be more than one color or striped.
   5. Dark tints may be used on metal frames that may require more coats than that indicated on paint schedule for proper coverage; apply as many coats as necessary for complete hide.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Wood: 15 percent.
   2. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions [and compatibility with existing finishes and primers].

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. Use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
   2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

C. Seal surfaces that might cause bleed through or staining of topcoat.

D. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

E. Insulated Coverings to be Painted: Remove dirt, grease, and oil from canvas and cotton.

F. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

G. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Passivated Galvanized Steel: Clean with a water-based industrial strength cleaner, and/or “Brush Blast” in accordance with SSPC-SP7. After the surface has been prepared, apply recommended primer to a small area. Allow primer to cure for 7 days, and test adhesion using the “cross-hatch adhesion tape test” method in accordance with ASTM D 3359. If the adhesion of the primer is positive, proceed with a recommended coating system for galvanized metal.

J. Wood Substrates:
   1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

L. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 COLOR COORDINATION

A. Tint intermediate coats for wall surfaces to match color sample selections.

B. Architect will visit the Project within 7 days after notification, to review primed walls for final color coordination.

C. Allow 3 week days in schedule for Architect to change final wall colors between intermediate coat and remaining coat(s).

D. Allow time to order final paint colors; do not order final paint colors until obtaining final color approvals.

3.4 APPLICATION

A. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
   2. Wall Surfaces: Receive final color approvals following Architect's review of Intermediate Coats, before proceeding.
   3. Omit primer over metal surfaces that have been shop primed and touchup painted.
   4. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
   5. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

B. Apply paints according to manufacturer's written instructions.
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
      a. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
   3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   4. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   5. Finish doors on tops, bottoms, and side edges the same as faces.

C. Block Fillers:
   1. Apply two coats of block filler to concrete masonry block at a rate to ensure complete coverage with pores filled.
   2. Perform a squeegee operation on second coat to fill all crevices and produce a smooth surface; do not remove filler material from surface with the squeegee operation.

D. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
   1. Wall Surfaces: Tint Prime Coat a lighter shade to facilitate identification; tint Prime Coat to match color of finish coat, but provide sufficient difference in shade to distinguish Prime Coat from Intermediate Coat used for final color selections.
   2. Other Surfaces: Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

E. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

F. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

G. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

H. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
   1. Mechanical Work:
      a. Uninsulated metal piping.
      b. Uninsulated plastic piping.
      c. Pipe hangers and supports.
      d. Tanks that do not have factory-applied final finishes.
      e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
      f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
      g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
   2. Electrical Work:
      a. Switchgear.
      b. Panelboards.
      c. Electrical equipment that is indicated to have a factory-primed finish for field painting.
      d. Exposed wiremold and conduit in all finished spaces to match color of wall.

I. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
   1. Prefinished items include the following factory-finished components:
      a. Architectural woodwork.
      b. Acoustical wall panels.
      c. Metal toilet enclosures.
      d. Metal lockers.
      e. Finished mechanical and electrical equipment.

f. Light fixtures.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
   a. Foundation spaces.
   b. Furred areas.
   c. Ceiling plenums.
   d. Utility tunnels.
   e. Pipe spaces.
   f. Duct shafts.
3. Finished metal surfaces include the following:
   a. Anodized aluminum.
   b. Stainless steel.
   c. Chromium plate.
   d. Copper and copper alloys.
   e. Bronze and brass.
4. Operating parts include moving parts of operating equipment and the following:
   a. Valve and damper operators.
   b. Linkages.
   c. Sensing devices.
   d. Motor and fan shafts.
5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
6. Items indicated to receive other finishes.
7. Items indicated to remain unfinished.
8. Floors, unless specifically so indicated.
9. Ceramic and other tiles.
10. Acoustical materials, unless specifically so indicated.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:
   1. Institutional Low-Odor/VOC Latex System: Eggshell Finish.
      a. Prime Coat: Institutional low-odor/VOC interior latex matching topcoat.
         1) Ultra Spec 500 Interior Latex Primer (N534) ; Benjamin Moore & Co.
         2) Interior Acrylic Enamel Undercoater DU00004123; Duron, Inc.
         3) Ultra-Hide 250 Primer 1402; Glidden Professional.

4) PERMA-CRETE 4-603 Interior/Exterior Alkali Resistant Primer; PPG Industries.
5) S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600; Sherwin-Williams Company.

b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
1) Ultra Spec 500 Interior Latex Eggshell Finish (N538); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Eggshell Enamel, DU0036 Series; Duron, Inc.
3) Lifemaster Interior Latex Eggshell 9300; Glidden Professional.
4) SPEEDHIDE 6-421 series High Solids Interior Enamel Eggshell Latex; PPG Industries.
5) S-W ProMar 200 Zero VOC Interior Latex Eg-Shel, B28-2600 Series; Sherwin-Williams Company.

c. Topcoat: Institutional low-odor/VOC interior latex (eggshell).
1) Ultra Spec 500 Interior Latex Eggshell Finish (N538); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Eggshell Enamel, DU0036; Duron, Inc.
3) Lifemaster Interior Latex Eggshell 9300; Glidden Professional.
4) SPEEDHIDE 6-421 series High Solids Interior Enamel Eggshell Latex; PPG Industries.
5) S-W ProMar 200 Zero VOC Interior Latex Eg-Shel, B28-2600 Series; Sherwin-Williams Company.

B. CMU Substrates:
1. Institutional Low-Odor/VOC Latex System:
a. Prime Coat: Interior/exterior latex block filler.
1) Latex Block Filler 285; Benjamin Moore & Co.
2) Duron Block Kote Latex Block Filler, DU0008128; Duron, Inc.
3) Concrete Coatings Block Filler Interior/Exterior Primer 3010-1200; Glidden Professional.
4) SPEEDHIDE 6-7 Interior/Exterior Masonry Latex Block Filler; PPG Industries.
5) S-W PrepRite Block Filler, B25W25; Sherwin-Williams Company (The).

b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
1) Ultra Spec 500 Interior Latex Eggshell Finish (N538); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Eggshell Enamel, DU0036 Series; Duron, Inc.
3) Lifemaster Interior Latex Eggshell 9300; Glidden Professional.
4) SPEEDHIDE 6-421 series High Solids Interior Enamel Eggshell Latex; PPG Industries.
5) S-W ProMar 200 Zero VOC Eg-Shel, B20-2600 Series; Sherwin-Williams Company.

c. Topcoat: Institutional low-odor/VOC interior latex (eggshell).
1) Ultra Spec 500 Interior Latex Eggshell Finish (538); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Eggshell Enamel, DU0036 Series; Duron, Inc.
3) Lifemaster Interior Latex Eggshell 9300; Glidden Professional.
4) SPEEDHIDE 6-421 series High Solids Interior Enamel Eggshell Latex; PPG Industries.
5) S-W ProMar 200 Zero VOC Eg-Shel, B20-2600; Sherwin-Williams Company.

C. Spot Prime for Field Connections and Touch Up for Structural Elements:

1. Thoroughly examine structural elements for bare spots and abraded surface; spot prime for full coverage.
2. Extend spot prime minimum 6 inches beyond edge of field connections.
3. Waterborne Enamel System:
   a. Prime Coat:
      1) SUPER SPEC HP Acrylic Metal Primer P04; Benjamin Moore & Co.
      2) ProCryl Universal Primer, B66-310 Series; Duron, Inc.
      3) Devflex 4020PF Direct to Metal Primer & Flat Finish; Glidden Professional.
      4) Pitt-Tech Plus 90-912 Interior/Exterior DTM Industrial Metal Primer; PPG Industries.
      5) Pro Industrial Pro-Cryl® Universal Primer, B66-310 Series; Sherwin-Williams Company.

D. Steel Substrates:
1. Quick-Drying Enamel System: Shop prime.
   a. Prime Coat: Quick-drying alkyd metal primer.
      1) SUPER SPEC Shop-Coat Alkyd Metal Primer P14; Benjamin Moore & Co.
      2) Kem Bond HS Universal Metal Primer, B50NZ3 Series; Duron, Inc.
      3) Devflex 4020PF Direct to Metal Primer & Flat Finish; Glidden Professional.
      4) Pitt-Tech Plus 90-912 Interior/Exterior DTM Industrial Metal Primer; PPG Industries.
      5) Kem Bond HS Universal Metal Primer, B50NZ3 Series; Sherwin-Williams.
2. Water-Based Dry-Fall System:
   a. Prime Coat: Waterborne dry fall.
      1) Super Spec Sweep-UP Latex Flat (153); Benjamin Moore & Co.
      2) ProCryl Universal Primer, B66-310 Series; Duron, Inc.
      3) Devflex 4020PF Direct to Metal Primer & Flat Finish; Glidden Professional.
      4) Pitt-Tech Plus 90-912 Interior/Exterior DTM Industrial Metal Primer; PPG Industries.
      5) S-W ProCryl Universal Primer, B66-310 Series; Sherwin-Williams Company.
   b. Intermediate Coat:
      1) Eggshell Finish Not Available; Benjamin Moore & Co.
      2) Waterborne Acrylic Dry Fall Low VOC, B42W82; Duron, Inc.
      3) Waterborne Dryfall Eggshell 1482-1200; Glidden Professional.
      4) SPEEDHIDE-SUPER TECH WB- 6-724XI (Low Sheen Semi Gloss) or 6-725XI (flat) Interior 100% Acrylic Latex Dry-Fog; PPG Industries.
      5) S-W Waterborne Acrylic Dry Fall, Low VOC, B42W82; Sherwin-Williams Company.
   c. Topcoat: Waterborne dry fall.
      1) Eggshell Finish Not Available; Benjamin Moore & Co.
      2) Waterborne Acryclic Dry Fall Low VOC, B42W82; Duron, Inc.
      3) Waterborne Dryfall Eggshell 1482-1200; Glidden Professional.
      4) SPEEDHIDE-SUPER TECH WB- 6-724XI (Low Sheen Semi Gloss) or 6-725XI (flat) Interior 100% Acrylic Latex Dry-Fog; PPG Industries.
      5) S-W Waterborne Acrylic Dry Fall, Low VOC, B42W82; Sherwin-Williams Company.
3. Institutional Low-Odor/VOC Latex System (Field Primed): Eggshell finish.
   a. Prime Coat - Field Applied: (shop prime with Quick-Drying Enamel System)
      1) Super Spec Acrylic Metal Primer (P04); Benjamin Moore & Co.

2) ProCryl Universal Primer, B66-310 Series; Duron, Inc.
3) ; Glidden Professional.
4) Pitt-Tech Plus 90-912 Interior/Exterior DTM Industrial Metal Primer; PPG Industries.
5) S-W ProCryl Universal Primer, B66-310 Series; Sherwin-Williams Company.

b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
1) Ultra Spec 500 Interior Latex Eggshell Finish (N538); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Eggshell Enamel, DU0036 Series; Duron, Inc.
3) Ultra-Hide 250 Interior Eggshell 1402; Glidden Professional.
4) SPEEDHIDE 6-421 series High Solids Interior Enamel Eggshell Latex; PPG Industries.
5) S-W ProMar 200 Zero VOC Interior Latex Eg-Shel B20-2600 Series; Sherwin-Williams Company.

c. Topcoat: Institutional low-odor/VOC interior latex (eggshell).
1) Ultra Spec 500 Interior Latex Eggshell Finish (N538); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Eggshell Enamel, DU0036 Series; Duron, Inc.
3) Ultra-Hide 250 Interior Eggshell 1402; Glidden Professional.
4) SPEEDHIDE 6-421 series High Solids Interior Enamel Eggshell Latex; PPG Industries.
5) S-W ProMar 200 Zero VOC Interior Latex Eg-Shel B20-2600 Series; Sherwin-Williams Company.

4. Waterborne High-Performance Gloss Enamel System: Handrails and railing systems; and items indicated to be gloss finish.
a. Prime Coat - Field Applied: (shop prime with Quick-Drying Enamel System).
1) SUPER SPEC HP Acrylic Metal Primer P04; Benjamin Moore & Co.
2) DTM Wash Primer (Galvanized) or WB Tile-Clad Primer (Steel); Duron, Inc.
3) Devflex 4020PF Direct to Metal Primer & Flat Finish; Glidden Professional.
4) Pitt-Tech Plus 90-912 Interior/Exterior DTM Industrial Metal Primer; PPG Industries.
5) DTM Wash Primer (Galvanized) or WB Tile-Clad Primer (Steel); Sherwin-Williams Company.

b. Intermediate Coat: Interior latex matching topcoat.
1) SUPER SPEC HP Waterborne Urethane Gloss Enamel P73; Benjamin Moore & Co.
2) Waterbased Acrolon 100 Urethane, B65W720 Series; Duron, Inc.
3) Devflex 4216HP Waterborne Acrylic Semi-Gloss Enamel 4216L Series; Glidden Professional.
4) Pitt-Tech Plus 90-1310 series Interior/Exterior High Gloss DTM Industrial Enamel; PPG Industries.
5) S-W Waterbased Acrolon 100 Urethane, B65W720 Series; Sherwin-Williams Company.

c. Topcoat: Interior latex (eggshell).
1) ; Benjamin Moore & Co.
2) Waterbased Acrolon 100 Urethane, B65W720 Series; Duron, Inc.
3) ; Glidden Professional.

4) Pitt-Tech Plus 90-1310 series Interior/Exterior High Gloss DTM Industrial Enamel; PPG Industries.
5) S-W Waterbased Acrolon 100 Urethane, B65W720 Series; Sherwin-Williams Company.

E. Galvanized-Metal Substrates:
1. Water-Based Dry-Fall System:
a. Prime Coat: Waterborne dry fall.
1) Super Spec Sweep-Up Latex Flat (153); Benjamin Moore & Co.
2) Waterbased Acrylic Dry Fall Low VOC B42W82; Duron, Inc.
3) Waterborne Dryfall Eggshell 1482-1200; Glidden Professional.
4) SPEEDHIDE-SUPER TECH WB- 6-724XI (Low Sheen Semi Gloss) or 6-725XI (flat) Interior 100% Acrylic Latex Dry-Fog; PPG Industries.
5) S-W Waterborne Acrylic Dry Fall, Low VOC B42W82; Sherwin-Williams Company.
b. Topcoat: Waterborne dry fall.
1) Eggshell Finish Not Available; Benjamin Moore & Co.
2) Waterbased Acrylic Dry Fall Low VOC B42W82; Duron, Inc.
3) Waterborne Dryfall Eggshell 1482-1200; Glidden Professional.
4) SPEEDHIDE-SUPER TECH WB- 6-724XI (Low Sheen Semi Gloss) or 6-725XI (flat) Interior 100% Acrylic Latex Dry-Fog; PPG Industries.
5) S-W Waterborne Acrylic Dry Fall Low VOC, B42W82; Sherwin-Williams Company.
2. Quick-Drying Enamel System: Shop prime.
a. Prime Coat: Quick-drying alkyd metal primer.
1) SUPER SPEC HP Universal Metal Primer P07; Benjamin Moore & Co.
2) Kem Bond HS Universal Primer B50NZ3 Series; Duron, Inc.
3) Devflex 4020PF Direct to Metal Primer & Flat Finish; Glidden Professional.
4) Pitt-Tech Plus 90-912 Interior/Exterior DTM Industrial Metal Primer; PPG Industries.
5) Kem Bond HS Universal Primer B50NZ3 Series; Sherwin-Williams Company.
3. Institutional Low-Odor/VOC Latex System Over Waterborne Primer System: Semigloss finish.
a. Prime Coat - Field Applied: (shop prime with Quick-Drying Enamel System)
1) SUPER SPEC HP Acrylic Metal Primer P04; Benjamin Moore & Co.
2) ProCryl Universal Primer, B66-310 Series; Duron, Inc.
3) Devflex 4020PF Direct to Metal Primer & Flat Finish; Glidden Professional.
4) Pitt-Tech Plus 90-912 Interior/Exterior DTM Industrial Metal Primer; PPG Industries.
5) S-W ProCryl Universal Primer, B66-310 Series; Sherwin-Williams Company.
b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
1) Ultra Spec 500 Interior Semi-gloss Finish (N539); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Semi-Gloss Enamel, DU0035 Series; Duron, Inc.
3) Lifemaster Interior Semi-Glass 9200; Glidden Professional.
4) SPEEDHIDE 6-500 series Interior Semi-Gloss Acrylic Latex; PPG Industries.
5) S-W ProMar 200 Zero VOC Semi-gloss, B31-2600 Series; Sherwin-Williams Company.
c. Topcoat: Institutional low-odor/VOC interior latex (semigloss).

1) Ultra Spec 500 Interior Semi-Gloss Finish (N539); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Semi-Gloss Enamel, DU0035 Series; Duron, Inc.
3) Lifemaster Interior Semi-Gloss 9200; Glidden Professional.
4) SPEEDHIDE 6-500 series Interior Semi-Gloss Acrylic Latex; PPG Industries.
5) S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600 Series; Sherwin-Williams Company.

4. Waterborne High-Performance Gloss Enamel System: Provide for interior railing systems and exposed steel stair risers.
   a. Prime Coat - Field Applied: (shop prime with Quick-Drying Enamel System).
      1) SUPER SPEC HP Acrylic Metal Primer P04; Benjamin Moore & Co.
      2) DTM Wash Primer (Galvanized) or WB Tile-Clad Primer (Steel); Duron, Inc.
      3) Devflex 4020PF Direct to Metal Primer & Flat Finish; Glidden Professional.
      4) Pitt-Tech Plus 90-912 Interior/Exterior DTM Industrial Metal Primer; PPG Industries.
      5) DTM Wash Primer (Galvanized) or WB Tile-Clad Primer (Steel); Duron, Inc.
   b. Intermediate Coat: Interior urethane matching topcoat.
      1) SUPER SPEC HP Waterborne Urethane Gloss Finish P73; Benjamin Moore & Co.
      2) Waterbased Acrolon 100 Urethane, B65W720 Series; Duron, Inc.
      3) Devflex 4216HP Waterborne Acrylic Semi-Gloss Enamel 4216L Series; Glidden Professional.
      4) Pitt-Tech Plus 90-1310 series Interior/Exterior High Gloss DTM Industrial Enamel; PPG Industries.
      5) S-W Waterbased Acrolon 100 Urethane, B65W720 Series; Sherwin-Williams Company (The).
   c. Topcoat: Interior latex (gloss).
      1) SUPER SPEC HP Waterborne Urethane Gloss Finish P73; Benjamin Moore & Co.
      2) Waterbased Acrolon 100 Urethane, B65W720 Series; Duron, Inc.
      3) Devflex 4216HP Waterborne Acrylic Semi-Gloss Enamel 4216L Series; Glidden Professional.
      4) Pitt-Tech Plus 90-1310 series Interior/Exterior High Gloss DTM Industrial Enamel; PPG Industries.
      5) S-W Waterbased Acrolon 100 Urethane, B65W720 Series; Sherwin-Williams Company (The).

F. Dimensional and Dressed Lumber Substrates:
   1. Institutional Low-Odor/VOC Latex System: Semigloss finish.
      a. Prime Coat: Interior latex-based wood primer.
         1) Ultra Spec 500 Latex Primer (N534); Benjamin Moore & Co.
         2) Interior Acrylic Enamel Uncercoater DU0004123; Duron, Inc.
         3) Gripper Interior/Exterior Primer-Sealer 3210-1200; Glidden Professional.
         4) SEAL Grip 17-921 Interior/Exterior 100% Acrylic Universal Primer/Sealer; PPG Industries.
         5) S-W PrepRite® ProBlock® Latex Primer, B51 Series; Sherwin-Williams Company.
      b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
         1) Ultra Spec 500 Interior Semi-Gloss Finish (N539); Benjamin Moore & Co.

2) Ultra Deluxe Interior Acrylic Latex Semi-Gloss Enamel, DU0035 Series; Duron, Inc.
3) Lifemaster Interior Semi-Gloss 9200; Glidden Professional.
4) SPEEDHIDE 6-500 series Interior Semi-Gloss Acrylic Latex; PPG Industries.
5) S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600 Series; Sherwin-Williams Company.

c. Topcoat: Institutional low-odor/VOC interior latex (semigloss).
1) Ultra Spec 500 Interior Semi-Gloss Finish (N539); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Semi-Gloss Enamel, DU0035 Series; Duron, Inc.
3) Lifemaster Interior Semi-Gloss 9200; Glidden Professional.
4) SPEEDHIDE 6-500 series Interior Semi-Gloss Acrylic Latex; PPG Industries.
5) S-W ProMar 200 Zero VOC Semi-Gloss, B31-2600 Series; Sherwin-Williams Company.

G. Wood Panel Substrates:
1. Institutional Low-Odor/VOC Latex System: Semigloss finish.
a. Prime Coat: Interior latex-based wood primer.
1) Ultra Spec 500 Interior Primer (N534); Benjamin Moore & Co.
2) Interior Acrylic Enamel Undercoater DU0004123; Duron, Inc.
3) Gripper Interior/Exterior Primer-Sealer 3210-1200; Glidden Professional.
4) SEAL Grip 17-921 Interior/Exterior 100% Acrylic Universal Primer/Sealer; PPG Industries.
5) ProBlock® Latex Primer, B51 Series; Sherwin-Williams Company.
b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
1) Ultra Spec 500 Interior Semi-Gloss Finish (N539); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Semi-Gloss Enamel, DU0035 Series; Duron, Inc.
3) Lifemaster Interior Semi-Glass 9200; Glidden Professional.
4) SPEEDHIDE 6-500 Series Interior Semi-Gloss Acrylic Latex; PPG Industries.
5) ProMar 200 Zero VOC Int. Latex S/G B31-2600; Sherwin-Williams Company.
c. Topcoat: Institutional low-odor/VOC interior latex.
1) Ultra Spec 500 Interior Semi-Gloss Finish (N539); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Semi-Gloss Enamel, DU0035 Series; Duron, Inc.
3) Lifemaster Interior Semi-Gloss 9200; Glidden Professional.
4) SPEEDHIDE 6-500 series Interior Semi-Gloss Acrylic Latex; PPG Industries.
5) ProMar 200 Zero VOC Int. Latex S/G B31-2600; Sherwin-Williams Company.

H. Gypsum Board Substrates:
1. Institutional Low-Odor/VOC Latex System: Eggshell finish.
a. Prime Coat: Interior latex primer/sealer.
1) Ultra Spec 500 Interior Primner (N534); Benjamin Moore & Co.
2) Interior Latex Drywall Primer DU0004125; Duron, Inc.
3) High Hide Interior Primer Sealer 1000-1000; Glidden Professional.
4) SPEEDHIDE 6-2 Interior Latex Sealer Quick-Drying; PPG Industries.
5) S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600; Sherwin-Williams Company.
b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.

1) Ultra Spec 500 Interior Eggshell Finish (N538); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Eggshell Enamel, DU0036 Series; Duron, Inc.
3) Lifemaster Interior Eggshell 9300; Glidden Professional.
4) SPEEDHIDE 6-421 series High Solids Interior Enamel Eggshell Latex; PPG Industries.
5) S-W ProMar 200 Zero VOC Eg-Shel, B20-2600 Series; Sherwin-Williams Company.

c. Topcoat: Institutional low-odor/VOC interior latex (eggshell).
1) Ultra Spec 500 Interior Eggshell Finish (N538); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Eggshell Enamel, DU0036 Series; Duron, Inc.
3) Lifemaster Interior Eggshell 9300; Glidden Professional.
4) SPEEDHIDE 6-421 series High Solids Interior Enamel Eggshell Latex; PPG Industries.
5) S-W ProMar 200 Zero VOC Eg-Shel B20-2600; Sherwin-Williams Company.

2. Institutional Low-Odor/VOC Latex System: Flat finish; ceilings.
a. Prime Coat: Interior latex primer/sealer.
1) Ultra Spec 500 Interior Primer (N534); Benjamin Moore & Co.
2) Interior Latex Drywall Primer DU0004125; Duron, Inc.
3) High Hide Interior Primer Sealer 1000-1000; Glidden Professional.
4) SPEEDHIDE 6-2 Interior Latex Sealer Quick-Drying; PPG Industries.
5) S-W ProMar 200 Zero VOC Interior Latex Primer, B28SW2600; Sherwin-Williams Company.

b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
1) Ultra Spec 500 Interior Flat Finish (N536); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Flat, DU144 Series; Duron, Inc.
3) Lifemaster Interior Flat 9100; Glidden Professional.
4) SPEEDHIDE 6-70 series Interior Latex Flat; PPG Industries.
5) S-W ProMar 200 Zero VOC Flat, B30-2600; Sherwin-Williams Company.

c. Topcoat: Institutional low-odor/VOC interior latex (flat).
1) Eco Spec WB Interior Latex Flat, 373; Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Flat, DU144 Series; Duron, Inc.
3) Ultra-Hide 250 Flat Latex Paint 1200N Series; Glidden Professional.
4) SPEEDHIDE 6-70 series Interior Latex Flat; PPG Industries.
5) S-W ProMar 200 Zero VOC Flat, B30-2600; Sherwin-Williams Company.

I. Cotton or Canvas Insulation-Covering Substrates: Including pipe and duct coverings.
1. Institutional Low-Odor/VOC Latex System:
a. Prime Coat: Interior latex primer/sealer.
1) SUPER SPEC Latex Enamel Undercoater & Primer Sealer 253; Benjamin Moore & Co.
2) Interior Latex Primer DU0004125; Duron, Inc.
3) Gripper Interior/Exterior Primer-Sealer 3210-1200; Glidden Professional.
4) SPEEDHIDE 6-2 Interior Latex Sealer Quick-Drying; PPG Industries.
5) ProMar 200 Zero VOC Interior Latex Primer B28W2600; Sherwin-Williams Company.

b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
1) Ultra Spec 500 Interior Eggshell Finish (N538); Benjamin Moore & Co.

2) Ultra Deluxe Interior Latex Eggshel DU0036102l; Duron, Inc.
3) Lifemaster Interior Latex Eggshell 9300; Glidden Professional.
4) SPEEDHIDE 6-421 series High Solids Interior Enamel Eggshell Latex; PPG Industries.
5) ProMar 200 Zero VOC Eg-Shel, B20-2600; Sherwin-Williams Company.

c. Topcoat: Institutional low-odor/VOC interior latex (eggshell).
1) Ultra Spec 500 Interior Eggshell Finish (N538); Benjamin Moore & Co.
2) Lifemaster Interior Latex Eggshell 9300; Duron, Inc.
3) ; Glidden Professional.
4) SPEEDHIDE 6-421 series High Solids Interior Enamel Eggshell Latex; PPG Industries.
5) ProMar 200 Zero VOC Eg-Shel, B20-2600; Sherwin-Williams Company.

J. Exposed PVC Piping:
1. Institutional Low-Odor/VOC Latex System over bond coat:
a. Bond Coat:
1) STIX Waterborne Bonding Primer SXA-110; Insl-X (Benjamin Moore & Co.)
2) Terminator 2 Water Based Stain Killer/Primer, DU0071218; Duron, Inc.
3) Gripper Interior/Exterior Primer-Sealer 3210-1200; Glidden Professional.
4) SEAL Grip 17-921 Interior/Exterior 100% Acrylic Universal Primer/Sealer; PPG Industries.
5) Adhesion Bonding Primer, B51W50; Sherwin-Williams Company.

b. Intermediate Coat: Interior latex matching topcoat.
1) Ultra Spec 500 Interior Eggshell Finish (N538); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Eggshell Enamel, DU0036 Series; Duron, Inc.
3) Lifemaster Interior Latex Eggshell 9300; Glidden Professional.
4) SPEEDHIDE 6-421 series High Solids Interior Enamel Eggshell Latex; PPG Industries.
5) ProMar 200 Zero VOC Eg-Shel, B20-2600 Series; Sherwin-Williams Company.

c. Topcoat: Interior latex (eggshell).
1) Ultra Spec 500 Interior Eggshell Finish (N538); Benjamin Moore & Co.
2) Ultra Deluxe Interior Acrylic Latex Eggshell Enamel, DU0036 Series; Duron, Inc.
3) Lifemaster Interior Latex Eggshell 9300; Glidden Professional.
4) SPEEDHIDE 6-421 series High Solids Interior Enamel Eggshell Latex; PPG Industries.
5) ProMar 200 Zero VOC Eg-Shel, B20-2600 Series; Sherwin-Williams Company.

3.7 INTERIOR PAINTING SCHEDULE - EXISTING AREAS

A. Paint all remaining exposed surfaces in the existing building area (mostly consisting of interior side of exterior walls).

B. When painting existing surfaces, Contractor bears the responsibility of assuring compatibility of new paint materials with existing.

END OF SECTION

SECTION 09 93 00 - STAINING AND TRANSPARENT FINISHING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section includes surface preparation and the application of wood finishes on the following substrates:
   1. Interior Substrates:
      a. Dressed lumber (finish carpentry).
      b. Exposed wood panel products.

1.2 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: For each type of product indicated.

C. Samples for Initial Selection: For each type of product indicated

D. Samples for Verification: For each type of finish system and in each color and gloss of finish indicated.
   1. Submit Samples on representative samples of actual wood substrates, 8 inches square.
   2. Label each Sample for location and application area.

E. Product List: For each product indicated, include the following:
   1. Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules.

F. LEED Submittals: For Credit EQ 4.2, manufacturers' product data for field-applied finishes, including printed statement of VOC content in g/L.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
      a. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.5 FIELD CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Benjamin Moore & Co.

B. Duron, Inc.

C. Glidden Professional/Flood Company.

D. PPG Industries.

E. Sherwin-Williams Company.

2.2 MATERIALS, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.

B. Stain Colors: Match Architect's samples.

C. LEED Compliance: Field-applied wood finishes applied to interior elements can not exceed the VOC content limits established in South Coast Air Quality Management District Rule 1113, Architectural Coatings, rules in effect January 1, 2004.
   1. Clear Wood Finishes - VOC Limits:
      a. Varnish 350 g/L.
      b. Lacquer 550 g/L.
   2. Sealers - VOC Limits:
      a. Sanding Sealers: 275 g/L.
      b. Other Sealers: 200 g/L.
   3. Stains - VOC Limits: 250 g/L.
   4. Shellacs - VOC Limits: Clear 730 g/L; pigmented 550 g/L.

D. Volatile Organic Compound (VOC) Content: Comply with Section 01 61 16.

2.3 WOOD FILLERS

A. Wood Filler Paste: As recommended by finish manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
   1. Maximum Moisture Content of Wood Substrates: 15 percent when measured with an electronic moisture meter.
   2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes.
   3. Begin finish application only after unsatisfactory conditions have been corrected and surfaces are dry.
   4. Beginning application of finish system constitutes Contractor's acceptance of substrate and conditions.

3.2 PREPARATION

A. Remove plates, machined surfaces, and similar items already in place that are not to be finished. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
   1. After completing finishing operations, reinstall items that were removed; use workers skilled in the trades involved. Remove surface-applied protection if any.

B. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
   1. Remove surface dirt, oil, or grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
   2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
   3. Countersink steel nails, if used, and fill with putty tinted to final color to eliminate rust leach stains.

C. Apply wood filler paste to open-grain woods, to produce smooth, glasslike finish.

3.3 APPLICATION

A. Apply in accordance with manufacturer's instructions.
   1. Use applicators and techniques suited for finish and substrate indicated.
   2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Finish Carpentry Substrates:
   1. Polyurethane Varnish Over Stain System:
      a. Stain Coat: Interior wood stain (semitransparent).
         1) Minwax 250 V.O.C. Compliant WoodFinish Interior Penetrating Stain; Duron, Inc.
         2) OLYMPIC 44500 Preminum Interior Oil Based Wood Stain 240 gpl VOC; PPG Industries.
         3) Minwax 250 V.O.C. Compliant WoodFinish Interior Penetrating Stain; Sherwin-Williams Company.

4) Wood Pride Professional Finish Water Based Semi-Transparent Wood Finishing Stain 1700V Series; Glidden Professional.

b. Two Finish Coats: Interior, waterborne polyurethane (satin).
1) Benwood Stays Clear Acrylic Polyurethane Low Lustre 423; Benjamin Moore & Co.
2) Wood Classic WB Polyurethane, A68 Series; Duron, Inc.
3) OLYMPIC Preminum Interior Water Based Polyurethane Clear 42786 Stain / 42784 Gloss; PPG Industries.
4) WoodClassics Waterborne Polyurethane Varnish - Gloss A68V91 (first coat)/Satin A68F90 (second coat); Sherwin-Williams Company.
5) Wood Pride Professional Finishes Water Based Satin Varnish 1802-0000; Glidden Professional.

B. Exposed Wood Panel-Product Substrates:
1. Polyurethane Varnish Over Stain System:
a. Stain Coat: Interior wood stain (semitransparent).
1) Minwax 250 V.O.C. Compliant WoodFinish Interior Penetrating Stain; Duron, Inc.
2) OLYMPIC 44500 Preminum Interior Oil Based Wood Stain 240 gpl VOC; PPG Industries.
3) Minwax 250 V.O.C. Compliant WoodFinish Interior Penetrating Stain; Sherwin-Williams Company.
4) Wood Pride Professional Finish Water Based Semi-Transparent Wood Finishing Stain 1700V Series; Glidden Professional.
b. Two Finish Coats: Interior, waterborne polyurethane (satin).
1) Benwood Stays Clear Acrylic Polyurethane Low Lustre 423; Benjamin Moore & Co.
2) Wood Classic WB Polyurethane, A68 Series; Duron, Inc.
3) OLYMPIC Preminum Interior Water Based Polyurethane Clear 42786 Stain / 42784 Gloss; PPG Industries.
4) WoodClassics Waterborne Polyurethane Varnish - Gloss A68V91 (first coat)/Satin A68F90 (second coat); Sherwin-Williams Company.
5) Wood Pride Professional Finishes Water Based Satin Varnish 1802-0000; Glidden Professional.

END OF SECTION

SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This Section includes surface preparation and application of high-performance coating systems on the following substrates:
   1. Exterior Substrates:
      a. Exposed steel canopy structure and other rooftop structures.
      b. Exposed angle lintels and hung plates.
      c. Exposed Concrete Masonry Units.

1.2 DEFINITIONS

A. Gloss Ranges:
   1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
   2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
   3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
   4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.3 REFERENCE STANDARDS

A. SSPC-SP 6/NACE No. 3 - Commercial Blast Cleaning.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: For each type of product indicated.

C. Samples for Initial Selection: For each type of finish-coat product indicated.

D. Samples for Verification: For each type of coating system and in each color and gloss of finish coat indicated.
   1. Submit Samples on rigid backing, minimum 8 inches square.
   2. Step coats on Samples to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

E. Product List: For each product indicated. Cross-reference products to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.

F. LEED Submittals: For Credit EQ 4.2, manufacturers' product data for interior coatings, including printed statement VOC content and chemical components; requirements of coating systems for high humidity areas differ from normal-conditioned spaces.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
      a. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

1.6 MOCK-UP

A. Benchmark Samples (Mock-ups): Provide benchmark finish sample (all coats) for each coating type and substrate.
   1. Architect will select several rooms or surfaces to represent surfaces and conditions, for application of each paint system type and substrate; colors will be provided for Benchmark Samples.
      a. Wall Surfaces: Complete minimum 100 square feet.
      b. Small Areas and Items: Apply systems to items designated by the Architect.
   2. Complete Benchmark Samples per the requirements of this Section.
      a. Provide required sheen, color and texture for each surface.
      b. Architect-accepted Benchmark Samples to establish level of quality for remainder of Work.
   3. Architect to provide final color approvals from Benchmark Samples and intermediate coat wall colors; refer to subsection 3.3 of this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Benjamin Moore & Co.

B. Duron, Inc.

C. Glidden Professional.

D. International Paint LLC distributed by McCormick Paints.

E. PPG Industries.

F. Sherwin-Williams Company.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. Provide products of same manufacturer for each coat in a coating system.

B. Chemical Components of Interior Paints and Coatings: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions:
   1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
   2. Nonflat Paints and Coatings: VOC content of not more than 150 g/L.
   3. Anticorrosive & Anti-Rust Coatings: VOC content of not more than 250 g/L.

C. Volatile Organic Compound (VOC) Content: Comply with Section 01 61 16.

D. Colors: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
   1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   3. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
   4. Coating application indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
   1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.

C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.

D. Steel Substrates: Remove rust and loose mill scale.
   1. Clean using methods recommended in writing by coating manufacturer.
   2. Blast clean according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

3.3 APPLICATION

A. Apply in accordance with manufacturer's instructions.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by

manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

2. Wall Surfaces: Receive final color approvals following Architect's review of Intermediate Coats, before proceeding.
3. Omit primer over metal surfaces that have been shop primed and touchup painted.
4. If undercoats or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
5. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Apply high-performance coatings according to manufacturer's written instructions.
1. Use applicators and techniques suited for coating and substrate indicated.
2. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
   a. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
3. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
4. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

D. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
1. Wall Surfaces: Tint Prime Coat a lighter shade to facilitate identification; tint Prime Coat to match color of finish coat, but provide sufficient difference in shade to distinguish Prime Coat from Intermediate Coat used for final color selections.
2. Other Surfaces: Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

E. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

F. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

G. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

H. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

3.4 CLEANING

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.5 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Exposed Structural Canopy Steel, Angle Lintels and Hung Plate Substrates:
   1. Basis-of-Design Polysiloxane Coating System:
      a. Prime Coat: Two component, high solids, metallic rich epoxy primer.
      b. Intermediate Coat: High-build epoxy marine coating, low gloss.
      c. Topcoat: Two component, high solids Polysiloxane coating Interfine 878 by International Paint LLC.
   2. Polysiloxane System PPG Industries:
      a. Prime Coat: PPG AQUAPON 97-670 series Organic Zinc Rich Primer.
      b. Prime Coat: PPG Pittguard 97-946 series All-Weather DTR Epoxy Mastic.
      c. Topcoat: PPG Amercoat PSX 1001 Series Single pack acrylic polysiloxane.
   3. Other Available Products:
      a. Glidden Professional (Devoe Coatings) - Steel:
         1) Prime Coat: CATHA-COAT® 302H Reinforced Inorganic Zinc Primer.
         2) Intermediate Coat: BAR-RUST® 231 Multi-Purpose Epoxy.
         3) Topcoat: DEVTHANE® 379UVA Aliphatic Acrylic Urethane Gloss Enamel.
      b. Glidden Professional (Dovoe Coatings) - Galvanized Steel:
         1) Prime Coat: DEVRAN® 205 Universal Epoxy.
         2) Intermediate Coat: DEVTHANE® 379UVA Aliphatic Acrylic Urethane Gloss Enamel.
         3) Topcoat: DEVTHANE® 379UVA Aliphatic Acrylic Urethane Gloss Enamel.
      c. Sherwin-Williams Company - Steel:
         1) Prime Coat: S-W Zinc Clad IV Epoxy Primer B69 A8 Series.
         2) Intermediate Coat: S-W Acrolon 218HS B65W00611 Aliphatic Urethane Gloss Enamel.
         3) Topcoat: S-W Acrolon 218HS B65W00611 Aliphatic Urethane Gloss Enamel.
      d. Sherwin-Williams Company - Galvanized Steel:
         1) Prime Coat: S-W Recoatable Epoxy Primer B67A5 Series or, for high abrasion areas: DTM Wash Primer.

2) Intermediate Coat: S-W Acrolon 218HS B65W00611 Aliphatic Urethane Gloss Enamel.
3) Topcoat: S-W Acrolon 218HS B65W00611 Aliphatic Urethane Gloss Enamel.

e. PPG Industries, Inc.:
1) Prime Coat: PPG Pittguard 97-946 series All-Weather DTR Epoxy Mastic.
2) Intermediate Coat: PPG Pitthane Ultra 95-812 series Acrylic Aliphatic Urethane.
3) Topcoat: PPG Pitthane Ultra 95-812 series Acrylic Aliphatic Urethane.

f. PPG Industries, Inc.:
1) Prime Coat: PPG AQUAPON 97-670 series Organic Zinc Rich Primer.
2) Intermediate Coat: PPG Pitthane Ultra 95-812 series Acrylic Aliphatic Urethane.
3) Topcoat: PPG Pitthane Ultra 95-812 series Acrylic Aliphatic Urethane.

B. Concrete Masonry Units:
1. Location: Backside of Screen Wall.
2. Basis-of-Design: Sherwin Williams.
a. Block Filler Coat: S-W Kem Cati-Coat HS Epoxy Filler/Sealer, B24W400/V400 S (constantly wet/high moisture areas), or S-W Loxon Block Surfacer, A24W200.
b. Intermediate Coat: S-W Acrolon 218HS B65W00611 Aliphatic Urethane Gloss Enamel.
c. Topcoat: S-W Acrolon 218HS B65W00611 Aliphatic Urethane Gloss Enamel.

C. Do not allow excessive time to elapse following application of epoxy type coatings, as determined by the manufacturer; document manufacturer's recommendation for the Architect's information.

END OF SECTION

SECTION 10 00 05 - MISCELLANEOUS SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes equipment and specialties not specified in other sections of the Project Manual.

B. Furnish labor, materials, tools, equipment, services and supervision required to complete Work, including all incidental and complementary Work shown, specified or necessary to complete Work.

C. Make all final connections for products included in this Section.

D. Section includes:
   1. Technology Podium.
   2. Exhibit display cases.
   3. Combination Chain Hoist and Trolley.
   4. Battery Powered Clocks.

1.2 SUBMITTALS

A. Shop Drawings: Indicate locations, construction and anchorage details, dimensions and rough-in opening sizes.

B. Product Data: Submit data for furnishings describing size, color and finish, details of function and attachment methods.

C. LEED Submittals: Provide documentation for composite wood and laminating adhesives products indicating no added urea formaldehyde.

D. Samples:
   1. When directed by the Architect, furnish samples showing full color range and other features of the product.
   2. Where applicable, furnish one of each type wall clip or anchoring device to install product to the building construction.

E. Certify in writing that each product meets the specifications and can be installed in building where scheduled; certifications shall be produced and submitted following verification of site conditions.

F. Submit operation and maintenance data for electrically operated equipment.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum five years experience.

1.4 PROJECT CONDITIONS

A. Verify measurements in field as required for Work fabricated to fit job conditions.

B. Before ordering items or fabrication of Work, examine Drawings, job conditions, to assure good fit, neat installation.

PART 2 PRODUCTS

2.1 TECHNOLOGY PODIUM

A. Basis-of-Design: Inspiration Lectern, Model 55411-FM-FM-B-36-S1-0-4-TK-0-1-0-1 manufactured by Spectrum Industries, Inc.

B. Colors: Laminate, Edge Color, and Metal Finish color to be selected by Architect from manufacturers full range.

C. Size: 36 Inches High.

D. Components:
   1. Worksurface: Standard with surround.
   2. Base: Provide with toe kick.
   3. Wheels: 2 rigid and 2 swivel balloon wheels.
   4. Instructor-side locking door with single-bolt lock.
   5. Flip-up shelves mounted on left and right side of podium.

2.2 EXHIBIT DISPLAY CASES

A. Basis-of-Design: Vista by Helmut Guenschel, Inc.

B. Operable glass door panels and fixed panels of 5/16 inch thick tempered safety glass mounted in aluminum C-channel with dual action aluminum hinge. Frameless glass construction with no intermediate support. In closed position, adjacent glass panels shall remain in one plane. Adjustable alignment pins shall assure that the glass is properly closed and positioned. Structural components shall not be visible, fasteners shall be concealed and locking is provided by means of 5-pin tumbler cylinder locks. Metal finish is factory primed and painted with two-component polyurethane.

C. Provide LED lighting with light valence, switched outside the case.

D. Hinges: Dual actuated hinges manufactured from aluminum. When unlocked, the door panels releases and rotates out and away from the display space providing full access. The pivot end of the panel does not rotate into the display case.

2.3 COMBINATION CHAIN HOIST AND TROLLEY

A. Basis-of-Design: Vestil Model LOW-4G.
   1. Type: Geared.
   2. Height: 16 1/4 inches.
   3. I-Beam Flange Size: 3 1/2 inches to 8 inches.
   4. Capacity: 4,000 pounds.

2.4 BATTERY POWERED CLOCKS

A. Provide a battery powered clock in each location indicated on the drawings:
   1. Display Type: Analog.
   2. Time Format: 12 Hour.
   3. Movement Type: Quartz.
   4. Shape: Round.
   5. Overall Diameter:
      a. Type 1: 14 inches.
      b. Type 2: 10 inches.
   6. Digit Size: 1 1/4 inches.

7. Power Source: Standard replaceable battery.
8. Mounting Type: Wall.
9. Face Color: White.
10. Case Color: Black.

PART 3 EXECUTION

3.1 INSTALLATION

A. Order items in ample time so as not to delay job progress with delivery at job site coordinated with other Work.

B. Install in a thorough, workmanlike manner, in strict accordance with manufacturer's printed instructions and subject to inspection by the Architect.

C. Assembly:
1. Deliver factory-built units completely assembled in one piece without joints, whenever possible.
2. Where dimensions exceed unit size, provide two or more pieces of equal length as acceptable to Architect and Owner.
3. When overall dimensions require delivery in separate units, prefit at factory, disassemble for delivery, and make final joints at site.
4. Use splines at joints to maintain surface alignment.

D. Install units in locations and mounting heights as shown on Drawings, keeping perimeter lines straight, plumb and level.

E. Provide all grounds, clips, backing materials, adhesives, brackets, anchors, trim and accessories for complete installation.

F. Coordinate job-assembled units with grounds, trim and accessories; join all parts with neat, precision fit.

G. Verify accessories required for each unit properly installed and operating units properly functioning.

3.2 CLEANUP

A. Remove temporary protective cover at completion.

END OF SECTION

SECTION 10 11 01 - VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Markerboards and Tackboards.

1.2 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2009.

B. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a.

C. ASTM C208 - Standard Specification for Cellulosic Fiber Insulation Board; 2012.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data on markerboard, tackboard, tackboard surface covering, trim, and accessories.

C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
   1. Include dimensions indicating location of boards in relation to other items in the room.

D. Samples: Submit color charts for selection of color and texture of markerboard, tackboard, tackboard surface covering, and trim.

E. Test Reports: Show conformance to specified surface burning characteristics requirements.

F. LEED Submittals: Product data indicating composite wood, agrifiber products and laminating adhesives have no added urea formaldehyde.

G. Maintenance Data: Include data on regular cleaning, stain removal .

1.4 QUALITY ASSURANCE

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

1.5 WARRANTY

A. See Section 01 78 00 - Closeout Submittals - Closeout Submittals, for additional warranty requirements.

B. Provide life-of-the-building warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

C. Provide ten year warranty for tackboards to include repair or replacement of tackboards that fail in materials or workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Visual Display Boards:
   1. MooreCo, Inc: www.moorecoinc.com.

2. Claridge Products and Equipment, Inc; LCS Markerboard Series 1 (Basis-of-Design): www.claridgeproducts.com.
3. Marsh Industries, Inc.: www.marsh-ind.com.

2.2 VISUAL DISPLAY BOARDS

A. Markerboards: Porcelain enamel on steel, laminated to core.
1. Steel Face Sheet Thickness: 24 gage, 0.0239 inch .
2. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
3. Backing: Aluminum sheet, laminated to core.
4. Frame: Extruded aluminum, with concealed fasteners.
5. Frame Profile: Manufacturers standard profile.
6. Frame Finish: Anodized, natural.
7. Accessories: Provide chalk tray and map rail.
a. Provide continuous chalk tray; match length of markerboard.
b. Box Type: Extruded aluminum with slanted front, grooved tray, and cast-aluminum end closures.

B. Tackboards: Composition cork.
1. Vinyl Plastic Cork:
a. Natural materials consisting of linseed oil, granulated cork, resin binders and dry pigments, mixed and calendered onto a natural jute backing.
b. Color shall extend throughout total thickness of material.
c. Able to self-heal from thumbtack and pin punctures.
d. Does not dry, crack, peel or crumble.
e. Washable finish.
2. Cork Thickness: 1/8 inch.
3. Color: Minimum of nine color selections available for Architect selection; Architect reserves the right to select several colors throughout the Project.
4. Backing: Fiberboard, 3/8 inch thick, laminated to tack surface.
5. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
6. Size: As indicated on drawings.
7. Frame: Same type and finish as for markerboard.
a. Exception: Tackboards mounted on doors to be provided with solid wood frame coordinated with species of door.
8. Frame Finish: Anodized, natural.

C. Combination Units and Units Made of More Than One Panel: Factory-assembled markerboards and tackboards in a single frame, of materials specified above.
1. Join panels of different construction with H-shaped extruded aluminum molding finished to match frame.
2. Join panels of similar construction with butt joints, aligned and secured with steel spline concealed in edge of core.
3. Configuration: As indicated on drawings.
4. Units Too Large to Ship Assembled: Fully assembled in factory, then disassembled for shipping.

2.3 MATERIALS

A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.

B. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.
   1. Core for markerboards.

C. Fiber Board: ASTM C208, cellulosic fiber board.
   1. Core for tackboards.

D. Aluminum Sheet Backing: Manufacturers standard thickness.

E. Adhesives: Type used by manufacturer.

2.4 ACCESSORIES

A. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 1 inch wide overall, full width of frame.

B. Map Supports: Formed aluminum sliding hooks and roller brackets to fit map rail.
   1. Provide two map hooks for every 48 inches of map rail or fraction thereof.

C. Flag Holders: Cast aluminum bored to receive 1 inch diameter flag staff, bracketed to fit top rail of board .
   1. Provide one standard flag holder at the front of each classroom.

D. Chalk Tray: Aluminum, manufacturer's standard profile one piece full length of chalkboard, molded ends; concealed fasteners, same finish as frame.

E. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.2 INSTALLATION

A. Install boards in accordance with manufacturer's instructions.

B. Secure units level and plumb.

C. Butt Joints: Install with tight hairline joints.

3.3 CLEANING

A. Clean board surfaces in accordance with manufacturer's instructions.

END OF SECTION

SECTION 10 14 00 - SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Room and door signs.

B. Plaque.

C. Dimensional characters.

D. LEED Plaque

E. Educational Signage.

1.2 DESIGN REQUIREMENTS - INTERIOR SIGNS

A. Permanent Rooms and Spaces:
   1. Provide signs identifying each room at each door.
   2. Type Styles:
      a. Must be upper case and sans serif.
      b. Must have a width to height ratio of between 3:5 and 1:1.
      c. Must have a stroke width to height ratio of between 1:5 and 1:10.
   3. Tactile and Braille Characters: Characters raised a minimum of 1/32 inch and accompanied by Grade 2 braille.
   4. Character Height: Tactile characters must be between 5/8 inch and 2 inches in height.
   5. Pictograms (Symbols), if specified:
      a. Minimum of a 6 inch high field or background; must be supplemented by upper case tactile descriptive verbiage and Grade 2 braille below pictogram.
      b. No other graphic can invade the pictogram field.
      c. Pictogram itself is not required to be tactile.
      d. Provide pictogram and descriptive verbiage accompanied by Grade 2 braille at locations required.
   6. Finish and Contrast:
      a. Matte (non-glare) characters and background; minimum contrast of 70 percent.
      b. Light characters on dark background or dark characters on light background are acceptable.
   7. Mounting Conditions:
      a. Mount 60 inches from finish floor to baseline of highest tactile letter on latch side of door.
      b. Where no wall space is provided at the latch side of the door, place on nearest adjacent wall so that a person can approach to within 3 inches of signage without protrusions or swing of door.

B. Direction and Informational:
   1. Type Styles:
      a. May be upper and lower case and sans serif.
      b. Shall have a width to height ratio of between 3:5 and 1:1.
      c. Shall have a stroke width to height ratio of between 1:5 and 1:10.
   2. Tactile and Braille Characters: Not required for Type 2 signage.
   3. Character Height: Characters shall be sized on viewing distance.
   4. Pictograms (Symbols), if specified:
      a. No tactile requirement.

b. Provide pictogram at locations designated in Signage Schedule and Drawings.

5. Finish and Contrast:
   a. Matte (non-glare) characters and background; minimum contrast of 70 percent.
   b. Light characters on dark background or dark characters on light background are acceptable.
6. Mounting Conditions:
   a. Mount 60 inches from finish floor to baseline of highest tactile letter on latch side of door.
   b. Where no wall space is provided at the latch side of the door, place on nearest adjacent wall so that person can approach to within 3 inches of signage without protrusions or swing of door.

C. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials, sign types, lettering font, tactile designations, foreground and background colors, locations, overall dimensions of each sign and method of attachment.

C. LEED Reports: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15 and appropriate forms.
   1. Credit IEQc4: Provide documentation of VOC content in g/L for adhesives and sealants; comply with VOC limits of Section 01 61 16.

D. 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. When room numbers to appear on signs differ from those on the drawings, include the drawing room number on schedule along with the room number that will appear on the sign.

E. Samples: Submit one sample of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

F. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips of the manufacturers full range of colors.

1.4 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 in name groups.

C. Store tape adhesive at normal room temperature.

PART 2 PRODUCTS

2.1 SIGNAGE FABRICATION

A. Available Manufacturers:
   1. Best Sign Systems, Inc: www.bestsigns.com.
   2. Mohawk Sign Systems, Inc: www.mohawksign.com.
   3. Bayuk Graphic Systems, Inc., Parkesburg, Pennsylvania.
   4. Digital Color Graphics, Pittsburgh, Pennsylvania.
   5. Supersine Company.

6. Acorn Sign Graphics: www.acornsign.com.
7. Adcorp Signs, Inc.

B. Fabrication Methods:
1. Plaque assembly to be plastic laminate construction; plastic laminate to be impervious to most acids, alkalies, alcohol, solvents, abrasives and boiling water; plastic laminate to be non-static, fire-retardant, and self extinguishing.
2. Approximately 0.080-inch thick non-glare matte acrylic face laminated to approximately 0.080-inch thick acrylic back plate with filler to create windows for inserts, if so indicated.
3. Non-tactile graphics to be subsurface or second surface applied signs; surface-applied graphics are not acceptable.
4. Painted surfaces will not be accepted.
5. Polycarbonate (0.03 inch thick) window inserts, if applicable; painted subsurface to match sign.
6. Tactile Copy Options:
a. Option 1: Individual plastic letters or characters of one solid color and chemically bonded by the use of a high strength solvent within a matched routed depression in sign face to create graphics which are raised a minimum of 1/32 inch from the face of sign; tactile characters 5/8 inch to 2 inches in height as required by Architect.
b. Option 2: Produced by blasting the laminate assembly removing the background material, and raising the characters and braille; the characters and braille are part of the original outer laminate color and do not require painting.
7. Braille (if applicable): Grade 2 braille engraved into face of sign.
8. Mechanically fasten plaque assembly to wall by use of a backplate, which will be secured to the outer assembly.
9. Corners as indicated; sides can be beveled or flat.
10. Colors to be selected by Architect, which include custom fabrications based on manufacturer's capabilities.
11. See attached sign type drawings.

2.2 DIMENSIONAL CHARACTERS

A. Available Manufacturers:
1. A. R. K. Ramos.
2. Gemini Incorporated.
3. Matthews International Corporation; Bronze Division..
4. Metal Arts; Div. of L&H Mfg. Co.
5. Nelson-Harkins Industries.

B. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

C. Cast Characters: Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free of pits, scale, sand holes, and other defects. Cast lugs into back of characters and tap to receive threaded mounting studs. Alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated. Comply with the following requirements.
1. Character Material: Aluminum.
2. Mounting:
a. Typical: Concealed stud; projected 1 inch from wall with aluminum tube spacers.
3. Letter and Number Heights: Provide sizes indicated on Drawings.

4. Font: Helvetica Medium.
5. Color: Match Architect's sample.
6. Finish:
    a. Typical - Interior and Exterior: Powder coat.

2.3 PLAQUES

A. Available Plaque Manufacturers:
1. A. R. K. Ramos.
2. Gemini Incorporated.
3. Matthews International Corporation; Bronze Division..
4. Metal Arts; Div. of L&H Mfg. Co.
5. Nelson-Harkins Industries.

B. Bronze Castings: ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).

C. Cast Plaque: Provide castings free of pits, scale, sand holes, and other defects, as follows:
1. Plaque Material: Bronze.
2. Background Texture: Manufacturer's standard pebble or leatherette texture.
3. Border Style: Projected bevel.
4. Mounting: Concealed studs, noncorroding for substrates encountered.
5. Thickness: 3/4 inch.

D. Cast-Bronze Plaque Finishes: Exposed surfaces free of porosity, burrs, and rough spots; with returns finished with fine-grain air blast.
1. Raised Areas: Hand-tool and buff borders and raised copy to produce manufacturer's standard satin finish.
2. Background Finish: Dark oxidized.
3. Clear Protective Coating: Coat exposed surfaces of copper alloys with manufacturer's standard, clear organic coating specially designed for coating copper-alloy products.

E. Plaque Schedule: One plaque.
1. Plaque Size: 18 inches wide by 12 inches high.
2. Text Style: As selected by Architect from manufacturer’s standards.
3. Text: Will be provided by Architect.
4. Location: As indicated.

2.4 LEED PLAQUE

A. Basis-of-Design: Product as manufactured by GreenPlaque; www.greenplaque.com.

B. Material: Laser Cut Aluminum.

C. Size: 16 inch diameter.

D. Finish: Brushed and clear coated.

E. Mounting Hardware: Brackets.

2.5 GLASS MOUNTED GRAPHIC FILM - NO SMOKING

A. Basis-of-Design: ALLSTATE Sign & Plaque, sticker; www.allstatesign.com.

B. Application: No smoking sign at entrance doors.

C. Mounting: Reverse applied to interior side of glass doors where indicated on plans.

D. Material: Premium grade indoor/outdoor vinyl.
1. Permanent adhesive bond.

2.6 EDUCATION SIGNS (INTERIOR)

A. Basis of Design: Apco Arcadia 2000 Series.

B. Size: 8-1/2"H x 12"L.

C. Holder and End Caps: ARH11-215H Natural satin anodized aluminum.

D. Insert:
1. ClearLens 0.40" PETG non-glare ARI-11-215H-CL.

E. Backer: Lumicor Coastal; size 12"h X 15"w.
1. Refer to Detail E4/A-9.4

F. Mounting: Surface mounted on wall; mechanically-fastened.

G. Accessories: Suction Cup Removal Tool (SCT).

H. Quantity: 7.

I. Locations: To be determined by Architect and Owner

2.7 EDUCATION SIGNS (EXTERIOR)

A. Basis-of-Design: Frames by Pannier Graphics; www.panniergrapics.com.
1. Other Available Manufacturers:
a. Bunting Graphics.
b. General Graphics Inc., Cumberland, MD.

B. Types:
1. Frames Low Profile:
a. Quantity: 1.
b. Size: 18 inches x 24 inches.
c. Description: Positions fiberglass panel at an angle that makes it easy to read but won't interfere with the surrounding view. Two centered posts anchor this style; frame includes a removable top rail that allows for easy maintenance, cleaning and the ability interchange panels.
2. Frames Wall Mounted:
a. Quantity: 1.
b. Size: 18 inches x 24 inches.
c. Description: Custom 9/16-inch frame secures fiberglass panel. Each Wall Mounted frame also features a tamper-proof top rail that can be removed to slide out panel for change or clean.

C. Fabrication:
1. Construction using fiberglass embedment.
2. Copy and graphics are permanently embedded in the fiberglass panel; the resulting sign is a solid, one-piece panel with all graphic elements inseparable from the fiberglass in which they are embedded. Artwork becomes a permanent part of the fiberglass sign, so it will not delaminate.
3. Sign to be manufactured of clear resin or UV stabilized, acrylic-modified polyester resin reinforced with high solubility, chopped strand fiberglass mat so that the index of refraction ensures clarity of all color, copy, and graphics. Sign has a glass content of no less than 28 percent of the total sign weight.
4. Sign face cannot be permanently defaced by steam, mild acids, aromatics, scratching, inks, or paints and can be readily wiped clean with paint remover and solvents without affecting the appearance or legibility of the sign finish or graphics. Sign face retains

legibility and finished appearance when sprayed with a 10% solution of hydrochloric, nitric, or sulfuric acid for one-half hour or when scrubbed by a brush of medium hardness using common commercial cleaning compounds such as ammonia, laundry soaps, detergents, carbon tetrachloride, or petroleum based solvents.

5. Sign may be opaque or translucent with a clear or matte finish, as indicated, with a minimum embedment of all graphic elements of .03125 inches (1/32").
6. Signs are router cut, and the sign edges will not be crazed or cracked; edge finish to be smooth, clean, and neat.

D. Properties:
1. Tensile Strength per ASTM D638: 12,000 psi
2. Flexural Strength per ASTM D790: 18,000 psi
3. Impact Strength per ASTM D256: 14 ft. lbs. / in. notch
4. Barcol Hardness per per ASTM D2583: 50
5. Moisture Permeability per ASTM D5229: Unaffected (<1%)
6. Solvent Resistance:
   a. Mild Acids Excellent.
   b. Alkalis Fair.
   c. Solvents Excellent.
7. Dielectric Strength: 350 volts per mil.
8. Ambient Temperature Range: -25°F to 150°F

E. Color graphics to be provided at later date.

F. Low profile type to be anchored by concrete footings sized to recommendations of the sign manufacturer.

2.8 ACCESSORIES

A. Exposed Screws: Chrome plated; tamper-proof.

B. Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions after surfaces are finished.

B. Install neatly, with horizontal edges level, plumb and true, and in correct relation to adjoining Work.

C. Locate signs where indicated:
1. If no location is indicated obtain Owner's instructions.

D. Protect from damage until Substantial Completion; repair or replace damage items.

E. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.

F. Cast-Metal Plaque: Mount plaque using standard fastening methods to comply with manufacturer's written instructions for type of wall surface indicated.
   1. Concealed Mounting: Mount plaque by inserting threaded studs into tapped lugs on back of plaque. Set in predrilled holes filled with quick-setting cement.

3.3 CLEANING

A. Wash surfaces following installation.

END OF SECTION

Main Line executive signs
4930 West Chester Pike
Suite 102 PO Box 155
Edgemont, PA 19028
info@mlexsigns.com
Ph (610) 356-2141
Fx (610) 356-2147

REGULATORY SIGNS

SIGN TYPE 1

SIGN TYPE 3 ← SIMILAR, BUT MEN ONLY

SIGN TYPE 4 ← SIMILAR, BUT MEN ONLY

SCALE: 1:2

PROJECT INFORMATION:

General Information:

Project Name: Garrett College
Date:
PO#:
Quantity: 16
Drawing Scale: 1:2
Part #: AP88

Component 1:

Section I: Material
Description: 8.5" x 8.5" Backplate
Thickness: 1/8"
Painted On: Backpainted
Colors: Arch Gray
Edge:

Component 2:

Section I: Material
Description: 8" x 8" Tactile Steel
Thickness: Surface Painted
Painted On: PMS 293 Blue
Colors:

Section II: Text & Graphics
Color: White
Typestyle: Helvetica Medium
Case: UC
Braille: Yes

Additional Information:

Copy and symbol vary.

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ROOM SIGN

SIGN TYPE 5

SIGN TYPE 2 ← SIMILAR, BUT DON'T INCLUDE ROOM # & REPLACE INSERT AREA W/ "EXIT" TEXT AND BRAILLE

SIGN TYPE 6 ← SIMILAR, BUT REPLACE INSERT AREA W/ ROOM NAME AND BRAILLE

SCALE: 1:2

PROJECT INFORMATION:

General Information:

Project Name:
Date:
PO#:
Quantity:
Drawing Scale: 1:2
Part #: 4070403

Component 1:

Section I: Material
Description: Low Profile Frame
Thickness: 1/8" Faceplate and 1/8" backplate.
Painted On: Backpainted
Colors: Arch Gray
Edge:

Component 2:

Section I: Material
Description: Tactile Plate
Thickness: Steel
Painted On: Surface Painted
Colors: PMS 293 (BLUE)

Section II: Text & Graphics
Color: White
Typestyle: Helvetica Medium
Case: UC
Braille: Yes

Additional Information:

To be lettered by Main Line Executive Signs on hi bond bright white paper stock.

SECTION 10 21 13.19 - PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Solid plastic toilet compartments.

B. Urinal screens.

1.2 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

C. Product Data: Provide data on panel construction, hardware, and accessories.

D. Samples: Submit two samples of partition panels, 3 x 3 inch in size illustrating panel finish, color, and sheen.

E. LEED Submittals: Document the use of recycled materials and local/regional materials as required by Section 01 35 14, Section 01 35 15, Section 01 35 16 and appropriate forms, and Section 01 61 16.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Comtec or Santana products by Scranton Products.

B. Bradley Corporation.

C. Hadrian.

D. Global Partitions.

2.2 SOLID PLASTIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), floor-mounted unbraced.

2.3 COMPONENTS

A. Toilet Compartments: Solid molded high density polyethylene (HDPE) plastic panels, doors, and pilasters, floor-mounted unbraced.
   1. Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.
   2. Recycled content products are preferred.
   3. Color: To be selected from manufacturer's entire range.

B. Door and Panel Dimensions:
   1. Thickness: 1 inch.
   2. Door Width: 24 inch.
   3. Door Width for Handicapped Use: 36 inch, out-swinging.
   4. Height: Manufacturer's standard not less than 55 inch.
   5. Thickness of Pilasters: 1 inch.

C. Urinal Screens: Wall mounted with continuous panel brackets and pilaster anchored to floor.
   1. Maximum dimension from finished floor to bottom of urinal screen: 12 inches.

2. Minimum dimension from finished floor to top of urinal screen: 60 inches.
3. Minimum depth of urinal screen to be 18 inches; or from finished wall to a minimum of 6 inches beyond the outermost front lip of the urinal, whichever is greater.

2.4 ACCESSORIES

A. Pilaster Shoes: Formed chromed steel with polished finish, 3 in high, concealing floor fastenings.
   1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Hollow anodized aluminum tube, 1 x 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.

C. Pilaster Brackets: Chrome-plated, nonferrous, cast zinc alloy (zamac) or clear anodized aluminum.

D. Wall Brackets: Continuous type, satin stainless steel or extruded aluminum.

E. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
   1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
   2. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

F. Hardware: Polished stainless steel:
   1. Continuous hinges self-closing; stainless steel.
   2. Door Latch: Slide type with exterior emergency access feature.
      a. Accessible stall door to be equipped with a slide latch that does not require gripping or twisting and shall be slotted to permit emergency access
   3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
   4. Coat hook with rubber bumper; one per compartment, mounted on door.
   5. Provide door pull for outswinging doors.
      a. Provide two door pulls (one each side) at accessible compartments to comply with ADA requirements.

G. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-polymer doors and partitions.

H. Provide wall stop at out-swinging doors where applicable.

2.5 FABRICATION

A. Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions.

B. Make provisions for setting and securing continuous head rail at top of each pilaster.

C. Provide shoes at pilasters to conceal supports and leveling mechanism.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

3.2 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.3 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

D. Adjust latching hardware for proper operation.

END OF SECTION

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Accessories for toilet rooms and utility rooms.

B. Grab bars.

1.2 REFERENCE STANDARDS

A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2014e1.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.

C. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2011e1.

D. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.

E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).

1.3 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. LEED Submittals: Provide product data for adhesives and sealants indicating VOC content in g/L; comply with requirements of Section 01 61 16.

1.4 COORDINATION

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. A & J Washroom Accessories Inc: www.ajwashroom.com.

B. American Specialties, Inc: www.americanspecialties.com.

C. Bradley Corporation: www.bradleycorp.com.

D. Bobrick.

E. All items of each type to be made by the same manufacturer.

2.2 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.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Type 304 or 316.

E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

F. Adhesive: Two component epoxy type, waterproof.

G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

H. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 FINISHES

A. Stainless Steel: No. 4 Brushed 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.

2.4 TOILET ROOM ACCESSORIES

A. Grab Bars: Stainless steel, nonslip grasping surface finish.

B. The design for each accessory is based on products indicated on the Drawings.

2.5 UTILITY ROOM ACCESSORIES

A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
   1. Mop/broom holders: 3 spring-loaded rubber cam holders at shelf front.
   2. Length: Manufacturer's standard length for number of holders/hooks.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

D. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings

END OF SECTION

SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Accessories.

1.2 REFERENCE STANDARDS

A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements, and location.

C. Product Data: Provide extinguisher operational features.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Strike First Corporation of America: www.strikefirstusa.com.

B. JL Industries, Inc: www.jlindustries.com.

C. Larsen's Manufacturing Co: www.larsensmfg.com.

D. Potter-Roemer: www.potterroemer.com.

2.2 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

B. Dry Chemical Type Fire Extinguishers: Steel tank, with pressure gage.
   1. Class Multi-purpose 4-A:80-B:C.
   2. Size 10 pounds.
   3. Finish: Baked enamel, color as selected.

2.3 FIRE EXTINGUISHER CABINETS

A. Description: Formed steel box with aluminum trim and door.

B. Cabinet Configuration: Recessed type.
   1. Sized to accommodate accessories.
   2. Provide semi-recessed type at locations where wall thickness is narrower than a fully recessed cabinet.
   3. Trim: Returned to wall surface, with 1/4 to 5/16 inch projection, 1-3/4 inch wide face.
   4. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim and door stiles.

C. Door: Reinforced for flatness and rigidity. Hinge doors for 180 degree opening with continuous piano hinge. Provide roller type catch.

D. Door Glazing: Glass, clear, 1/8 inch thick tempered. Set in resilient channel gasket glazing.
   1. Design: Vertical Duo.

E. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.

F. Weld, fill, and grind components smooth.

G. Finish of Cabinet Exterior Trim and Door: Clear anodized.

H. Finish of Cabinet Interior: White enamel.

2.4 ACCESSORIES

A. Extinguisher Brackets: Formed steel, galvanized and enamel finished.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure rigidly in place.

C. Place extinguishers and accessories in cabinets.

END OF SECTION

SECTION 10 56 13 - METAL STORAGE SHELVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Standard metal storage shelving.

B. Cantilevered Rack Columns.

C. Shelving accessories.

1.2 REFERENCE STANDARDS

A. ANSI MH28.1 - American National Standard for the Design, Testing, Utilization and Application of Industrial Grade Steel Shelving - Specifications; 1997.

1.3 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. Rated uniform shelf loads.
   2. Details of shelving assemblies, including reinforcement.
   3. Accessories.

C. Test Reports: Provide independent agency test reports documenting compliance with specified structural requirements.
   1. In lieu of test reports, detailed drawings stamped and sealed by a Professional Engineer licensed in the State of Maryland will be acceptable.

D. Shop Drawings: Indicate location, type, and layout of shelving, including lengths, heights, and aisle layout, and relationship to adjacent construction.
   1. Indicate methods of achieving specified anchoring requirements.

E. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and finishes.

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

G. LEED Submittals:
   1. Credit MR 4.1 and 4.2: Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
      a. Contributions to this Credit include recycled content of steel and aluminum.
   2. Credit MR 5.1 and 5.2: List of proposed regionally manufactured and extracted, harvested or recovered materials.
      a. Identify each regionally manufactured material, and each regionally extracted, harvested or recovered material by source and material cost.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inspect for dents, scratches, or other damage. Replace damaged units.

B. Store in manufacturer's unopened packaging until ready for installation.

C. Store under cover and elevated above grade.

1.5 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide one year manufacturer warranty covering defects of manufacturing and workmanship and rust and corrosion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Four Post Shelving:
1. Hallowell, Div. of List Industries, Inc : www.hallowell-list.com.
2. Penco Products, Inc : www.pencoproducts.com.
3. Lyon Metal Products, Inc.
4. Republic.

B. Cantilevered Rack Columns:
1. Basis-of-Design: JARKE Brace Sets for Button On Cantilever Rack Columns.

2.2 SHELVING - GENERAL

A. See drawings for layout and sizes.

B. Fabricate all units as initial shelving units with a post at each corner so that units may be moved or relocated by Owner as desired

C. Shelving: Provide products tested to comply with ANSI MH28.1 for design criteria, lateral stability, shelf connections, and shelf capacity.

D. Anchors: Provide anchoring hardware to secure each shelving unit to wall.
1. Provide hardware of type recommended by manufacturer for substrate.

2.3 FOUR POST SHELVING

A. Four Post Shelving: Steel post-and-beam type with sway bracing, shelving brackets, shelving surfaces, and accessories as specified.
1. Standard Unit Width: 36 inches, center to center of posts.
2. Capacity: Minimum 1,200 pound capacity for dead weight evenly distributed over a 36 inches wide x 18 inch deep shelf, including minimum 1.65 safety factor.
3. Shelf Deflection: 1/4 inch in 36 inches, maximum, under rated uniform load.
4. Adjustability of Shelving: At intervals of 1-1/2 inches on center maximum.
5. Shelves per Unit: As indicated on drawings.
6. Finish: Baked enamel, medium gloss.
7. Color: As selected by Architect from manufacturer’s standard range.
8. Number of Units: As indicated on drawings.

B. Posts and Beams: Formed sheet members; perforations may be exposed on face of members.
1. Metal Thickness for Standard Units: 16 gage, 0.0598 inch.
2. Post Face Width: 2 inches, maximum.
3. Connecting Hardware: Manufacturer's standard.
4. Post Bases: Flat steel foot plate, with manufacturer’s recommended adjustable leveling device.

C. Bracing: Formed sheet members.
1. Back Sway Bracing: Either strap or panel; at back of each unit.
2. Side Sway Bracing: Either strap or panel; at each side of each unit.
3. Strap Sway Bracing: One strap installed diagonally, 16 gage, 0.0598 inch; welded, riveted, or bolted to uprights.

4. Panel Sway Bracing: Formed sheet metal panels, 20 gage, 0.0359 inch; welded, riveted, or bolted to uprights.

D. Shelves: Formed sheet, finished on all surfaces .
1. Minimum Metal Thickness: 16 gage, 0.0598 inch.
2. Shelf Edge Profile: Extending 3/4 inch, maximum, below top surface of shelf.
3. Shelf Connection to Posts: Manufacturer's standard.

2.4 CANTILEVERED RACK COLUMNS

A. Basis-of-Design: Jarke Model CR-6.
1. Single Sided.
2. Height: 7 feet.
3. Arm Length: 16 inches.
4. Capacity per Arm: 1,000.
5. Base Length: 72 inches.
6. Number of Arms: 12.
7. Arm Type: Straight, adjustable on 4 inch centers.
8. Arm Steel Guage: 10 ga.
9. Column Steel Guage: 11 ga.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate is level and that clearances are as specified.

B. Verify that walls are suitable for shelving attachment.

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.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Anchor and reinforce as specified, as indicated on drawings, and as recommended by manufacturer.

C. Install shelving with shelf surfaces level and vertical supports plumb; adjust feet and bases as required.

D. Out-Of-Square Tolerance - Four Post Shelving: Maximum of 1/8 inch difference in distance between bottom shelf and canopy top, measured along any post in any direction.

3.3 PROTECTION

A. Clean area after installation.

B. Protect installed products until completion of project.

C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 11 00 05 - MISCELLANEOUS EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes equipment not specified in other sections of the Project Manual.

B. Furnish labor, materials, tools, equipment, services and supervision required to complete Work, including all incidental and complementary Work shown, specified or necessary to complete Work.

C. Make all final connections for products included in this Section.

D. Section includes:
   1. Wind Turbine.

1.2 SUBMITTALS

A. Shop Drawings: Indicate locations, construction and anchorage details, dimensions and rough-in opening sizes.

B. Product Data: Submit data for furnishings describing size, color and finish, details of function and attachment methods.

C. Coordination Drawings: Showing job specific installation details, connections electrical system, and connection to software.

D. Performance Calculations for unit provided.

E. Samples:
   1. When directed by the Architect, furnish samples showing full color range and other features of the product.
   2. Where applicable, furnish one of each type wall clip or anchoring device to install product to the building construction.

F. Certify in writing that each product meets the specifications and can be installed in building where scheduled; certifications shall be produced and submitted following verification of site conditions.

G. Submit operation and maintenance data for electrically operated equipment.
   1. Provide video training of wind turbine operation.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum five years experience.

B. Maintenance: Installer is to provide twice yearly maintenance for 3 years from date of installation.

1.4 PROJECT CONDITIONS

A. Verify measurements in field as required for Work fabricated to fit job conditions.

B. Before ordering items or fabrication of Work, examine Drawings, job conditions, to assure good fit, neat installation.

PART 2 PRODUCTS

2.1 WIND TURBINE

A. Basis-of-Design: Swift Wind Energy System; www.renewabledevices.com.

1. Turbine Type: Upwind Horizontal Axis with Acoustic Diffuser Ring.
2. Rotor Radius: 1.0 m/ 1.04m Diffuser.
3. Swept Area: 3.4 square meters.
4. Start-Up Speed: 3.4 m/s.
5. Rated wind Speed: 12 m/s.
6. Rated Power Output: 1.5kW.
7. RPM at rated Wind speed: 450 RPM.
8. Generator: Permanent Magnet.
9. Governing type: Angle furling/Dynamic brake.
10. Governing wind speed: 14 m/s.
11. Shut-down Mechanism: Dynamic Brake.
12. Control Included.
13. Grid tie version: Standard Product (include inverter).
14. Electrical network versatility: 50Hz/60Hz 220V/230V.
15. Phase configuration: Single.
16. Mounting system: Wall.
17. Acoustic Emissions: <35dB.
18. Product Life: 20 year design life.
19. Turbine Class: BS EN 61400 Class 2.
20. Warranty: 2 year manufacturers warranty.
21. Accessory:
    a. Live-feed, web-based display feature modified to work with wind turbine
    b. Basis of Design Product: Eco-eye smart www.eco-eye.com.
    c. Details: Small LCD screen and web service showing all cumulative and instantaneous power generation from the turbine as well as wind speed and wind direction in a screen shot with a wireless range of 50m minimum. System includes upload to an owner server.
    d. Contact: David Anderson, The Renewable Devices Group, dave@renewabledevices.com

PART 3 EXECUTION

3.1 INSTALLATION

A. Order items in ample time so as not to delay job progress with delivery at job site coordinated with other Work.

B. Install in a thorough, workmanlike manner, in strict accordance with manufacturer's printed instructions and subject to inspection by the Architect.

C. Assembly:
1. Deliver factory-built units completely assembled in one piece without joints, whenever possible.
2. Where dimensions exceed unit size, provide two or more pieces of equal length as acceptable to Architect and Owner.
3. When overall dimensions require delivery in separate units, prefit at factory, disassemble for delivery, and make final joints at site.
4. Use splines at joints to maintain surface alignment.

D. Install units in locations and mounting heights as shown on Drawings, keeping perimeter lines straight, plumb and level.

E. Provide all grounds, clips, backing materials, adhesives, brackets, anchors, trim and accessories for complete installation.

F. Coordinate job-assembled units with grounds, trim and accessories; join all parts with neat, precision fit.

G. Verify accessories required for each unit properly installed and operating units properly functioning.

3.2 CLEANUP

A. Remove temporary protective cover at completion.

END OF SECTION

SECTION 11 53 13 - LABORATORY FUME HOODS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Bench-top laboratory fume hoods (barrier free).
   2. Fume hood base stands with countertops (barrier free).
   3. Laboratory cup sinks in fume hoods.
   4. Water, laboratory gas, and electrical service fittings in fume hoods.
   5. Piping and wiring within fume hoods for service fittings, light fixtures, blower switches, and other electrical devices.

B. Related Sections include the following:
   1. Division 12 Section "Wood Laboratory Casework" for laboratory cabinets, including countertops, sinks, and service fittings.
   2. Division 23 Sections for fume hood duct connections, including ducts.
   3. Division 22 and 26 Sections for installing service fittings in fume hoods, including piping and wiring within fume hoods, and for other wiring in fume hoods, including connecting light fixtures, blower switches, and other electrical devices.
   4. Division 22 and 26 Sections for connecting service utilities at back of fume hoods. Piping and wiring within fume hoods are specified in this Section.

1.2 PERFORMANCE REQUIREMENTS

A. Containment: Provide fume hoods that comply with the following when tested according to ASHRAE 110 as modified below at a release rate of 4.0 L/min.:
   1. Average Face Velocity: 100 fpm plus or minus 10 percent with sashes fully open.
   2. Face Velocity Variation: Not more than 10 percent of average face velocity.
   3. Sash Position: Fully open.
      a. Test hoods with horizontal sashes with maximum opening on one side, with maximum opening in the center, and with one opening at each side equal to half of maximum opening.
      b. Test hoods with combination sashes fully raised, with maximum opening on one side, with maximum opening in the center, and with one opening at each side equal to half of maximum opening.
   4. As-Manufactured (AM) Rating: AM 0.10.

B. Static-Pressure Loss: Not more than 3/8-inch wg at 100-fpm) face velocity when tested according to Paragraph 6.4.2.4 in SEFA 1.2, "Laboratory Fume Hoods--Recommended Practices."

1.3 SUBMITTALS

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

B. Shop Drawings: For laboratory fume hoods. Include plans, elevations, sections, details, and attachments to other work.
   1. Indicate details for anchoring fume hoods to permanent building construction including locations of blocking and other supports.
   2. Indicate locations and types of service fittings together with associated service supply connection required.
   3. Indicate duct connections, electrical connections, and locations of access panels.

4. Include roughing-in information for mechanical, plumbing, and electrical connections.
5. Show adjacent walls, doors, windows, other building components, laboratory casework, and other laboratory equipment. Indicate clearances from above items.
6. Include coordinated dimensions for laboratory equipment specified in other Sections.

C. Samples for Initial Selection: For factory-applied finishes epoxy sinks.

D. Product Test Reports: Based on evaluation of comprehensive tests according to SEFA 1.2, "Laboratory Fume Hoods--Recommended Practices" and ASHRAE 110 performed by manufacturer and witnessed by a qualified independent testing agency, for fume hoods.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain laboratory fume hoods through one source from a single manufacturer.

B. Product Designations: Drawings indicate sizes and configurations of laboratory casework by referencing designated manufacturer's catalog numbers. Unless modified by notation on Drawings, or otherwise specified, catalog description for designated product constitutes requirements for each product and establishes a standard of design and quality for materials, construction and workmanship. Other acceptable manufacturers' laboratory casework of similar sizes, similar door and drawer configurations, and complying with the Specifications will be accepted.

C. Product Standard: Comply with SEFA 1.2, "Laboratory Fume Hoods--Recommended Practices."

D. Safety Glass: Products complying with testing requirements in 16 CFR 1201 for Category II materials.
1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Administrative Requirements."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install fume hoods until building is enclosed, wet work and utility roughing-in are complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 COORDINATION

A. Coordinate installation of fume hoods with laboratory casework, fume hood exhaust ducts, and plumbing and electrical work.

1.8 EXTRA MATERIALS

A. Furnish complete touchup kit for each type and color of fume hood finish provided. Include fillers, primers, paints, and other materials necessary to perform permanent repairs to damaged fume hood finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Basis-of-Design: Campbell Rhea, refer to drawings for model number.
   2. Kewaunee Scientific Corporation, Laboratory Products Group.
   3. Fisher Hamilton L.L.C.
   4. Labconco Corporation.
   5. Collegedale Casework, LLC.

2.2 MATERIALS

A. Steel Sheet: Cold-rolled commercial steel sheet, complying with ASTM A 1008/A 1008M; matte finish; suitable for exposed applications.

B. Glass-Fiber-Reinforced Polyester: Polyester laminate complying with ASTM D 4357, with a chemical-resistant gel coat on the exposed face, and having a flame-spread index of 25 or less per ASTM E 84.

C. Epoxy: Factory molded of modified epoxy-resin formulation with smooth, nonspecular finish.
   1. Physical Properties:
      a. Flexural Strength: Not less than 10,000 psi.
      b. Modulus of Elasticity: Not less than 2,000,000 psi.
      c. Hardness (Rockwell M): Not less than 100.
      d. Water Absorption (24 Hours): Not more than 0.02 percent.
      e. Heat Distortion Point: Not less than 260 deg F.
   2. Flame-Spread Index: 25 or less per ASTM E 84.
   3. Chemical Resistance: Epoxy-resin material has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5:
      a. No Effect: Acetic acid (98 percent), acetone, ammonium hydroxide (28 percent), benzene, carbon tetrachloride, dimethyl formamide, ethyl acetate, ethyl alcohol, ethyl ether, methyl alcohol, nitric acid (70 percent), phenol, sulfuric acid (60 percent), and toluene.
      b. Slight Effect: Chromic acid (60 percent) and sodium hydroxide (50 percent).

D. Laminated Safety Glass: ASTM C 1172, Kind LT, Condition A, Type I, Class I, Quality q3 with clear, polyvinyl butyral interlayer.

2.3 CONVENTIONAL FUME HOODS

A. CAV (Constant Air Volume) type: Design incorporates an automatic air bypass system so that the exhaust air volume is constant. Bypass is recessed behind plane of the sash and affords velocity tempering performance with face velocities not in excess of 3.8 times full-open face velocity.

B. Fume hoods shall be designed for consistent and safe air flow through the hood face. Negative variations of face velocity shall not exceed 20% of the average face velocity at any designated measuring point as defined in this section.

C. Fume hood shall maintain essentially constant exhaust volume at any baffle position for safety. Maximum variation in exhaust CFM, static pressure and average face velocity as a result of baffle adjustment shall not exceed 5% for any baffle position at the specified face velocity.

2.4 FABRICATION

A. General: Preassemble fume hoods in factory to greatest extent possible. Disassemble fume hoods only as necessary for shipping and handling limitations. Fume hoods shall be capable of being partly disassembled as necessary to permit movement through a 35-by-79-inch door opening.

B. Steel Exterior: Fabricate from steel sheet, not less than 0.0478 inch thick, with component parts screwed together to allow removal of end panels, front fascia, and airfoil and to allow access to plumbing lines and service fittings. Apply chemical-resistant finish to interior and exterior surfaces of component parts before assembly.

C. Ends: Fabricate with double-wall end panels without projecting corner posts or other obstructions to interfere with smooth, even airflow. Close area between double walls at front of fume hood and as needed to house sash counterbalance weights, utility lines, and remote-control valves.

D. Interior Lining: Provide the following, unless otherwise indicated:
   1. Glass-fiber-reinforced polyester, not less than 1/4 inch thick.

E. Molded Glass-Fiber-Reinforced Polyester Lining: Molded unit consisting of end panels, back panel, preset rear baffle, and top bonded together into a single piece; reinforced to form a rigid assembly to which exterior is attached.
   1. Punch fume hood lining side panels to receive service fittings and remote controls. Provide removable plug buttons for holes not used for indicated fittings.

F. Exhaust Plenum: Full width of fume hood and with adequate volume to provide uniform airflow from hood, of same material as hood lining, and with duct stub for exhaust connection.
   1. Duct-Stub Material: Type 316 stainless steel.

G. Sashes: Provide operable sashes of type indicated.
   1. Fabricate from 0.0478-inch- minimum thickness steel sheet, with chemical-resistant finish. Form into four-sided frame with bottom corners welded and finished smooth. Make top member removable for glazing replacement. Set glazing in chemical-resistant, U-shaped gaskets.
   2. Glaze with laminated safety glass, with 3-mm-thick plies.
   3. Provide a frameless vertical sash containing a 1/4" (6 mm) glass panel connected to a steel rear-hung counterweight system insuring non-tilting, non-binding, and non-creeping sash performance. Rear-mounted counterweight shall be connected to a #35 case-hardened steel chain engaging a twin sprocket axle system with positive master link connection points both front and rear. Sash systems utilizing cables and pulleys are not acceptable.
   4. Provide sash opening height of 27 to 30 inches, unless otherwise indicated.
   5. Sash to be self-closing to 18 inches.

H. Provide airfoil at bottom of sash opening to direct airflow across countertop from 1-inch space between airfoil and countertop.

I. Light Fixtures: Provide vaporproof LED fixtures. Shield fuxtures from hood interior with 1/4-inch- thick laminated glass or 3-mm-thick tempered glass, sealed into hood with chemical-resistant rubber gaskets.
   1. Provide fixtures with color temperature of 3500 K and minimum color-rendering index of 85.

J. Fume Hood Base Stands: Fabricated from 0.0625- and 0.0500-inch-thick furniture grade, cold-rolled steel. Weld frame to form a rigid assembly with pipe chases at one side. The chase end panel is attached with screws and is removable for installation of plumbing and electrical services. Provide a removable enclosure panel at the rear of the base assembly. Finish entire assembly with chemical-resistant finish. Provide leveling device at each corner of base stand at floor.
   1. Provide clear floor space not less than required to comply with Americans with Disabilities Act Architectural Guidelines ADAAG.

K. Countertops and Cup Sinks:
   1. Resin Countertops: Fabricate with front overhang of 1 inch over base cabinets, continuous drip groove on underside 1/2 inch from edge, and factory cutouts for sinks.
      a. Countertop Material: Epoxy composition, uniform throughout full thickness.
   2. Cup Sinks: Epoxy, 3-by-6-inch nominal size.
      a. Provide with stainless-steel strainers and integral tailpieces.

L. Comply with requirements in Divisions 22, 23, and 26 Sections for installing water and laboratory gas service fittings, piping, electrical devices, and wiring. Install according to Shop Drawings. Securely anchor fittings, piping, and conduit to fume hoods, unless otherwise indicated.

2.5 CHEMICAL-RESISTANT FINISH

A. Preparation: Clean steel surfaces, other than stainless steel, of mill scale, rust, oil, and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it.

B. Chemical-Resistant Finish: Immediately after cleaning and pretreating, apply fume hood manufacturer's standard two-coat, chemical-resistant, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
   1. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8. Acceptance level for chemical spot test shall be no more than four Level 3 conditions.
   2. Colors for Fume Hood Finish: As selected by Architect from manufacturer's full range.

2.6 ACCESSORIES

A. Service Fittings: Comply with requirements in Division 12 Section "Wood Laboratory Casework."
   1. Provide service fittings with exposed surfaces, including fittings, escutcheons, and trim, finished with acid- and solvent-resistant, baked-on plastic coating in manufacturer's standard color as approved by Architect.

B. Mobile Flammable Storage Cabinet: Safety cabinet constructed 1-inch, 9-ply high density plywood, finished in standard caution yellow, with “flammable diamonds” on each door and “KEEP FIRE AWAY” in red

C. Airflow Indicator: Provide fume hoods with airflow indicator of the following type:

1. Indicator Type: Direct-reading aneroid (Magnehelic-type) gage that measures fume hood exhaust duct static pressure as an indication of airflow.
2. Indicator Type: Thermal anemometer that measures fume hood face velocity and indicates whether it is below normal, normal, or above normal.
3. Indicator Type: Thermal anemometer that measures fume hood face velocity and displays data as digital readout.
4. Indicator Type: Any indicator type above.

D. Airflow Alarm: Provide fume hoods with audible and visual alarm that activates when airflow sensor reading is outside of preset range.
1. Provide with either thermal-anemometer or aneroid (Magnehelic-type) gage airflow sensor.
2. Provide with reset and test switches.
3. Provide with switch that silences audible alarm and automatically resets when airflow returns to within preset range.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fume hoods. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fume hoods according to Shop Drawings and manufacturer's written instructions. Install level, plumb, and true; shim as required, using concealed shims, and securely anchor to building and adjacent laboratory casework. Securely attach access panels, but provide for easy removal and secure reattachment. Where fume hoods abut other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

B. Comply with requirements in Divisions 22, 23, and 26 Sections for installing water and laboratory gas service fittings, piping, electrical devices, and wiring. Install according to Shop Drawings and manufacturer's written instructions. Securely anchor fittings, piping, and conduit to fume hoods, unless otherwise indicated.

3.3 ADJUSTING AND CLEANING

A. Adjust moving parts for smooth, near silent, accurate sash operation with one hand. Adjust sashes for uniform contact of rubber bumpers. Verify that counterbalances operate without interference.

B. Clean finished surfaces, including both sides of glass; touch up as required; and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION

SECTION 12 24 13 - WINDOW SHADE SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes room darkening roller shades.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.

B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining work.

C. LEED Reports: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15 and appropriate forms.
   1. Credit IEQc4: Provide documentation of VOC content in g/L for adhesives and sealants; comply with VOC limits of Section 01 61 16.

D. Samples for Initial Selection: For each colored component of each type of shade indicated.
   1. Include similar Samples of accessories involving color selection.

E. Samples for Verification:
   1. Complete, full-size operating unit not less than 16 inches wide for each type of roller shade indicated.
   2. For the following products:
      a. Shade Material: Not less than 3 inches square, with specified treatments applied. Mark face of material.
      b. Fascia: Full-size unit, not less than 12 inches long.
      c. Complete parts box containing motorized shade hardware.

F. Product Certificates: For each type of roller shade, signed by product manufacturer.

G. Qualification Data: For Installer.

H. Product Test Reports: For each type of roller shade.

I. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:
   1. Methods for maintaining roller shades and finishes.
   2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
   3. Operating hardware.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed installation of roller shades similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations:
   1. Obtain roller shades through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test

method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Resistance Ratings: Passes NFPA 701.

D. Product Standard: Provide roller shades complying with WCMA A 100.1.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory packages, marked with manufacturer and product name and location of installation.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Store, handle, protect and install absorptive materials, including fabrics materials, in accordance with the Construction IAQ Management Plan required by Division 1 specifications.

C. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.6 WARRANTY

A. Installation: Provide roller shade installer’s warranty that installation shall be free of defects for a period of not less than 1 year.

B. In the event of a warranted product failure, the roller shade installer will, at no cost to Owner, facilitate acquisition and delivery of all necessary components to the Owner. Owner will provide roller shade dealer/installer with direct access to the work, during dealer/installer’s normal business hours.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Rollers Shades: Before installation begins, for each size, color, texture, and pattern indicated, full-size units equal to 5 percent of amount installed, or portion thereof.

PART 2 PRODUCTS

2.1 ROLLER SHADES

A. Basis-of-Design Products:

1. Roller Shades: Subject to compliance with requirements, provide MechoShade by MechoShade Systems or equivalent products by Draper or Rollease.

B. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.

1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.

2. Shade band and Shade Roller Attachment:
   a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch in diameter for manual shades, and less than 2.55 inches for motorize shades are not acceptable.
   b. Provide for positive mechanical engagement with drive / brake mechanism.

C. Access and Material Requirements:
   1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
   2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
   3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.

D. Shade Brackets: Provide shade hardware constructed of minimum 1/8-inch thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade.

E. Manual Shade Bracket: Mecho/5.

F. Fascia: Provide at all locations.
   1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
   2. Fascia shall be able to be installed across two or more shade bands in one piece.
   3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
   4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.

G. Mounting: Wall extension brackets mounting permitting easy removal and replacement without damaging roller shade or adjacent surfaces and finishes.

H. Dual Roll Black Out Shades: At Physics 226, provide dual roll assembly to include opaque and transluscent shade cloth with jamb and sill light seal channels.

2.2 ROLLER SHADE FABRICATION

A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch in either direction per 8 feet of shade height due to warp distortion or weave design. Fabricate hem as follows:
   1. Concealed hem tube (Translucent Shades).

C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

2.3 MANUAL OPERATED CHAIN DRIVE HARDWARE AND BRACKETS

A. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.

B. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.

C. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.

D. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable

E. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.

F. Drive Bracket / Brake Assembly:
   1. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
   2. The entire assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.

G. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

2.4 SHADE CLOTH

A. Translucent Single-Fabric Shadecloth: MechoShade Systems, Inc., EcoVeil group, 100 percent thermoplastic olefin.
   1. Shading:
      a. Roller Shades: EcoVeil "1550 Series", 3 percent open.
      b. Blackout Shade (Physics Lab 226): Opaque.

B. Color: Selected from manufacturer’s standard colors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions. Allow clearances for window operation hardware.

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades.

END OF SECTION

SECTION 12 35 50 - EDUCATIONAL CASEWORK

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes plastic laminate casework and related items including, but not limited to, countertops, back splashes, filler panels, and scribe pieces, as necessary for complete installation.
   1. Related Sections include the following:
      a. Division 8 Section "Resilient Flooring" for resilient wall base.
      b. Division 12 for Countertops.
      c. Division 12 for Laboratory Casework.
      d. Division 25 Sections for sinks and fittings in countertops.
      e. Division 26 Sections for electrical fittings and outlets.

1.2 SUBMITTALS

A. Product Data: For each type of educational casework unit specified.

B. Shop Drawings: Include plan layout, elevations, ends, cross-sections, location and type of service fittings, required clearances, methods of assembly and reassembly, design and arrangements.

C. LEED Report: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15 and appropriate forms.
   1. Credit IEQc4: Provide documentation of VOC content in g/L for adhesives and sealants; comply with VOC limits of Section 01 61 16.
   2. Credit MR 5: Provide documentation of recycled content type and percentage by cost, location of extraction/recovery/harvest of primary raw materials, steel mill process, location of mill, and location of fabrication.
   3. Credit MR 4: Except for sizes not available from regional producers, materials shall be extracted/harvested/recovered and manufactured within 500 miles of the job site.
   4. Credit MR 7: Submit applicable LEED Submittal Form for each different product made of sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, as well as locally-sourced wood, as specified in Section 01 35 15.

D. Samples for Selection: Manufacturer’s color charts and material samples showing full range of colors, textures, and finishes. Submit a basic container unit with shelves, dividers, base and hardware. Samples must have cutaways to clearly demonstrate materials, construction, workmanship, and finish.

E. Sample for Verification: Submit full size sample of typical cabinet which may be incorporated into the Work if in good condition and approved by Architect. Owner may take one cabinet unit off site for deconstructive testing. Cabinet will be selected at random. Replace unit at no extra cost to Owner.

F. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements.

G. Maintenance Data: For educational casework to include in maintenance manuals.

H. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage a firm specializing in installation of casework for a minimum of 5 years and acceptable to manufacturer.

B. Product Designations: Drawings indicate sizes and configurations of laboratory casework by referencing designated manufacturer's catalog numbers. Unless modified by notation on Drawings, or otherwise specified, catalog description for designated product constitutes requirements for each product and establishes a standard of design and quality for materials, construction and workmanship. Other acceptable manufacturers' laboratory casework of similar sizes, similar door and drawer configurations, and complying with the Specifications will be accepted

C. Single Source Responsibility: To assure coordinated unit design, all items in each room or space, other than appliances and special equipment specified in other Sections, shall be products of one manufacturer to the greatest extent possible.

D. Quality Standard: Except as otherwise indicated, comply with the following standards:
   1. AWI Cabinet Quality Standard: AWI Section 1600.
   2. AWI Countertop Quality Standard: AWI Section 400C.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Administrative Requirements."

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating educational casework without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of educational casework that fail in materials or workmanship within specified warranty period.

B. Warranty Period: 3 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Case Systems, Inc.
   2. The Mastercraft Woodworking Company.
   3. Stevens Cabinet Company, Inc.
   4. TMI Systems Design Corporation.
   5. Paragon Casework.
   6. Cabinets By Design, Inc.

2.2 MATERIALS

A. High Pressure Decorative Laminate: NEMA LD3, grades as indicated.
   1. Plastic Laminate: Vertical General Purpose Grade (VGS), 0.030-inch nominal thickness; for exterior cabinet surfaces, interiors of open cabinets, and underside of wall cabinets.
   2. Plastic Laminate Balancing Sheet: Cabinet Liner Grade (CLS), 0.020-inch nominal thickness, white high-pressure cabinet liner, for balancing exterior laminate surfaces.

B. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Formica Corporation.
      b. Nevamar; International Paper; Decorative Products Div.
      c. Wilsonart International; Div. of Premark International, Inc.
   2. Colors: As selected by Architect from manufacturer's full range of finishes and colors consisting of both patterns and solid colors. Provide a minimum of 100 patterns/colors to select from.
   3. End panels may match face or may be a color as selected from manufacturer's standard finishes and colors.
   4. A maximum total of 12 different casework colors will be selected for this Project. All exposed exterior elements including edges, door and cabinet sides, and exposed backs shall be available in matching color.

C. Pressure Fused Laminate: Melamine resin impregnated, 90 gram PSM minimum, thermofused to core under pressure, complying with NEMA LD3 VGS and NEMA LD3 CLS standards.
   1. Provide white pressure fused laminate for cabinet interiors behind doors and drawers.
   2. Provide balanced construction at all concealed surfaces with thermofused melamine. Unsurfaced coreboard or simple backers will not be accepted.

D. Plywood complying with DOC PS 1.

E. Hardboard:
   1. Hardboard shall meet or exceed Commercial Standards CS-251 and Federal Specifications LLL-B-00810.
   2. Tempered Hardboard 1/4 inch thick, smooth both sides.
   3. Hardboard exposed one side to be 1/4 inch thick, prefinished in putty color to match cabinet interior. Opposite face prefinished with neutral color balance coating.

F. Edging Materials: Comply with the following:
   1. Exposed Exterior Cabinet Edges, Interior Dividers, Drawer Bodies, and Shelves: Banded with matching material, resistant to chipping, cracking, and high impact, applied with waterproof hot melt adhesive.
   2. Door and Drawer Front Edges: Banded with contrasting or matching PVC extrusion, 3 mm thick, resistant to chipping, cracking, and high impact, applied with waterproof hot melt adhesive, and shaped to provide radiused edges and corners.
   3. Color selection for PVC edging will be made at a later date; Architect reserves the right to select colors manufactured and offered by Woodtape Edge Banding (at no additional cost to the Owner), when a standard selection offered by the casework manufacturer does not provide a suitable color in the Architect's opinion.

G. Hardware:

1. Hinges: Hinges fully concealed from view when door is in closed position and shall permit 176-degree door swing. Hinge crank of heavy duty steel with a concealed integral self-closing spring mechanism. Hinge bosses of heavy duty diecast steel. Nylon expansion inserts to be provided in door for positive screw attachment. Hinge shall incorporate mounting features providing three-dimensional adjustment. Hinges to have lifetime guarantee as warranted by manufacturer. Doors less than 48 inches in height with 2 hinges per door, doors 48 to 63 inches in height with 3 hinges per door and all doors in excess of 63 inches with 4 hinges per door.
2. Wire Pulls: Stainless steel, accurately positioned on door and drawer front with #8-32 screws.
3. Door Catch: Heavy duty, spring-loaded, large roller type. Each door with a single catch mounted at the bottom edge. All mobile cabinets and doors over 48 inches high with a catch at both top and bottom of door.
4. Catch Strike Plate: Injection molded nylon, almond color, with integral molded engagement ridge. Strike plate to also provide a wide face bumper insuring a positive door stop.
5. Hanger Rods: 1-inch diameter heavy gage plated tubing, securely affixed in cabinet with injection molded rod sockets.
6. Drawer and Slide-Out Shelf Slides: Nylon roller steel slides to insure quiet, smooth operation. 100-lb load rating with built-in drawer stop and self-close feature in the last 1-inch of travel.
7. File Drawer Slides: Full extension steel slides with ball bearing nylon rollers. 100-lb. load rating.
8. Locks: Cylinder type, diecast, with 5 disc tumbler mechanism. Each lock to be provided with a milled brass key with keying options of keyed alike, keyed different, and master keyed locks, as selected by Owner. Provide locks on all cabinet doors and drawers, except sink and fumehood base cabinets.
9. Grommets: Plastic or metal, 1.5-inch-diameter, placed at each computer station.

H. Adjustable Shelf Support System:
1. Support Clips for Adjustable Shelves: 3/4-inch-and 1-inch-thick, injection molded nylon, incorporating integrally molded lock tabs to retain shelf from tipping or inadvertently being lifted out. Support clip to have double pin engagement into precision bored hole pattern in cabinet vertical members, with molded ridge in the clip body to provide additional pressure against edge of shelving and to maintain positive pin engagement. Clip shall be designed to provide means to permanently attach shelf to support clips. Static test load must exceed 200-lb per clip.
2. Vertical and Horizontal Shelf Dividers: 1/4-inch-thick, fully adjustable and retained with injection molded nylon support clip designed to trap divider to eliminate inadvertent lift out.
3. Adjustable Shelves and Dividers: Adjustable at 1.25 inches o.c. through full height of compartment.

I. Wardrobe Clothes Pole: 1-1/16-inch chrome steel rod – LH-362.

J. Wardrobe Clothes Pole Socket: Knape & Vogt #734 Flange Chrome.

K. Coat Hooks:
1. Single coat hooks - HEWI No. 520.60.1 ABS plastic, color to be selected by Architect from manufacturer's full range.
2. Double coat hooks - HEWI 520.50.2 ABS plastic, color to be selected by Architect from manufacturer's full range.

3. Ceiling hooks - HEWI 513 ABS plastic, color to be selected by Architect from manufacturer's full range.

L. Hangers: Captive and removable wood or metal; 17-inch.

2.3 COUNTERTOPS

A. Reference Section 12 36 00 Countertops.

2.4 FABRICATION, GENERAL

A. Cabinet Construction: High-pressure plastic laminate surface finish; flush overlay type door/drawer style.

B. Chemical Content: All materials used shall be relatively nontoxic when exposed to heat or flame.

C. Wall Hung Units: When mounted on a wall and loaded with 25 psf on all horizontal surfaces, units shall resist a lateral force applied at the bottom of the cabinet parallel to the long dimension of the cabinet of 300 lbs without failure. Each wall hung unit shall safely support a uniform load of 600 lbs.

D. Storage units with or without doors shall be able to have shelves and/or vertical dividers rearranged within one or more units of same size without defacing interior of unit.

2.5 FABRICATION, CABINETS

A. Drawers:
1. Drawers: Full box body design with a separate front; body sides and ends minimum 5/8-inch medium density fiberboard with almond color melamine laminate faces and matching almond color PVC top edges; bottoms minimum 1/4-inch thick medium density fiberboard with almond color facing.
2. Corner Joints: Interlocking dowel pin design, with 8mm diameter dowel pins inserted into drawer ends and fitted into matching hole patterns in drawer sides. Bottoms to be let into grooves all four sides; all joints glued and bottoms shall have additional mechanical fasteners; drawers to operate on mechanical slides as separately described.
3. Separate drawer front, surfaced and edges as described, attached to drawer body with no less than 4 screws through front side.

B. Solid Hinged Doors: 3/4-inch thick particle board core, balanced construction laminate faces. Surfacing, edging and hinges as separately described.

C. Solid Sliding Doors: 3/4-inch thick particle board core, balanced construction laminate faces. Each door with 2 nylon rollers mounted in bottom of door panel, and with door operating in aluminum top and bottom tracks. Surfacing and edging as separately described.

D. Sliding Display Doors: Constructed of 1/4-inch thick, distortion free glazing sheets. Outer edge to have full length aluminum pull channel for strength. Doors must be accurately sized for easy movement in upper and lower extruded aluminum guide channels.

E. Adjustable Shelves: Shelves less than 36 inches in length shall be 3/4 inches thick. Shelves 36 inches long and over, and all adjustable shelves in wall cabinets and bookcases shall be 1 inch thick. Shelves shall be constructed of plywood with almond color melamine laminate surfaces. Leading edge of shelf finished with a high impact, rigid PVC extrusion, almond in color to match shelf surface and cabinet interior. Exposed surfaces of open shelving without doors shall be finished with plastic laminate.

F. Frame Rails Between Drawers: Full cabinet length, 3/4 inches thick by 3-1/2 inches wide, pinned, and fastened into cabinet sides. Front leading edge to be edged as separately described.

G. Tote Trays: High impact polystyrene with smooth edges. Provide each tray with a card holder. Suspend tote trays from rails securely attached to cabinet partitions and sides.

2.6 FABRICATION, FIXED CASEWORK (BASE, WALL, HUTCH, AND TALL UNITS)

A. Corner Joints: Incorporate fluted hardwood dowel pin construction, factory glued and clamped under pressure to assure rigid loadbearing corner joints.

B. Cabinet Ends: 3/4-inch-thick panels of balanced construction, precision bored for fluted hardwood dowel pins installed in horizontal cabinet members. Base and tall units with one piece end panels continuous to floor for added load capability. Unexposed ends with laminate backing sheet.

C. Cabinet Bottoms and Tops: 3/4-inch-thick panels of balanced construction for base and tall units. Precision bore panels to receive fluted hardwood dowel pins inserted with glue. Dowel pins shall extend from the panel ends for joining into mating hole patterns in the cabinets' side panels.

D. Wall Cabinets: Full 1-inch-thick panels of balanced construction, with the same fluted hardwood fluted dowel pin and glue joint construction as the base and tall cabinets.

E. Kick Panels: 4-inch-high, set back from cabinets' front edge and mechanically fastened to cabinet bottom and ends, to be an integral part of cabinet structure.

F. Back Panels: 3/8-inch-thick, set in 3/8 inch from rear panels of balanced construction surfaced as described.

G. Finished exposed backs of fixed cabinets shall be 3/4-inch-thick panels of balanced construction surfaced as described.

H. Hanging rails to be provided in wall cabinets in upper back corner for mounting units to walls.

I. Cabinet Subbase:
   1. To be separate and continuous (no cabinet body sides-to-floor), water-resistant exterior grade plywood with concealed fastening to cabinet bottom.
   2. Ladder-type construction of front, back and intermediates to form a secure and level platform to which cabinets attach.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for, installation tolerances, and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Do not install casework units until painting and drywall work in the space has been completed and the space is dry.

B. Install cabinets in such a way that relocation can be accomplished without marred end panels and use of special tools.

C. Install cabinets under supervision of manufacturer's representative with factory-trained journeymen authorized by manufacturer.

D. Install cabinets indicated on Drawings in correct locations.

E. Erect casework straight, level and plumb and securely anchor in place; base cabinets installed on plywood ladder bases.

F. Mount wall-hung cabinets on concealed 1-by-3 softwood hanging strips secured to wall with expansion or toggle bolts, minimum four per cabinet.

G. Firmly anchor fixed cabinets and any required scribe moldings to walls and floors. Finish of scribe molding shall match cabinets.

H. Furnish scribes 3/4 inch thick and filler pieces to fill spaces in material matching cabinet panels or frames, between units and between units and walls where open spaces occur.

I. Patch surfaces damaged by installation to new condition or remove and install new material as approved.

J. Rims of sinks specified in Division 15 shall be set in sealant to insure waterproof seal between rim and countertop.

3.3 CLEANING AND PROTECTION

A. Leave finished work clean, free of scratches, dents, gouges, or other damage, with doors and drawers operating freely at time of final acceptance. Leave work area clean and free of debris.

B. Protect materials and installed casework from damage by work of other trades.

END OF SECTION

SECTION 12 35 53 - WOOD LABORATORY CASEWORK

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Wood laboratory casework.
   2. Laboratory countertops.
   3. Shelves.
   4. Laboratory sinks and troughs.
   5. Laboratory fixtures.
   6. Accessories.

B. Wood laboratory casework and equipment as specified herein and as scheduled, and noted on the drawings is to be furnished, delivered, and installed in the location required by the drawings, and left ready for connection of plumbing fixtures and electrical fixtures by others.

C. Casework, equipment, service fixtures and related work shall include:
   1. Furnishing, delivering to the building, uncrating, setting in place and leveling all casework and equipment listed in this specification or equipment schedule and/or shown on the drawings.
   2. Furnishing plumbing fixtures and fittings as defined in this specification, complete with tank nipples and lock nuts for mounting fixtures and fittings to tops or curbs. Fixtures shall be furnished assembled, in properly marked cartons for installation by casework contractor. Final hook up or connection to services shall be by others. Nipples for hot and cold water shall be brass.
   3. Furnishing electrical service fixtures directly attached to the casework or equipment as called for in this specification, equipment list and/or shown on the drawings. Fixtures shall be furnished assembled in properly marked cartons for installation and final hook up or connection by others. Rough in boxes for duplex receptacles and data drops located in cabinetry or aprons shall be installed at the factory by the equipment manufacturer.
   4. Furnishing of sink bowls and cupsinks, complete with required sink supports, overflows, and outlets with plugs and strainers, as called for in this specification, equipment schedule and/or shown on the drawings. Units shall be assembled and installed by casework contractor. Separate outlets shall not exceed 4” in length. Outlets shall be furnished without couplings required to connect to the drain piping system. Installation of the outlets shall be by casework supplier.
   5. Furnish along with specified fume hoods all service fixtures, fittings, remote control rods, escutcheon plates, valve handles and nipples. Service fixtures shall be furnished attached to superstructure and pre-piped below countertop for final connection by others.
   6. Furnishing and installing countertops as shown on the drawings, of the size and shape required on all laboratory casework.
   7. Remove all debris, dirt and rubbish accumulated as a result of installation of this equipment, leaving premises broom clean and orderly.
   8. Final Adjustment: It is recognized that wood doors and drawers will swell and stick because of unusually high ambient moisture in new construction work. Casework installer shall during the first year return after final inspection to make any final adjustments to drawers and doors to eliminate sticking or other problems. Any doors or drawers, which cannot be corrected shall be replaced.

D. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for wood blocking for anchoring laboratory casework.
2. Division 9 Section "Gypsum Board Assemblies" for reinforcements in metal-framed gypsum board partitions for anchoring laboratory casework.
3. Division 9 Section "Resilient Flooring" for resilient base applied to wood laboratory casework.
4. Division 11 Section "Laboratory Fume Hoods" for fume hoods, including base cabinets and countertops under fume hoods.
5. Division 25 Sections for sinks and fittings in countertops.
6. Division 26 Sections for electrical fittings and outlets.

1.2 DEFINITIONS

A. Exposed Portions of Casework: Surfaces visible when doors and drawers are closed, including bottoms of cabinets more than 48 inches above floor, and visible surfaces in open cabinets or behind glass doors.
   1. Ends of cabinets indicated to be installed directly against and completely concealed by walls or other cabinets after installation shall not be considered exposed.

B. Semiexposed Portions of Casework: Surfaces behind opaque doors, such as interiors of cabinets, shelves, dividers, interiors and sides of drawers, and interior faces of doors. Tops of cases 78 inches or more above floor are defined as semiexposed.

C. Concealed portions of casework include sleepers, web frames, dust panels, and other surfaces not usually visible after installation.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include independent certification that applied finish complies with specified chemical and physical resistance requirements.

B. Shop Drawings: For wood laboratory casework. Include plans, elevations, sections, details, and attachments to other work.
   1. Indicate locations of blocking and reinforcements required for installing laboratory casework.
   2. Include details of exposed conduits, if required, for service fittings.
   3. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and other laboratory equipment.
   4. Include coordinated dimensions for laboratory equipment and service fittings specified in other Sections.

C. LEED Reports: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15 and appropriate forms.
   1. Credit IEQc4: Provide documentation of VOC content in g/L for adhesives and sealants; comply with VOC limits of Section 01 61 16.
   2. Credit MR 5: Provide documentation of recycled content type and percentage by cost, location of extraction/recovery/harvest of primary raw materials, steel mill process, location of mill, and location of fabrication.
   3. Credit MR 4: Except for sizes not available from regional producers, materials shall be extracted/harvested/recovered and manufactured within 500 miles of the job site.
   4. Credit MR 7: Submit applicable LEED Submittal Form for each different product made of sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, as well as locally-sourced wood, as specified in Section 01 35 15.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework finishes and countertops with requirements specified for chemical and physical resistance.

E. Maintenance Data: For laboratory casework to include in maintenance manuals.

F. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain laboratory casework, including countertops, sinks, service fittings, and accessories, through one source from a single manufacturer.
   1. Obtain through same source from same manufacturer as fume hoods specified in Division 11 Section "Laboratory Fume Hoods."

B. Product Designations: Drawings indicate sizes and configurations of laboratory casework by referencing designated manufacturer's catalog numbers. Unless modified by notation on Drawings, or otherwise specified, catalog description for designated product constitutes requirements for each product and establishes a standard of design and quality for materials, construction and workmanship. Other acceptable manufacturers' laboratory casework of similar sizes, similar door and drawer configurations, and complying with the Specifications will be accepted.

C. Product Standard: Comply with SEFA 8, "Laboratory Furniture--Casework, Shelving and Tables--Recommended Practices."

D. Flammable Liquid Storage: Where cabinets are indicated for solvent or flammable liquid storage, provide units that are listed and labeled as complying with requirements of NFPA 30 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F. Accessibility Requirements: In addition to local governing regulations, comply with “Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG).”

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Administrative Requirements."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver laboratory casework only after wet operations in areas where casework is to be installed are completed.

B. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

C. Store completed laboratory casework in a ventilated place, protected from the weather, with relative humidity of 50 percent or less at 70 deg F.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install wood laboratory casework until building is enclosed, wet work and utility roughing-in are complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 COORDINATION

A. Coordinate layout and installation of framing and reinforcements for support of wood laboratory casework.

B. Coordinate installation of wood laboratory casework with installation of fume hoods and other laboratory equipment.

1.8 WARRANTY

A. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of laboratory casework systems due to defects of material and workmanship. Warranty shall not cover damage caused by misuse or negligence.
   1. Warranty Period: 3years from date of Substantial Completion.

1.9 EXTRA MATERIALS

A. Furnish complete touchup kit for each type and color of wood laboratory casework provided. Include scratch fillers, stains, finishes, and other materials necessary to perform permanent repairs to damaged laboratory casework finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Wood Laboratory Casework:
      a. Basis-of-Design: Campbell Rhea.
      b. Leonard Peterson.
      c. Sheldon Laboratory Systems.
      d. Kewaunee Scientific Corporation, Laboratory Products Group.
   2. Epoxy Countertops, Sinks and Troughs:
      a. Durcon Company, Inc. (The).
      b. Epoxyn Products.
      c. Laboratory Tops, Inc.
      d. Prime Industries, Inc.

2.2 CABINET MATERIALS

A. General:
   1. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.
   2. Hardwood Plywood: HPVA HP-1 made with adhesive containing no urea formaldehyde, either veneer core or particle core, unless otherwise indicated.
   3. Edgebanding for Wood-Veneered Construction: Minimum 1/8-inch-thick, solid wood of same species as face veneer; laminating glue shall contain no urea-formaldehyde.

B. Exposed Materials:
   1. General: Provide materials that are selected and arranged for compatible grain and color. Do not use materials adjacent to one another that are noticeably dissimilar in color, grain, figure, or natural character markings.
   2. Wood Species and Veneer Cut: Maple, plain sawn, slip matched.
   3. Stain Colors and Finishes: As selected by Architect from manufacturer's full range.
   4. Solid Wood: Clear hardwood lumber.

5. Plywood: Urea-formaldehyde free hardwood plywood; Grade A exposed faces at least 1/50 inch thick, Grade J crossbands, and backs of same species as faces.

C. Semiexposed Materials:
1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects, of any species similar in color and grain to exposed solid wood.
2. Plywood: Urea-formaldehyde free hardwood plywood of any species similar in color and grain to exposed plywood. Grade B faces, Grade J crossbands, and backs of same species as faces. Semiexposed backs of plywood with exposed faces shall be same species as faces.

D. Concealed Materials:
1. Solid Wood: Any hardwood or softwood species, with no defects affecting strength or utility.
2. Plywood: Urea-formaldehyde free hardwood plywood. Concealed backs of plywood with exposed or semiexposed faces shall be same species as faces.
3. Particleboard: ANSI A208.1, Grade M-3 Exterior Glue complying with requirements in ANSI A208.1, Grade M-3.
4. Hardboard: AHA A135.4, Class 1 tempered.

E. Glass for Glazed Doors: Clear tempered glass complying with ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality q3; not less than 5.5 mm thick.

2.3 CABINET DESIGN

A. Empire Full Overlay Style.

B. Grain Direction: Vertical on doors, horizontal on drawer fronts.

2.4 CABINET FABRICATION

A. Construction: Provide wood-faced laboratory casework of the following minimum construction:
1. Bottoms and Ends of Cabinets, Shelves, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch- thick plywood.
2. Base Cabinet Top Frames: 3/4-by-2-inch solid wood with mortise and tenon or doweled connections, glued with urea-formaldehyde free glue and pinned or screwed.
3. Backs of Cabinets: 3/4-inch- thick plywood where exposed, 1/4-inch- thick hardboard dadoed into sides, bottoms, and tops where not exposed.
4. Security Panels: 1/4-inch-thick hardboard panels between drawers and between drawers and doors when base cabinet locks are keyed differently.
5. Drawer Fronts: 3/4-inch- thick plywood or solid hardwood.
6. Drawer Sides and Backs: 1/2-inch- thick solid wood or plywood, with urea-formaldehyde free glued dovetail or multiple-dowel joints.
7. Drawer Bottoms: 1/4-inch- thick plywood glued and dadoed into front, back, and sides of drawers. Use 1/2-inch- thick material for drawers more than 24 inches wide.
8. Doors 48 Inches or Less in Height: 3/4 inch thick, with particleboard or medium-density fiberboard cores, solid hardwood stiles and rails, and hardwood face veneers and crossbands.
9. Doors More Than 48 Inches in Height: 1-1/8 inches thick, with honeycomb cores, solid hardwood stiles and rails, and veneer plywood on both sides.
10. Stiles and Rails of Glazed Doors: 3/4-inch- thick solid hardwood.

B. Leg Shoes: Vinyl or rubber, black, open-bottom type.

1. Provide minimum 1-1/2-inch-diameter, nonmarring floor glides with minimum 5/8-inch height adjustment capability, for open-leg tables.

C. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinet fronts.

D. Accessibility Requirements: Modify cabinets where indicated, as required to comply with the "Americans with Disabilities Act (ADA)."

2.5 WOOD FINISH

A. Preparation: Sand lumber and plywood for laboratory casework construction before assembling. Sand edges of doors, drawer fronts, and molded shapes with profile-edge sander. Sand casework after assembling for uniform smoothness at least equivalent to that produced by 220 grit sanding and without machine marks, cross sanding, or other surface blemishes.

B. Staining: Remove fibers and dust and apply stain to exposed and semiexposed surfaces as necessary to match approved Samples. Apply stain in a manner that will produce a consistent appearance. Apply wash-coat sealer before applying stain to closed-grain wood species.

C. Chemical-Resistant Finish: Apply laboratory casework manufacturer's standard three-coat, chemical-resistant, transparent finish consisting of sealer and catalyzed topcoat(s). Sand and wipe clean between coats. Topcoat(s) may be omitted on concealed surfaces.
1. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8. Acceptance level for chemical spot test shall be no more than four Level 3 conditions.

2.6 CABINET HARDWARE

A. General: Provide laboratory casework manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.

B. Hinges: Stainless-steel, 5-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips. Provide 2 for doors 48 inches or less in height; 3 for doors more than 48 inches in height.

C. Pulls: Solid aluminum, stainless steel, or chrome-plated brass; fastened from back with two screws. For sliding doors, provide stainless-steel or chrome-plated recessed flush pulls. Provide 2 pulls for drawers more than 24 inches in width.

D. Door Catches: Nylon-roller spring catch or dual, self-aligning, permanent magnet catch. Provide 2 catches on doors more than 48 inches in height.

E. Drawer Slides: Powder-coated, full-extension, self-closing, heavy-duty drawer slides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05091, and rated for 100 lbf.

F. Label Holders: Stainless steel, aluminum, or chrome plated; sized to receive standard label cards approximately 1 by 2 inches, attached with screws or rivets. Provide on all drawers.

G. Locks: Cam type with 5-pin tumbler, brass with chrome-plated finish; complying with BHMA A156.11, Type E07281.
1. Provide minimum of two keys per lock and five master keys where each of the following room(s) is keyed alike:
a. Physics & Physics Prep
b. Biology
c. Chemistry

d. Bio/Chem Prep
e. Engineering/Engineering Prep

2. Provide on all drawers and doors.

H. Adjustable Shelf Supports: Pin-type, corrosion-resistant coated shelf support clips for mounting on interior of cabinet work, to retain shelves from accidental removal. Shelves shall be adjustable on 2-inch centers. Surface mounted metal support strips and clips subject to corrosion are not acceptable.

2.7 COUNTERTOPS, TROUGHS, AND SINKS

A. Countertops, General: Provide units with smooth surfaces in uniform plane free of defects. Make exposed edges and corners straight and uniformly beveled. Provide front and end overhang of 1 inch, with continuous drip groove on underside 1/2 inch from edge.

B. Sinks, General: Provide sizes indicated or laboratory casework manufacturer's closest standard size of equal or greater volume, as approved by Architect.
1. Outlets: Provide with strainers and tailpieces, NPS 1-1/2, unless otherwise indicated.
2. Overflows: For each sink except cup sinks, provide overflow of standard beehive or open-top design with separate strainer. Height 2 inches less than sink depth. Provide in same material as strainer.

C. Epoxy Countertops, Troughs, and Sinks: Factory molded of modified epoxy-resin formulation with smooth, nonspecular finish.
1. Physical Properties:
a. Flexural Strength: Not less than 10,000 psi.
b. Modulus of Elasticity: Not less than 2,000,000 psi.
c. Hardness (Rockwell M): Not less than 100.
d. Water Absorption (24 Hours): Not more than 0.02 percent.
e. Heat Distortion Point: Not less than 260 deg F.
2. Chemical Resistance: Epoxy-resin material has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5:
a. No Effect: Acetic acid (98 percent), acetone, ammonium hydroxide (28 percent), benzene, carbon tetrachloride, dimethyl formamide, ethyl acetate, ethyl alcohol, ethyl ether, methyl alcohol, nitric acid (70 percent), phenol, sulfuric acid (60 percent), and toluene.
b. Slight Effect: Chromic acid (60 percent) and sodium hydroxide (50 percent).
3. Color: Black.
4. Countertop Fabrication: Fabricate with factory cutouts for sinks and with butt joints assembled with epoxy adhesive and prefitted, concealed metal splines.
a. Countertop Configuration: Flat, 1 inch thick, with rounded edge and corners, and with drip groove and integral coved backsplash where indicated on the drawings.
b. Countertop Construction: Uniform throughout full thickness.
5. Table Top Configuration: Raised (marine) edge, 1-1/4 inch thick at raised edge, with rounded edge and corners, and with integral coved backsplash.
6. Sink Fabrication: Molded in 1 piece with smooth surfaces, coved corners, and bottom sloped to outlet; 1/2-inch minimum thickness.
a. Provide with polypropylene strainers and tailpieces.

D. Cup Sinks: Material and size as indicated.
1. Provide epoxy cup sinks with polypropylene strainers and integral tailpieces.

2.8 ACCESSORIES

A. Reagent Shelves: Provide as indicated, fabricated from same material as adjacent countertop, unless otherwise indicated.

B. Pegboards: Phenolic-composite pegboards with removable polypropylene pegs and stainless-steel drip troughs with drain outlet.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of wood laboratory casework.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF CABINETS

A. Install level, plumb, and true; shim as required, using concealed shims. Where laboratory casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

B. Base Cabinets: Adjust top rails and subtops within 1/16 inch of a single plane. Fasten cabinets to utility-space framing, partition framing, wood blocking, or reinforcements in partitions with fasteners spaced not more than 24 inches o.c. Fasten adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.
   1. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches o.c. and at sides of cabinets with not less than 2 fasteners per side.

C. Wall Cabinets: Adjust fronts and bottoms within 1/16 inch of a single plane. Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 24 inches o.c. Align similar adjoining doors to a tolerance of 1/16 inch.

D. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.

E. Adjust laboratory casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

3.3 INSTALLATION OF COUNTERTOPS

A. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where shown on Shop Drawings.

B. Field Jointing: Where possible, make in the same manner as shop jointing using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop.
   1. Use concealed clamping devices for field joints in plastic-laminate countertops. Locate clamping devices within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a uniform heavy pressure at joints.

C. Fastening:
   1. Secure epoxy countertops to cabinets with epoxy cement, applied at each corner and along perimeter edges at not more than 48 inches o.c.

2. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.

D. Provide required holes and cutouts for service fittings.

E. Seal unfinished edges and cutouts in plastic-laminate countertops with heavy coat of polyurethane varnish.

F. Provide scribe moldings for closures at junctures of countertop, curb, and splash, with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.

G. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

3.4 INSTALLATION OF SINKS

A. Underside Installation of Epoxy Sinks: Use laboratory casework manufacturer's recommended adjustable support system for table- and cabinet-type installations. Set top edge of sink unit in sink and countertop manufacturers' recommended chemical-resistant sealing compound or adhesive and firmly secure to produce a tight and fully leakproof joint. Adjust sink and securely support to prevent movement. Remove excess sealant while still wet and finish joint for neat appearance.

3.5 INSTALLATION OF ACCESSORIES

A. Install accessories according to Shop Drawings and manufacturer's written instructions.

B. Securely fasten pegboards to partition framing, wood blocking, or reinforcements in partitions.

3.6 CLEANING AND PROTECTING

A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

B. Protect countertop surfaces during construction with 6-mil plastic or other suitable water-resistant covering. Tape to underside of countertop at minimum of 48 inches o.c.

END OF SECTION

SECTION 12 36 00 - COUNTERTOPS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Countertops for architectural cabinet work.

B. Wall-hung counters and vanity tops.

C. Window sills.

1.2 RELATED REQUIREMENTS

A. Section 06 41 00 - Architectural Wood Casework.

B. Division 12 - Educational Casework.

1.3 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

B. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; International Surface Fabricators Association; 2013.

C. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

D. PS 1 - Structural Plywood; 2009.

1.4 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. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

G. LEED Reports: Accurately document the use of recycled materials and local/regional materials, as required by Section 01 35 15 and appropriate forms.
   1. Credit IEQc4: Provide documentation of VOC content in g/L for adhesives and sealants; comply with VOC limits of Section 01 61 16.
   2. Credit MR 5: Provide documentation of recycled content type and percentage by cost, location of extraction/recovery/harvest of primary raw materials, steel mill process, location of mill, and location of fabrication.
   3. Credit MR 4: Except for sizes not available from regional producers, materials shall be extracted/harvested/recovered and manufactured within 500 miles of the job site.
   4. Credit MR 7: Submit applicable LEED Submittal Form for each different product made of sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, as well as locally-sourced wood, as specified in Section 01 35 15.

H. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.

B. Installer Qualifications: Fabricator.

1.6 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.

1.7 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 COUNTERTOP ASSEMBLIES

A. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. Flat Sheet Thickness: 1/2 inch, minimum.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01and NEMA LD 3; acrylic or 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.
      a. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E84.
      b. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
      c. Color and Pattern: To be selected from manufacturer's full line, including all price groups.
      d. Manufacturers:
         1) Basis-of-Design - Dupont: www.corian.com.
         2) Formica Corporation: www.formica.com.
         3) Avonite Surfaces : www.avonitesurfaces.com.
         4) Wilsonart, LLC: www.wilsonart.com.
   3. Other Components Thickness: 1/2 inch, minimum.
   4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge; use marine edge at sinks.
   5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
   6. Skirts: As indicated on drawings.

2.2 ACCESSORY MATERIALS

A. Wood-Based Components:
   1. Wood fabricated from old growth timber is not permitted.
   2. Composite Wood and Agrifiber Products: No added urea formaldehyde.

B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

C. Backer Sheet: Provide substrate with laminate backer sheet.

D. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

E. Surface-mounted "Rakks" Counter Brackets: L-shaped bracket fabricated from aluminum T sections; Model No. EH as manufactured by Rangine Corporation.
   1. Load capacity per bracket: 450 pounds.
   2. Size as required for each location.
   3. Finish: Custom powder paint coating.
   4. Provide with 5/8 inch opening rubber grommet installed in 7/8 inch hole.

2.3 FABRICATION

A. 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 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.

B. 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.

C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

D. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

PART 3 EXECUTION

3.1 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.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.2 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Seal joint between back/end splashes and vertical surfaces.

3.3 CLEANING AND PROTECTION

A. Clean countertops surfaces thoroughly.

B. Protect installed products until completion of project.

C. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 12 48 13 - ENTRANCE FLOOR MATS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Extruded aluminum entrance floor grilles.

B. Recessed mat frames.

1.2 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating properties of walk-off surface, component dimensions, recessed frame characteristics and profiles, and finishes.

C. Shop Drawings: Indicate dimensions, details for recessed frame, and divisions between mat sections.

1. For recessed frames located within a dimensionally restricted area, show dimensions of space within which the frame will be installed.

D. Samples for Initial Selection: For each type of product indicated.

E. LEED Submittals:

1. Credit MR 4: Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   a. Contributions to this Credit include recycled content of aluminum.
2. Coordinate with Construction Indoor Air Quality management Plan.

F. Maintenance Data: Include cleaning instructions and stain removal procedures.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain floor mats and frames through one source from a single manufacturer.

B. Accessibility Requirements: Provide installed floor mats that comply with most stringent requirements of Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)" and Sections 302 and 303 in ICC A117.1.

1.4 PROJECT CONDITIONS

A. Field Measurements: Indicate measurements on Shop Drawings.

1.5 COORDINATION

A. Coordinate size and location of recesses in concrete with installation of finish floors to receive floor mats and frames.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Entrance Floor Grilles and Gratings:

1. (Basis-of-Design) Construction Specialties, Pedigrid G1; www.c-sgroup.com.
2. Arden Architectural Specialties, Inc: www.ardenarch.com.
3. Pawling Corporation: www.pawling.com.

2.2 ENTRANCE FLOOR GRILLES AND GRATINGS

A. Entrance Floor Grilles: Recessed extruded aluminum grille assembly with nominal 1 inch wide tread strips running perpendicular to traffic flow, slots between treads, and perimeter frame forming sides of recess; grille hinged for access to recess.
   1. Recess Depth: 1 13/16 inches.
   2. Size: Custom as indicated on the drawings.
   3. Frame: Shall be 6063-T5 aluminum alloy with 1/2"(12.7mm) exposed surface and a depth of 1-13/16" (46.0mm). These assemblies receive 1/4"(6.4mm) thick heavy gauge EPDM support cushions 1" (25.4mm) long mounted to each continuous foot at 20" (0.51m) on center. Frame shall be supplied in mill finish aluminum.
   4. Pan: Anodized aluminum bottom pan with drain, sealed to frame and custom fabricated to the design by the manufacturer in the factory.
   5. Tread Inserts: RR- Recycled Rubber ECO Surfaces® Recycled Rubber Insert- High slip resistant rubber (SC of 90) insert manufactured with recycled rubber and EPDM.
      a. Color: As selected by Architect from manufacturers full range.

B. Mounting: Top of non-resilient members level with adjacent floor.

C. Structural Capacity: Capable of supporting a rolling load of 400 pounds without permanent deformation or noticeable deflection.

D. Vibration Resistant Fabrication: All members welded, riveted, or bolted; no snap or friction connections.

2.3 CONCRETE FILL AND GROUT MATERIALS

A. Provide concrete grout and fill equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.

2.4 FABRICATION

A. Construct recessed mat frames square, tight joints at corners, rigid. Coat surfaces with protective coating where in contact with cementitious materials.

B. Fabricate in single unit sizes; fabricate multiple units where indicated. Do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Verify size of floor recess before fabricating mats.

B. Vacuum clean floor.

3.3 INSTALLATION

A. Install frames to achieve flush plane with finished floor surface and comply with manufacturer's written instructions.

B. Coordinate top of surfaces with bottom of doors that swing across mats to provide clearance between door and mat.

C. Install walk-off surface in floor recess flush with finish floor after cleaning of finish flooring.
   1. Install necessary shims, spacers, and anchorages for proper location and secure attachment of frames.
   2. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.

3.4 PROTECTION

A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION