

PROJECT MANUAL

May 8, 2025



New Outbuildings Plainfield Community School Corporation

Plainfield, Indiana



OWNER:

Plainfield Community School Corporation

985 S. Longfellow Lane
Plainfield, Indiana 46168

ARCHITECT:

CSO

8831 Keystone Crossing
Indianapolis, Indiana 46240

CONSTRUCTION MANAGER:

Garmong

5988 N. Michigan Road
Indianapolis, Indiana 46228

STRUCTURAL ENGINEER:

Lynch Harrison Brumleve

550 Virginia Ave.
Indianapolis, Indiana 46203

CIVIL ENGINEER:

Banning Engineering

853 Columbia Rd.
Plainfield, Indiana 46168

MEP ENGINEER:

RE Dimond

732 N. Capitol Ave.
Indianapolis, Indiana 46204

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2025016
New Storage Buildings
Plainfield CSC

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SECTION 00 10 00 – NOTICE TO BIDDERS

INVITATION TO BID

For the Project:

**PLAINFIELD COMMUNITY SCHOOL CORPORATION
NEW STORAGE BUILDINGS**

Pre-Bid Meeting: May 28, 2025; 11:00 AM EST

This meeting will be conducted virtually using the link below.

<https://tinyurl.com/Plainfield-Prebid>

Bid Date: June 5, 2025; 2:00 PM EST

In Person:

Plainfield Community School Corporation
985 Longfellow Lane
Plainfield, IN 46168

Virtual Link:

<https://tinyurl.com/Plainfield-Opening>

All questions should be directed to:

John Robert Patterson

jpatterson@garmong.net

Garmong Construction Services
3050 Poplar Street
Terre Haute, IN 47803

Notice is hereby given that Garmong Construction Services ("CMC"), is requesting bids from qualified contractors to provide work and services related to the public work project entitled New Storage Buildings for the Plainfield Community School Corporation ("Project").

Work consists of one (1) 29'-8" x 29'-8" outbuilding at Brentwood Elementary School (located at 1630 West Oliver Avenue, Plainfield, IN 46168) and one (1) 60'-0" x 29'-8" outbuilding at Clarks Creek Elementary School (located at 401 Elm Drive, Plainfield, IN 46168). Each building will include site work, site concrete, site utilities, concrete foundations, concrete slab, CMU walls, brick veneer, wood trusses, insulation, asphalt shingles, hollow metal doors/frames/hardware, overhead coiling doors, drywall, drywall finishing, paint, mechanical (electric unit heaters), and electrical (lighting and receptacles). This work will be performed under separate contracts direct with the Owner.

The sealed bids for the project will be received electronically until June 5, 2025, at 2:00 PM EST.

All work for the complete construction of the project shall be performed under contracts with the CMc. The form of the contract is set forth in the bidding documents. Bidders must submit a completed SBOA Form 96 financial statement, statement of experience, proposed plans for performing the work, and the resources, labor, technology, materials, supplies, and equipment bidder has available for the performance of the work. Bidders must include a satisfactory bid bond or certified check pursuant to Ind. Code § 36-1-12-4.5, payable to the Plainfield Community School Corporation. Bid security shall be in the amount of 5% of the bidder's total contract price and shall be payable to Plainfield Community School Corporation. Should a successful bidder within ten (10) days after written notice of acceptance of bid withdraw its bid

fail to provide the required payment and performance bonds, or execute a satisfactory contract, the CMc may then declare that bid security forfeited as liquidated damages, not as a penalty.

Bidding documents for each project, including plans and specification are on file with the CMc and examined at <https://tinyurl.com/Plainfield-Support-Buildings> ("Bidding Site"). Bidders must establish an account on the Bidding Site to be added to a distribution list to allow the bidder to receive communications, notices, and addendums related to the bidding documents.

Prior to approval and execution of the CMc's contracts, each contractor who is the successful bidder for a project shall furnish an approved performance and labor and materials payment bond in the amount of 100% of the contract amount, which shall cover the faithful performance of the contract and the payment of all obligations arising thereunder. Performance and payment bonds shall remain in full force and effect for a period of one year after the CMc's acceptance of the work and CMc's final settlement with the successful bidder.

The Owner reserves the right to hold bids, including any alternates, for up to 90 days from the date of the bid opening. The Owner reserves in its sole discretion the right to cancel the solicitation, reject any or all bids, is not obligated to accept the lowest or any other bid, and may waive any irregularities, discrepancies, omissions, variances or informalities in the bidding procedure.

A pre-bid meeting for discussion of the project, reviewing the scope of work, contract documents, qualifying requirements, and other important matters will be held virtually on May 28, 2025, at 11:00 AM EST. All prospective offerors are encouraged to participate in this important meeting. Offerors will be responsible for complying with items discussed at the meeting.

Questions regarding each project, or requests for fair and equal treatment, can be directed in writing to the CMc via Bidding Site or at jpatterson@garmong.net.

Garmong Construction Services would like to thank you for your time and interest in this project.

END OF SECTION

SECTION 00 21 13 – INSTRUCTIONS TO BIDDERS

PART 1 – GENERAL

1.1 GENERAL INFORMATION NOTES

- A. To be considered, bids must be submitted in accordance with these Instructions to Bidders and *Section 01 00 00 – Notice to Bidders*.
- B. Communications for the administration of the Contract in general, shall be through the Owner via <https://app.buildingconnected.com/create-account> ("Building Connected.")
- C. The advertisement for bid information regarding this project can be found by going to:
 - 1. Building Connected website at www.buildingconnected.com.
 - 2. Garmon Public Plan room at www.plansbidding.garmon.net

1.2 DOCUMENTS

- A. Bidders shall obtain complete sets of Bidding Documents at:
 - 1. Building Connected under the Files section.
 - a. <https://tinyurl.com/Plainfield-Support-Buildings>
- B. Failure to Execute Contract Documents: In the event the Bidder withdraws the bid or fails to execute a satisfactory Contract and furnish a satisfactory Contract Performance Bond and Payment Bond with a surety company in accordance with Article 1.16 of these Instructions to Bidders within ten (10) days after a contract has been awarded to the Bidder may forfeit their bid security required herein.

1.3 BIDDERS' EXAMINATION AND REPRESENTATION

- A. Before submitting a bid, each Bidder should carefully examine the Documents and the construction site and fully inform themselves with the limitations and conditions related to the Work included in their Bid and shall include in their Bid a sum to cover the cost of such items. Contractors will not be given extra payments for conditions, which could have been determined by examining the site and the documents.
- B. It is the purpose and intent of the Contract Documents that a fully complete job be accomplished. It shall be each Bidder's responsibility to include the costs necessary to provide labor and materials for that portion of the Work bid upon, including incidentals, whether or not specifically required in the Specifications and Drawings.
- C. The Drawings and Specifications as furnished is for the convenience of the Contractor in preparing a proposal for this Project. However, each Contractor is responsible to review the complete set of Drawings and Specifications to assure that Work required to be installed to complete their phase of the Work is included in their proposal. Where a specific item of Work is not defined, but is normally inherent to a trade, or is included in the scope of the applicable technical section, it will be the responsibility of that Contractor to include the Work in his proposal.

- D. Each Bidder, by making their Bid, represents that they have read and understand the bidding documents.
- E. Each Bidder, by making their Bid, represents that they have visited the site and familiarized themselves with the local conditions under which the Work shall be performed.
- F. Each Bidder shall be responsible for being completely familiar with the work of other bid package(s), which require interface of Work with the bid package(s) on which the Bidder is bidding.
- G. No allowance shall be subsequently made on behalf of a Bidder by reason of an error or oversight on its part resulting from its failure to so examine the Construction Documents for the other trades.
- H. Each Bidder understands that past acceptance of products does not assure acceptance on this Project. Products not specifically specified require requests for approval prior to bid due date.
- I. This is a Construction Manager as Advisor project. All Bidders on this Project shall be contracted directly with the Owner.
- J. Safety Program. Each Prime Contractor is responsible for the safety and security of employees and Work areas under their control and will, therefore, provide a written safety and hazardous communication program to the Owner for the jobsite file.

1.4 QUALIFICATIONS OF BIDDERS

- A. The Owner shall have the right to take such other steps as deemed necessary to determine the ability of the Bidder to perform the Work, and the Bidder shall furnish the Owner such data for this purpose as requested.
 - 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.
- B. Each Bid must be accompanied by a financial statement Indiana Form No. 96 (<https://forms.in.gov/Download.aspx?id=6422>), as prescribed by IN State Board of Accounts per Specification *Section 00 45 19 – Indiana Form 96*. This shall clearly show the Bidder's financial resources, construction experience, organization, and equipment available for Work contemplated.
- C. Each responsive Bid must be accompanied by *Section 00 45 10 – Bidder's Certification of Authorized Employment* and *Section 00 45 20 – Certification of Non-Investment in Iran*.

1.5 CLARIFICATION OF BIDDERS' QUESTIONS

- A. Questions for this Project shall be directed to the Owner via the Messages tab of Building Connected.
- B. Each Bidder is responsible for calling to the attention of the Owner ambiguities, inconsistencies, discrepancies, errors, or omissions, which occur in the Contract Documents for their part of the

Work. Failing to request clarification, the Bidder will be expected to overcome such conditions without additions to their Bid Proposal.

- C. Prospective Bidders in doubt as to the true meaning of a part of the Drawings, Specifications, or other Contract Documents shall submit to the Owner and, not less than ten (10) days before the date of the bid, a written request for interpretation and clarification.
- D. Bidders are instructed to request interpretations and the issuing of Addenda if the Contract Documents call for materials, equipment, or methods which adversely affect the cost or quality of the Project or are unavailable.

1.6 APPROVAL BEFORE BIDDING

- A. If a Contractor preparing bids for submission on the Work is in doubt as to the acceptability of a manufacturer's material or equipment, under the requirements as set forth in the Specifications, they shall require that representatives of the proposed manufacturer or supplier contact the Owner and request a ruling on the acceptability of the material or equipment in question. The contact should be made within the time herein required before the date scheduled for the closing of bids, so that an Addendum can be issued to clarify the situation.
- B. It is not possible to set the time allowance for the resolution of every problem; however, the time allowed shall not be less than ten (10) days before bid date. Each party requesting a ruling under this Article shall be responsible for the proper evaluation of the time involved and shall submit their request in ample time, as determined by the Owner, to process it.
- C. Prior to receipt of bids, the Owner will consider proposals for substitution of materials, equipment, and methods only when such proposals are submitted in writing within the time period stated before the date and time set for receipt of bids and are accompanied by full and complete technical data and other information required by the Owner to evaluate the proposed substitution.
- D. Requests for product approval shall be submitted on sample form located in the Appendix Section and sent via Building Connected/Messages.

1.7 ADDENDA

- A. Additional information required by the Bidders, revisions in the Work, changes or additions, discrepancies in the Bidding Documents, or clarifications will be in the form of addenda written by the Owner and issued by the Owner to Bidders of Record as of the date of such addenda.
- B. The Owner reserves the right to issue addenda changing, altering, or supplementing the Contract Documents prior to the time set for receiving bids.
- C. Copies of addenda will be available for inspection wherever Contract Documents are on file for that purpose.
- D. Bidders are responsible for acquiring each issued addendum in time to incorporate them into their proposal.
- E. In the event delivery of addenda to Bidders is delayed, for reasons not the fault of the Bidders, the Owner may be requested to allow a reasonable extension of time for the opening of bids, to permit inclusion of such addenda.

- F. Each Bidder shall acknowledge in their Bid each addendum they have received and reviewed.
- G. If a Bidder fails to indicate receipt of each addendum through the last addendum, issued by the Owner on its Bid Proposal Form, the bid of such Bidder shall:
 - 1. Clearly indicate that the Bidder received the addendum, such as where the addendum added another item to be bid upon and the Bidder submitted a bid on that item; or
 - 2. Indicate the addendum involves only a matter of form or is one which has either no effect or has merely a trivial or negligible effect, as determined by the Owner on price, quantity, quality, or delivery of the item bid upon.
 - a. Failure to include either item above will be reason to deem the bid nonresponsive.

1.8 ALTERNATIVES

- A. Requested alternatives are listed on the Bid Proposal Form and are described in detail under *Section 01 23 00 – Alternates*, Division 01 – General Requirements. They must be bid with base bid.
 - 1. NOTE: The terms "alternate" and "alternative" are used interchangeably to have the same meaning in this Project Manual and on the Drawings.
- B. The cost of each alternate shall include omissions, additions, and adjustments of trades as may be necessary because of each change, substitution, addition, or omission.
- C. Each Bidder shall be responsible for bidding alternates which affect the Work of the base bid they are bidding, regardless of whether listed or not listed on the Bid Proposal Form. If an applicable alternate(s) is not listed on the Bid Proposal Form, the Bidder shall submit on their letterhead the cost of said alternate(s). No additional costs will be allowed after signing of Prime Contract for failure to bid applicable alternates.
- D. The Owner retains the right to include or exclude work required by Alternates, for the sums established exercisable within ninety (90) days from and including the date of signing the Prime Contract.

1.9 UNIT PRICES

- A. NOT USED

1.10 OWNER'S COOPERATION DURING BIDDING PERIOD

- A. Each Bidder is encouraged to contact the Owner in the event that problems occur, or questions arise in analyzing the Drawings and Specifications, where additional clarification or information would be helpful in the preparation of a proper bid.
- B. The Owner will cooperate fully in connection with requests, and will provide the information required, providing the Owner's ethical responsibilities are not encroached upon. This will include, upon request, providing information in order to clarify basic intentions of the Specifications; and other assistance as may be helpful in the preparation of a proper, competitive bid.

- C. It is the general policy of the Owner to be as helpful as possible to Bidders, insofar as is consistent with fair and open competition.

1.11 BIDDING PROCEDURES

- A. Bids will be collected through Building Connected and will be sealed until the bid opening. Bids not submitted correctly or timely will not be considered for this project.
- B. Each bid shall be submitted via Building Connected no later than the deadlines outlined in the notice to bidders.
- C. Submit bids via Building Connected. Do not modify, alter, qualify, or attach stipulations to your Bid Form. The Owner reserves the right to reject such bids as non-responsive.
 - 1. The required Supplementary documents shall be included as attachments. Failure to include required documents could result in the Bid being deemed nonresponsive.
- D. Unless the Bidder withdraws the bid as provided in Article 1.12 hereof, the Bidder will be required to comply with all requirements of the Contract Documents, regardless of whether the Bidder had actual knowledge of requirements and regardless of any statement or omission made by the Bidder which might indicate a contrary intention.
- E. A bid is nonresponsive if it has not been submitted correctly prior to the time and date for receipt of bids indicated in the Notice to Bidders.
- F. Texted, faxed, or emailed bids will not be considered.
- G. Each Bidder shall acknowledge in their Bid the Addenda they have incorporated into their Bid Proposal.
- H. It is the Bidder's responsibility to include in their bid the costs necessary for a completed and finished project for items of Work bid upon.
- I. When an alternate is listed on the bid Form, the Bidder shall fill in the applicable blank with an increased or decreased bid amount. The Owner reserves the right to accept or reject any or all bids on alternates, in whole or in part, and in any order.
- J. If no change in the bid amount is required, indicate "\$0".
- K. Bidders wishing to submit combination bids for multiple bid packages should provide a bid for each package and attach a combination bid proposal for consideration.
- L. A blank entry or an entry of "No Bid", "N/A", or similar entry on any alternate affecting the Contractor's scope of work, will cause the bid to be rejected as nonresponsive only if that alternate is selected.
- M. If an alternate is not selected, an entry as listed in paragraph hereinbefore on that alternate will not, by itself, render a bid nonresponsive.

- N. Indiana Sales Taxes should not be included as part of the bid for this project. The Owner is a governmental entity and exempt from sales tax.
- O. Bids shall be valid for a period of ninety (90) days following submission.

1.12 BID SECURITY

- A. Bid Security must accompany each Bid payable to Plainfield Community School Corporation. Bid Security must be in the form of "a satisfactory bid bond or certified check pursuant to Ind. Code § 36-1-12-4.5."
- A. The amount of Bid Security required is defined in *Section 00 10 00 - Notice to Bidders* and in *Section 00 43 13 - Bid Security*. The Surety for Bid Security shall be one complying with the requirements of these Instructions to Bidders.
- B. Bid security of the two (2) apparent low Bidders may be held by the Construction Manager, following the bid opening, for not more than the maximum number of days stipulated in the *Section 00 10 00 - Notice to Bidders*, unless the Construction Manager and Bidders agree otherwise; except that in the event a Bidder has been awarded the Subcontract and has failed to execute same or furnish proper performance and payment bonds, then the bid security of such Bidder will be subject to forfeit, and the next responsive Bidder, if tendered the Subcontract, will be subject to the same provisions as hereinbefore set forth. Should the award fall to the third responsive Bidder because of default of the previous two Bidders, the same condition will apply to the third Bidder as hereinbefore set forth.
- C. The bid security of Bidders other than the two (2) responsible low Bidders for each category, may be returned within ten (10) days after the opening of bids, at the Construction Manager's option.
- D. The bid security of the two (2) responsible low Bidders will be returned within ten (10) days after the Form of Agreement has been executed, upon request.
- E. In the event that the Construction Manager should decide to reject all bids, the bid securities will be returned within seventy-two (72) hours following that decision.
- F. Bid security is subject to forfeiture if a bid is withdrawn during the time period bids are to be held.
- G. The two (2) low responsible Bidders will be required to submit a complete list of subcontractors, material suppliers, and products on *Section 00 43 50 – Subcontractors and Products List*, to the Construction Manager within two (2) working days (48 hours), after being notified by the Construction Manager. Failure to submit this information within the required time may be considered as grounds for rejection of the bid.
- H. Manufacturers approved by addenda may be written in appropriate location.
- I. If Bidder awarded the Subcontract fails to indicate a specific product or manufacturer or lists multiple products and manufacturers for the same product, that Bidder (Subcontractor) shall provide the first listed product and manufacturer in the specification section.

1.13 MODIFICATION OR WITHDRAWAL OF BID PROPOSAL

- A. A Bidder may withdraw their Bid prior to the scheduled time for the receipt of Bids, without forfeiture of Bid Security. If a postponement of the time for receiving bids is made, the new time established therein shall be the time within the meaning of this Article.
- B. Bids may be modified prior to bid opening time.
- C. After commencement of the opening of bids, no Bidder may recall their bid.

1.14 OPENING OF BIDS

- A. The Notice to Bidders indicates the time and place fixed for opening of bids.
- B. Bids received prior to the time of opening will be sealed. The Owner will decide when the specified time has arrived, and no Bid received incomplete or thereafter will be considered responsive.
- C. The amounts involved in alternates requested will be read or disclosed as part of the requirements of this Article. Voluntary alternates will not be considered.
- D. The Owner reserves the right to delay the time for opening of bids when, in its judgment, it is desirable or necessary.
- E. Bids may be modified and then resubmitted prior to bid opening time.
- F. Bids will be read publicly at the time and location decided by the Owner, or they may be read in a virtual setting published by the Owner. A link will be provided to bidders requesting access prior to the Bid date.
- G. After commencement of the opening of bids, no Bidder may withdraw their bid.

1.15 DISQUALIFICATION

- A. The Owner reserves the right to reject each and every Bid, to waive formalities or informalities in bidding, to accept or reject alternates regardless of their order or sequence.
- B. The right is reserved to reject a Bid where an investigation of the available evidence of information does not satisfy the Owner that the Bidder is responsible for fulfilling the terms of the Contract Documents.
- C. Only "bona fide" bids in a definite stated amount, without special clauses governing price of labor and material increases, will be considered. The Prime contract shall not include what is commonly known as an "Escalator Clause".
- D. Bids which contain qualifications or conditions that are contrary to the text or intent of the Contract Documents, and which are inserted in the bid for the purpose of limiting or otherwise qualifying the responsibility of the Bidder, outside of the text or intent of the Contract Documents, will be determined to be nonresponsive.
- E. Failure to submit the requested information with the bid shall be grounds for rejecting the Bid.

- F. The ability of the Bidder to obtain or qualify for a performance bond or payment bond shall not be regarded as a sole test of such Bidder's competence or responsibility.
- G. The Bidder acknowledges the right of the Owner to reject bids and to waive informalities or irregularities in bids received. In addition, the Bidder recognizes the right of the Owner to reject a bid if the Bidder failed to furnish the information required by the bidding Documents or if the bid is incomplete or irregular.

1.16 DETERMINATION OF LOWEST RESPONSIBLE AND RESPONSIVE BID

- A. Subject to the right's of the Owner to reject each and every bid, the Owner will award the Prime Contract for the Work to the Bidder submitting the lowest responsive and responsible bid. In making their determination the Owner may take into consideration not only the amount of the bid but also:
 - 1. Whether the Bidder has submitted a bid or quote that conforms in all material respects to the specifications.
 - 2. Whether the Bidder has submitted a bid that complies specifically with the Invitation to Bid and the Instructions to Bidders.
 - 3. Whether the Bidder has complied with all applicable statutes.
 - 4. The ability and capacity of the Bidder to perform the Work.
 - 5. The integrity, character, and reputation of the Bidder.
 - 6. The competence and experience of the Bidder.
- B. The failure to submit the requested information on a timely basis may result in the determination that the Bidder is not responsible.
- C. In addition to the above items, the Owner will consider when awarding Work if the intent of the Guideline Schedule and completion of Work can be met within the specified number of consecutive calendar days.

1.17 PERFORMANCE BOND AND PAYMENT BOND

- A. The successful Bidder, awarded the Prime contract on this Project and prior to the execution of the Form of Agreement, shall provide a Performance Bond and Payment Bond, covering the faithful performance of the Contract and the payment of obligations arising thereunder in a penal sum equal to 100 percent of the amount of the Contract sum. Said bonds shall remain in effect for 12 months after date established as start of one-year warranty period. Premiums shall be included and paid-for by the Contractor.
- B. Bonds shall be submitted on AIA Document A312.
- C. The Bidder shall deliver the required bonds to the Owner not later than the date of execution of the Contract.
- D. The Bidder shall require the attorney-in-fact that executes the required bonds on behalf of the Surety to affix thereto a certified and current copy of their Power of Attorney indicating the monetary limit of such power.
- E. Surety Company shall comply with the following:
 - 1. Insurance and Surety Companies shall be deemed qualified and acceptable to the Owner in connection with Contractor bonding and insurance requirements under said Subcontracts only if such companies have a policy holders rating of

“A+”, “A”, or “A-”, a financial category not less than Class VII as shown on Best’s Key Rating Guide, latest edition; provided, however, that the bond is furnished by one of the aforesaid qualified Sureties who is also listed in the Department of the Treasury Circular 570, Volume 41, No. 132 Part V (Federal Register) and is licensed in the State of Indiana and the penal sum of the bond does not extend the underwriting limitation set forth in the subject Circular, unless the excess, if any, is reinsured with the approval of the Owner.

2. Bonds shall be executed and be in force on the date of the execution of the Prime contract.
3. The bonds shall be made out for not less than 100 percent of the entire amounts due under the Prime contract, and shall make provisions to cover additional amounts which may be authorized as provided for under changes in the work; and authorized as provided for under changes in the work; and authorized extensions of time by either making provisions for such additional items in the text of the bond or by the issuance of an amendment or rider to provide for such additional coverage.

1.18 EXECUTION OF THE PRIME CONTRACT

- A. Subsequent to the award, and within ten (10) days after the prescribed Form of Agreement is presented for their signature, the Awardee shall execute and deliver them to the Owner.
- B. The failure of the Awardee to execute such Prime Contract and to supply the required bonds when the Agreement is presented for signature or within such extended period as the Owner may grant, based upon reasons determined adequate by the Owner, shall constitute a default; and the Owner may either award the Prime contract to the next responsible Bidder or readvertise for bids. In the event of default, the Owner shall have the right to declare the amount, if required, of the bid security forfeited. It shall be a further condition that the Owner shall not collect more on a defaulted Bid than the difference between the defaulted bid amount and the bid of the firm to which the award is made, after giving due weight and consideration to alternatives accepted.

1.19 TIME OF COMMENCEMENT AND COMPLETION

- A. The Contractor shall commence work within ten (10) days of being notified in writing to proceed and shall complete the Work within the time limitations established in the Form of Agreement, these Instructions to Bidders, and in *Section 01 12 00 – Multiple Contract Summary*.
- B. Construction shall be completed per the dates indicated in the Scope of Work.

1.20 LIST OF MAJOR SUBCONTRACTORS, SUPPLIERS, AND MANUFACTURERS

- A. The Owner may request a listing of major subcontractors and manufacturers within forty-eight (48) hours of notification that the Bidder’s bid is being considered.
- B. After submission of this list by the Bidder, and after approval by the Owner, it shall not be changed unless written approval of change is authorized by the Owner.

1.21 OUT-OF-STATE CONTRACTORS

- A. Out-of-state Contractor, which is a corporation, shall obtain a Certificate of Authority from the Secretary of State, State of Indiana, Indianapolis, Indiana prior to transacting business in the State of Indiana in accordance with Indiana Code 23-1-49-1.
- B. Proof of payment of Indiana Gross Income Tax, as provided in Chapter 370, Section 2, Subsection E, Acts of 1947, shall be submitted by out-of-state Contractor before final payment will be approved.
- C. If the out-of-state Contractor is not a corporation or is a corporation but does not obtain authorization to do business in the State of Indiana, taxes will be withheld.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 00 25 00 – CRIMINAL HISTORY CHECK

PART 1 – GENERAL

1.1 SUMMARY

- A. Expanded Criminal History background checks are required for vendors accessing the project property.
 - 1. This cost the responsibility of each Contractor for their own employees and their tiered subcontractor's employees.
- B. Safe Hiring Solutions is the only allowable source for the required background checks.
 - 1. No employee is allowed to work on the project without prior completion of APPROVED background checks via Safe Hiring Solutions.
 - 2. All background checks that come back with "Alerts" will have to be reviewed and approved by the Owner prior to the employee being able to work on the project.
 - 3. Employees NOT APPROVED by the Owner will be prohibited from working on the project.
- C. The background checks are Expanded Criminal History reports with a base cost of \$29.95.
 - 1. There can be additional fees associated with the background checks depending on the applicants' address history as well.
- D. SafeVendor Background Checks Includes
 - 1. Verification of Identity with Social Security Verification
 - 2. Verification of Other Names
 - 3. Verification of Address History

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

3.1 PROCESS AND PROCEDURES

- A. Enter the link below in your web browser
 - 1. <https://secure.safevisitor.io/Safe/Volunteer/008906>
- B. Search for your company name and select it in the drop-down menu
- C. Enter the required information for all applicable employees working on the jobsite and submit to be processed

3.2 CRITERIA FOR CERTIFIED STATUS

- A. No felony convictions for violent crime
- B. No felony convictions in the past eight (8) years for theft, drugs, property crimes, or fraud
- C. No misdemeanor convictions for violent crime, battery, domestic violence, stalking, theft, drugs, personal property or fraud in the past three (3) years.

- D. No sexual offenses
- E. No crimes against children
- F. No pending cases for disqualifying felony or misdemeanors above.
- G. No open warrants of any type
 - 1. The Owner reserves the right to make decisions on a case-by-case basis for violations other than those listed above.

END OF SECTION

SECTION 00 31 00 – AVAILABLE INFORMATION TO BIDDERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. List of standard Appendices.
- B. For Reference:
 - 1. Appendix A – Preliminary Project Schedule
 - 2. Appendix B – Site Logistics Plan
 - 3. Appendix C – Garmon Standard Subcontract Agreement
- C. Forms Required with Bid Submission
 - 1. Appendix D – Sample Building Connected Bid Form (SUBMIT ONLINE)
 - 2. Appendix E – Bidders Certification of Authorized Employment Form
 - 3. Appendix F – Indiana Form 96
 - a. Include audited financial statement
 - 4. Appendix G – Certification of Non-Investment in Iran Form
- D. Other Forms:
 - 1. Appendix H – Bid Period Substitution Request Form
 - 2. Appendix I – Subcontractors & Products List

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 00 31 13 – PRELIMINARY PROJECT SCHEDULE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. A copy of the Preliminary Project Schedule is enclosed in the Appendix section of this Project Manual.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 AGREEMENT

- A. By submitting a Bid Proposal for the Project, the Bidder acknowledges that they have included all supervision, labor, materials and equipment necessary to meet the Preliminary Project Schedule. This includes, but is not limited to:
 - 1. Labor overtime and premium time
 - 2. Multiple crews
 - 3. Multiple mobilizations

END OF SECTION

SECTION 00 42 00 – BID FORM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. A sample of the online Bid Form is enclosed in the Appendix section.
- B. Use the Bid Form via Building Connected. Do not modify, alter, qualify, or attach stipulations to your Bid Form.
 - 1. Bidder MUST infill appropriate Base Bid text box.
 - a. When an alternate is listed on the Bid Form, the Bidder shall infill in the applicable text box with an increased or decreased bid amount.
 - i. If no change in the bid amount is required, indicate "\$0".
 - 2. Bidder MUST respond to all General Acknowledgements.
 - 3. Bidder MUST enumerate in their bid the addenda they have incorporated into their proposal.
 - 4. Bidder MUST attach all bid submission requirements.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION

SECTION 00 43 00 – STANDARD FORMS

PART 1 – GENERAL

1.1 GENERAL INFORMATION

- A. The purpose of this Section is to identify some of the forms that will be used in conjunction with the administration of this Project.

1.2 BIDDING FORMS: The following forms must be submitted with the Contractor's Bid. Failure to furnish any one of the forms can be cause for the rejection of the Contractor's Bid.

- A. Bidder's Certification of Authorized Employment per *Section 00 45 10 – Bidder's Certification of Authorized Employment*.
- B. Indiana Form 96 per *Section 00 45 19 – Indiana Form 96*.
 - 1. Financial statement must accompany this form.
- C. Certification of Non-Investment in Iran per *Section 00 45 20 – Certification of Non-Investment in Iran*.

1.3 CONTRACT FORMS: The following forms must be submitted and approved by the Construction Manager prior to acceptance and execution of the Standard Form of Agreement.

- A. Contractor, material, manufacturer list per *Section 00 43 30 – Subcontractors and Product List*.
- B. Performance and Payment Bond per *Section 00 61 13 – Performance Bond and Payment Bond*.
- C. Certificate of Insurance per *Section 00 62 16 – Insurance Requirements*.

1.4 ADMINISTRATIVE FORMS: Forms for monthly pay requests and the final pay request shall be acquired after the award of the Contract, by the Contractor.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 00 43 13 – BID SECURITY

PART 1 – GENERAL

1.1 GENERAL INFORMATION

- A. Bid Security in the amount of five percent (5%) of the Bid must accompany each Bid in accordance with *Section 00 22 13 – Supplementary Instruction to Bidders*. Bid Security must be in the form of “a satisfactory bid bond or certified check pursuant to Ind. Code § 36-1-12-4.5” and be made payable to Plainfield Community School Corporation.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 BID SECURITY

- A. The amount of Bid Security required is defined in *Section 00 22 13 – Supplementary Instruction to Bidders*. The Surety for Bid Security shall be one complying with the requirements of *Section 00 21 13 – Instructions to Bidders*.
- B. Bid security of the two (2) apparent low Bidders may be held by the Construction Manager, following the bid opening, for not more than the maximum number of days stipulated in the Notice to Bidders, unless the Construction Manager and Bidders agree otherwise; except that in the event a Bidder has been awarded the Subcontract and has failed to execute same or furnish proper performance and payment bonds, then the bid security of such Bidder will be subject to forfeit, and the next responsive Bidder, if tendered the Subcontract, will be subject to the same provisions as hereinbefore set forth. Should the award fall to the third responsive Bidder because of default of the previous two Bidders, the same condition will apply to the third Bidder as hereinbefore set forth.
- C. The bid security of Bidders other than the two (2) responsible low Bidders for each category, may be returned within ten (10) days after the opening of bids, at the Construction Manager's option.
- D. The bid security of the two (2) responsible low Bidders will be returned within ten (10) days after the Form of Agreement has been executed, upon request.
- E. If the Construction Manager should decide to reject all bids, the bid securities will be returned within seventy-two (72) hours following that decision.
- F. Bid security is subject to forfeiture if a bid is withdrawn during the period bids are to be held.
- G. The two (2) low responsible Bidders will be required to submit a complete list of Contractors, material suppliers, and products on *Section 00 43 50 – Subcontractors and Products List*, to the Construction Manager within two (2) working days (48 hours), after being notified by the Construction Manager. Failure to submit this information within the required time may be considered as grounds for rejection of the bid.

- H. Manufacturers approved by addenda may be written in appropriate location.
- I. If Bidder awarded the Contract fails to indicate a specific product or manufacturer or lists multiple products and manufacturers for the same product, that Bidder (Contractor) shall provide the product and manufacturer of the Construction Manager/Architect's choosing.

END OF SECTION

SECTION 00 43 25 – BID PERIOD SUBSTITUTION REQUEST

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. A copy of the Bid Period Substitution Request is enclosed in the Appendix section of this Project Manual.
- B. This form should be submitted along with technical data, testing, and any information required for review.
 - 1. Submit request within the period indicated in *Section 00 21 13 – Instructions to Bidders*.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 00 43 50 – SUBCONTRACTORS AND PRODUCTS LIST

PART 1 – GENERAL

1.1 DESCRIPTION

- A. The two (2) low responsive Bidders in each Bid Category shall furnish electronically the Subcontractors and Products List to the Construction Manager within two (2) working days (48 hrs.) of bid opening, unless submitted with Bid. The blanks appropriate to the Bid Category(ies) on which they bid shall be completed.
 - 1. The Owner, Architect/Engineer, and Construction Manager shall have the right to select any material or equipment named in the Specifications for any item where the Bidder either fails to list the same or lists more than one name for the item in question.
 - 2. It is intended that this list will show the manufacturer and supplier of major items of work that will be subcontracted and to whom.
 - 3. Subcontractors and Products List form can be found in the Appendix section.

1.2 INSTRUCTIONS FOR SUBCONTRACTORS AND PRODUCTS LISTS

- A. Each Bidder shall submit a copy of their list of subcontractors and manufacturers of products and equipment proposed for work indicated as required above.
- B. The list shall be submitted on forms provided and shall be completely executed. "As Specified" or "With Equipment" type of terminology will not be accepted.
- C. Under "Subcontractor", insert the name of the firm which the Bidder proposes to have perform the respective work. If work will be completed by the Bidder and no subcontract will be awarded, state "By Own Forces".
- D. Submission does not constitute acceptance for use of listed manufacturers' products. Materials and subcontractors are subject to the provisions of the General Conditions and "Standard of Product Acceptability" and must be formally reviewed and adjudged acceptable by the Construction Manager and Architect/Engineer.
- E. Construction Manager, Architect/Engineer, and Owner reserves the right to reject submissions of materials, work, or subcontractors that do not, in their opinion, meet the requirements of Drawings, Specifications or job conditions.
- F. Materials and subcontractors used for work on the Project shall be in accordance with accepted material list.
 - 1. The list is intended to assure use of materials and vendors acceptably equivalent to those specified and is not a substitution sheet or complete listing of required materials or services.
 - 2. Substitutions for listed items will not be allowed, except when termed acceptable, in writing by the Construction Manager and Architect/Engineer, provided that

substitution will result in a cost savings to the Owner, determined by the Owner to be a better product, or is made necessary due to unavailability of listed item. Unavailability shall be confirmed in writing by the manufacturer named on accepted list.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 00 45 10 – BIDDER'S CERTIFICATION OF AUTHORIZED EMPLOYMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. A copy of the Bidder's Certification of Authorized Employment shall be submitted with each Bid Proposal in accordance with Indiana Code 22-5-1.7 as amended. This form is enclosed in the Appendix section of this Project Manual.
- B. This form is required to be included with the Bid.
- C. Each Contractor in any tier of a public works project shall not knowingly employ unauthorized aliens. Every Contractor shall enroll in and verify the work eligibility status of all employees hired after June 30, 2015 using the U.S. Citizenship and Immigration Services (USCIS) E-Verify program as defined in IC §22-5-1.7-3, unless the E-Verify program no longer exists.
- D. The Contractor shall require their tiered Subcontractors who perform work under this Contract to certify that the tiered Subcontractor does not knowingly employ or contract with an unauthorized alien and that the tiered Subcontractor has enrolled and is participating in the E-Verify program. The Contractor agrees to maintain this certification throughout the duration of the term of a contract with any tiered Subcontractor. The Contractor and its tiered Subcontractors at all levels must comply with all provisions of the statute or the Contract is subject to cancellation.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 00 45 19 – INDIANA FORM 96

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. A copy of the six (6) page Contractor's Bid for Public Work – Form 96 (Revised 2013) is enclosed in the Appendix section of this Project Manual.
- B. This form is required to be included with the Bid.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 00 45 20 – CERTIFICATION OF NON-INVESTMENT IN IRAN

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. A copy of the Certification of Non-Investment in Iran shall be submitted with each Bid Proposal in accordance with Indiana Code 5-22-16.5, et seq, that it is not involved in the Iranian Energy Industry and does not do business with Vendors involved in the Iranian Energy Industry is enclosed in the Appendix section of this Project Manual.
- B. This form is required to be included with the Bid.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 00 52 14 – STANDARD FORM OF AGREEMENT

PART 1 – GENERAL

1.1 GENERAL INFORMATION

- A. A sample copy is included in the Appendix section, and which when executed, will become a part of the Contract Documents of the successful Bidder.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 AGREEMENT

- A. By submitting a Bid Proposal for this Project, Contractor is agreeing to all terms, conditions, and requirements of the Agreement.
- B. No agreement modifications will be made, except for terms modified by other sections of this Project Manual.

END OF SECTION

SECTION 00 61 13 – PERFORMANCE BOND AND PAYMENT BOND

PART 1 – GENERAL

1.1 GENERAL INFORMATION

- A. The successful Bidder, awarded the Contract on this Project and prior to the execution of the Form of Agreement, shall provide a Performance Bond and Payment Bond, covering the faithful performance of the Contract and the payment of obligations arising thereunder in a penal sum equal to 100 percent of the amount of the Contract Sum. Said bonds shall remain in effect for 12 months after date established as start of warranty period. Premiums shall be included and paid-for by the Contractor.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PERFORMANCE BOND AND PAYMENT BOND

- A. Bonds shall be submitted on AIA Document A312.
- B. The Bidder shall deliver the required bonds to the Construction Manager not later than the date of execution of the Contract.
- C. The Bidder shall require the attorney-in-fact that executes the required bonds on behalf of the Surety to affix thereto a certified and current copy of his Power of Attorney indicating the monetary limit of such power.
- D. Surety Company shall comply with the following:
 - 1. Insurance and Surety Companies shall be deemed qualified and acceptable to the Construction Manager in connection with Contractor bonding and insurance requirements under said Contracts only if such companies have a policy holders rating of "A+", "A", or "A-", a financial category not less than Class VII as shown on Best's Key Rating Guide, latest edition; provided, however, that the bond is furnished by one of the aforesaid qualified Sureties who is also listed in the Department of the Treasury Circular 570, Volume 41, No. 132 Part V (Federal Register) and is licensed in the State of Indiana and the penal sum of the bond does not extend the underwriting limitation set forth in the subject Circular, unless the excess, if any, is reinsured with the approval of the Owner.
 - 2. Bonds shall be executed and be in force on the date of the execution of the Subcontract.
 - 3. The bonds shall be made out for not less than 100 percent of the entire amounts due under the Contract, and shall make provisions to cover additional amounts which may be authorized as provided for under changes in the work; and authorized as provided for under changes in the work; and authorized extensions of time by either making provisions for such additional items in the text of the bond or by the issuance of an amendment or rider to provide for such additional coverage.

2025016
New Storage Buildings
Plainfield CSC

00 61 13
PERFORMANCE BOND AND
PAYMENT BOND

END OF SECTION

SECTION 00 62 16 – INSURANCE REQUIREMENTS

PART 1 – GENERAL

1.01 INSURANCE REQUIREMENTS

- A. As listed in the Agreement referenced in *Section 00 52 14 – Standard Form of Agreement*.

PART 2 – PRODUCTS

1.02 WORKERS COMPENSATION INSURANCE

- A. Individual Subcontractors, etc., shall provide their own Workers Compensation Insurance.

1.03 BUILDER'S RISK INSURANCE

- A. The Construction Manager will carry Builder' Risk.

PART 3 – EXECUTION

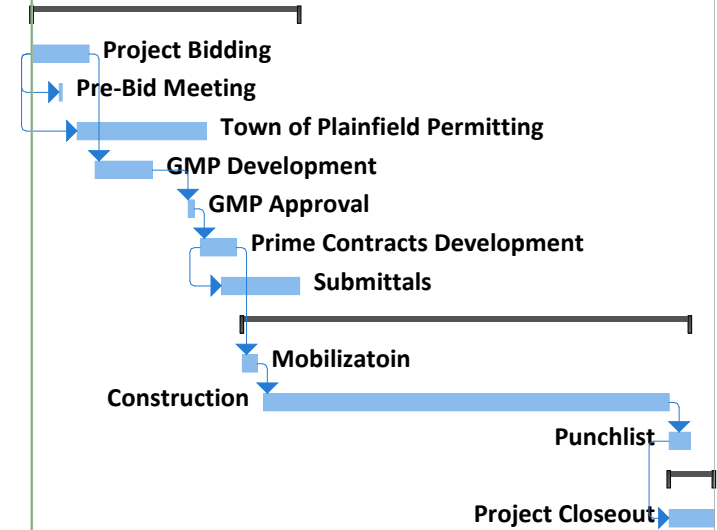
- A. Insurance requirements necessary to complete installations are included in Base Bid. A Certificate of Insurance must be issued to Construction Manger prior to commencement of Work at the site. Identify additional insured as required.
- B. The Contractor is required to keep a valid Certificate of Insurance on file for a period of three (3) years from the date of Substantial Completion.
- C. By submitting a Bid Proposal for this Project, Contractor is agreeing to all terms, conditions, and requirements of insurance requirements. No insurance requirement modifications will be made.

END OF SECTION

(Appendix A – Preliminary Project Schedule)

Plainfield Community School Corporation
Plainfield Outbuildings (Clarks Creek Elementary School & Brentwood Elementary School)
May 19, 2025

ID	Task Name	Duration	Start	Finish	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2026 Jan
1	Preconstruction	63 days	Mon 5/19/25	Fri 8/15/25										
2	Project Bidding	14 days	Mon 5/19/25	Fri 6/6/25										
3	Pre-Bid Meeting	1 day	Wed 5/28/25	Wed 5/28/25										
4	Town of Plainfield Permitting	30 days	Tue 6/3/25	Tue 7/15/25										
5	GMP Development	15 days	Mon 6/9/25	Fri 6/27/25										
6	GMP Approval	2 days	Thu 7/10/25	Fri 7/11/25										
7	Prime Contracts Development	10 days	Mon 7/14/25	Fri 7/25/25										
8	Submittals	20 days	Mon 7/21/25	Fri 8/15/25										
9	Construction	105 days	Mon 7/28/25	Tue 12/23/25										
10	Mobilizatoion	5 days	Mon 7/28/25	Fri 8/1/25										
11	Construction	95 days	Mon 8/4/25	Tue 12/16/25										
12	Punchlist	5 days	Wed 12/17/25	Tue 12/23/25										
13	Project Closeout	10 days	Wed 12/17/25	Wed 12/31/25										
14	Project Closeout	10 days	Wed 12/17/25	Wed 12/31/25										
15														



(Appendix B – Site Logistics Plan)
TO BE ISSUED VIA ADDENDUM

(Appendix C – Garmong Standard Subcontract Agreement)

PROJECT AGREEMENT**Cover Sheet**

Owner: Plainfield Community School Corporation
985 Longfellow Lane
Plainfield, Indiana 46168

Construction Manager: C.H. Garmong & Son, Inc.
3050 Poplar Street
Terre Haute, IN 47803
Attn: John Robert Patterson, Project Manager
Telephone: (812)234-3714
E-mail: jpatterson@garmong.net

Contractor: [Contractor Company Name]
[Contractor CM]
[Address 1]
Address 2]
Telephone: [xxx-xxx-xxxx]
E-mail: [xx@xx.com]

Project: Plainfield Community School Corporation Outbuildings
1630 W. Oliver Ave. & 401 Elm Dr.
Plainfield, IN 46168
See Exhibit A for additional details

Agreement Total: \$[Agreement total]

Commencement Date: [Date]
Substantial Completion Date: [Date]

Exhibits Incorporated by Reference and Made Part of This Project Agreement:

Exhibit A: Project/Scope of Work/Project Schedule	Exhibit F: Lien Waiver in Support of Final Payment
Exhibit B: Terms and Conditions of Project Agreement	Exhibit G: Contractor Request for Change form
Exhibit C: Application for Payment form	Exhibit H: Change Order form
Exhibit D: Contractor's Schedule of Values	Exhibit I: Insurance Requirements
Exhibit E: Lien Waiver in Support of Progress Payment	Exhibit J: E-Verify Program Compliance Affidavit

Owner retains Contractor to satisfactorily and timely provide and perform the work, labor, supervision, equipment and materials required to fulfill the Scope of Work set forth in Exhibit A pursuant to the Agreement Documents in exchange for Owner's payment of the Agreement Amount in the method and manner provided in this Project Agreement ("Agreement"). The foregoing Exhibits are hereby incorporated into this Agreement as if set forth fully herein.

IN WITNESS WHEREOF, the parties have executed this Project Agreement as of the date indicated below.

[signature page follows]

|

Plainfield Community School Corporation
"Owner"

[CONTRACTOR]
"Contractor"

By: _____

By: _____

Name: _Mark Shayotovich_____

Name: _____

Title: Assistant Superintendent, Finance & Operations

Title: _____

Date: _____

Date: _____

EXHIBIT A – Project/ Project Schedule/Scope of Work

1. The Scope of Work set forth in this Exhibit A relates to the following project (the “Project”):

Plainfield Community School Corporation Outbuildings
 1630 W. Oliver Ave. & 401 Elm Dr.
 Plainfield, IN 46168

2. Contractor Documents List:

2.1. Project Schedule, dated [DATE]

2.2. [DESCRIPTION AND DATE OF CONTRACT DOCUMENT 1]

2.3. [DESCRIPTION AND DATE OF CONTRACT DOCUMENT 2]

2.4. [DESCRIPTION AND DATE OF CONTRACT DOCUMENT 3]

2.5. [DESCRIPTION AND DATE OF CONTRACT DOCUMENT 4]

3. Scope of Work:

Contractor awarded this Contract and prior to execution of the Form of Agreement, shall provide a Performance Bond and Payment Bond, covering the faithful performance of this Contract and the payment of obligations arising thereunder in a penal sum equal to 100 percent of the amount of the Contract Sum. Said bonds shall remain in effect for 12 months after date established at start of the one-year warranty period. Premiums shall be included and paid for by the Contractor.

- [DESCRIPTION OF SCOPE 1]
- [DESCRIPTION OF SCOPE 2]
- [DESCRIPTION OF SCOPE 3]
- [DESCRIPTION OF SCOPE 4]
- [DESCRIPTION OF SCOPE 5]
- [DESCRIPTION OF SCOPE 6]
- [DESCRIPTION OF SCOPE 7]
- [DESCRIPTION OF SCOPE 8]

EXHIBIT B – Terms and Conditions of Project Agreement

These terms and conditions apply to and govern the Project Agreement identified on the cover sheet (i.e., page 1) between the Owner and Contractor. C.H. Garmong & Son, Inc. is hereafter referred to as the “CM.”

1. Work. Contractor shall furnish, deliver, and pay for all labor, equipment, services, supervision and materials and perform all of the work necessary or incidentally required to complete its obligations strictly pursuant to and as reasonably inferred from: this Agreement and plans and specifications for the Project, any general, special, supplementary conditions, and all Exhibits identified on the cover sheet (i.e., page 1) and/or attached hereto (collectively, the “Agreement Documents”), or that part of the work covered by the Agreement Documents, and the Project Schedule (as defined herein) and all governing laws, regulations and ordinances and including design where required by the Agreement Documents, and the Scope of Work set forth on Exhibit A to this Agreement (collectively, the “Work”).

The Agreement Documents (including, without limitation, all Exhibits) are applicable to this Agreement and are, therefore, incorporated herein by reference and made a part of this Agreement. In the event of conflicts between any Agreement Documents, the document that imposes the most stringent requirement will govern. Contractor understands and agrees that the Agreement Documents are complementary, and what is required by one shall be binding as if required by all, unless specifically stated otherwise. In the event of a conflict between Agreement Documents involving quality or quantity, the highest quality and the greatest quantity shall be furnished.

Contractor understands and agrees that the intent of Exhibit A is to define the scope of labor, equipment, material, supervision, and services that are to be provided by Contractor in furtherance of the construction of the Project, and not to define other rights, responsibilities, or liabilities. Notwithstanding any terms or conditions in Exhibit A that purport to define rights, responsibilities, or liabilities related to the Agreement Amount, payments, Contractor’s representations or warranties, lien rights, damages, time for prosecuting the Work, changes, Contractor’s on-site presence, protection of persons and property, indemnity, termination, Contractor’s responsibilities, claims and dispute resolution, assignment, choice of law, damages, or waiver, no such terms or conditions therein shall supplement, supersede or control over any conflicting, inconsistent, or relevant term of this Exhibit B or any other Agreement Document.

Contractor represents and warrants to Owner that it and its employees are experienced and skilled in the construction of structures and improvements of the type described in the Agreement Documents and it has examined the Agreement Documents and the real property on which the Work will be located as indicated as the address or location of the Project identified on the cover page of the Agreement (“Site”), and has familiarized itself with the local conditions and all other factors impacting the successful completion of the Work and Contractor agrees that the design for Work depicted in the Agreement Documents can be constructed on Site. Contractor understands and agrees that the plans and specifications for the Project were prepared by independent design professionals and, as a result, Owner and CM do not warrant the fitness, accuracy or completeness of such plans and specifications. Contractor agrees to promptly report to CM and Owner any errors, inconsistencies, omissions, or violations of legal requirements Contractor discovers. Contractor shall be liable to Owner for damages resulting from any such errors, inconsistencies, omissions, or violations of legal requirements which Contractor discovers and fails to report to CM and Owner.

Contractor acknowledges this Project is being procured by Owner on a multiple prime contract delivery method coordinated and managed by CM. The Contractor shall participate with other contractors, CM, and Owner in reviewing and coordinating all schedules for incorporation into the Project that is prepared by CM (the “Project Schedule”). The Contractor shall make revisions to the Work Schedule (as defined in Section 9 below) and submittal schedule as deemed necessary by CM to conform to the Project Schedule. Should the proper and accurate performance of the Work depend upon the work performed by Owner, other contractors or any other persons engaged in work outside of the Scope of Work, Contractor shall inspect such work and report in writing to CM and Owner any defects which render it unsuitable for proper execution of the Work. Should Contractor fail to notify CM and Owner of any defects or non-conformities then Contractor shall be deemed to have accepted such defects and non-conformities. The Contractor shall coordinate the Contractor’s operations with, and secure the approval of, CM before using any portion of the site.

2. Agreement Amount. For Work satisfactorily and timely completed hereunder and accepted by Owner, Owner agrees to pay to Contractor the sum set forth on the cover page of the Agreement identified as “Agreement Amount.” The duty to make and the right to receive payments are subject to the terms and conditions of this Agreement.

3. Payments. Within ten (10) days of the execution of this Agreement, Contractor shall submit to CM and Owner an accurate

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W-9 certificate. Contractor may make applications for periodic progress payments, less retainage of 10% or, where applicable, such lower percentage mandated by law, for work satisfactorily performed when set forth in an application for payment submitted, on or before the 30th day of the month, on the form provided in Exhibit C itemizing the estimated percentage of Work performed for each line item set forth in the Schedule of Values provided as Exhibit D. The Contractor's application for payment is an affirmative representation by Contractor to Owner and CM that the Work has progressed in strict accordance with the Agreement Documents to the extent indicated by the application. Each application for payment shall (a) be in the form of Exhibit C, (b) be accompanied by verified partial lien and claim waivers for Work, as well as that of its subcontractors, materialmen and suppliers, in an aggregate amount of the application for payment utilizing the form provided as Exhibit E, and (c) provide evidence reasonably adequate to demonstrate that previous periodic progress payments have been disbursed to agents, subcontractors, materialmen and suppliers in accordance with the applications therefor. Invoices or other applications for payment not presented in this form do not create a right to receive or a duty to make payment; they will not be paid.

Contractor may make an application for final payment, not to exceed one hundred percent (100%) of the Total Agreement Amount set forth on the cover page (i.e., page 1), after Contractor completes its obligations hereunder to the full satisfaction of Owner, CM, and/or any public or governmental authority having jurisdiction. The Contractor's final application for payment is an affirmative representation by Contractor to Owner and CM that all of the Work required by the Agreement Documents has been completed in strict accordance with the Agreement Documents. At the time of submission of its application for final payment, Contractor shall provide the following: (a) an application in the form of Exhibit C with supporting documentation indicating all payments to agents, subcontractors, materialmen and suppliers proving that there are no claims, obligations or liens outstanding or unsatisfied for labor, services, material, equipment, taxes or other items performed, furnished or incurred for or in connection with the Work which will in any way affect Owner's interests; (b) verified conditional final lien and claim waivers for its Work as well as that of its agents, subcontractors, materialmen and suppliers in an aggregate amount of the final contract amount including Change Orders, if any, and utilizing the form included as Exhibit F to the Agreement; (c) consent of Contractor's surety, if any, to final payment; and (d) all operating manuals, warranties and other deliverables required by the Agreement Documents. Invoices or other applications for payment not presented in this form or missing required enclosures do not create a right to receive or a duty to make payment; they will not be paid.

Upon receipt of a timely submitted application for payment, the CM will, by the last day of the next month, either recommend to the Owner that Contractor's application for payment should be paid or return the application for payment to the Contractor and notify the Contractor and Owner in writing of the CM's reasons for not recommending payment. The CM may refuse to recommend payment, in whole or in part, or may nullify previous recommendations made on prior applications for payment, to protect the Owner from loss for which the Contractor is responsible, including loss resulting from: (a) incomplete, non-conforming or defective work; (b) claims filed or reasonable evidence indicating probable filing of claims, including lien claims, involving or arising out of Contractor's performance; (c) damage to Owner's or its contractors' work; (d) failure of Contractor to make payments when due to its agents, subcontractors, materialmen and suppliers; (e) reasonable insecurity regarding Contractor's intention or ability to continue with the proper and timely performance of the Work; (f) failure of Contractor to perform or comply with any of its obligations under the Agreement Documents; (g) failure of Contractor to comply with any federal, state, or local law governing its obligations under the Agreement Documents; or (h) any other breach of this Agreement or any other agreement between Contractor and Contractor.

Notwithstanding any provision in this Agreement or any other Agreement Documents to the contrary, no payment (including, but not limited to, any periodic progress payment or final payment, or payment for extras, Change Orders, delays, or acceleration of the Work) will be due Contractor until CM has made a recommendation of payment to the Owner. Acceptance of final payment shall constitute a waiver of all claims by Contractor relating to the Work but does not relieve Contractor of liability for warranties or for nonconforming or defective work discovered after final payment. Neither partial nor final payment to Contractor shall operate as approval or acceptance of work done or materials furnished under this Agreement. No recommendation made or withheld by CM shall be construed as a representation that CM has made exhaustive inspections of Work, and any Work completed by Contractor recommended by CM for payment shall be subject to further testing, inspection, or evaluation as reasonably necessary which may void all or a portion of CM's recommendation for payment.

Contractor shall keep the Project free of liens and payment claims. Contractor will retain the services of a duly licensed attorney experienced in the area of construction law consented to by CM to defend Contractor from and against such liens or payment claims. Contractor shall solely bear the cost of defense for any liens or payment claims, or any other costs which

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may be assigned or adjudged to the Contractor's liability. Within ten (10) days of Owner's demand, Contractor shall discharge or satisfy any lien or payment claim asserted by any individual or entity working for or supplying material to Contractor. CM's recommendations for payment may adjust or deduct from any amounts due or to become due to Contractor from Owner any sum or sums owing by Contractor to Owner; and in the event of any breach by Contractor of any provision or obligation of this Agreement or in the event of the assertion by other parties of any claim or lien against the Owner, Contractor or the premises arising out of Work, Owner may retain all or part of any payments due or to become due to Contractor in amounts sufficient to completely protect Owner from any and all loss, damage or expense therefrom, including actual and anticipated attorneys' fees and costs or bond premiums, until the situation has been satisfactorily remedied or adjusted by Contractor.

In the event Owner or CM has information that Contractor has failed to properly and fully compensate one of its employees, agents, subcontractors, materialmen or suppliers on the Project and monies are otherwise due to Contractor, Contractor agrees that Owner may issue checks jointly payable to Contractor and the unpaid employee, agent, subcontractor, materialmen and supplier.

4. Submittals and Substitutions. In accordance with the Agreement Documents and the Project Schedule, Contractor shall deliver to CM and Owner timely submittals, including shop drawings, product data and samples to allow for an orderly and proper coordination of the Work. By submitting shop drawings, product data, samples and similar submittals, the Contractor represents to the Owner and the CM that such submittals do not include any deviation from the Agreement Documents. Any variances from the Agreement Documents shall be specifically identified in Contractor's submittals. CM's and Owner's review of Contractor's submittals (i) 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 Agreement Documents; (ii) shall not relieve the Contractor of the obligations to perform the Work in accordance with the Agreement Documents; (iii) shall not constitute approval of safety precautions or, unless otherwise specifically stated by CM, of any construction means, methods, techniques, sequences or procedures. Contractor shall not make any substitutions in the Work or procedures or methods specified in the Agreement Documents unless it first receives written approval for such substitution signed by CM and Owner; and, (iv) shall not relieve Contractor of its responsibilities to perform the Work in accordance with the Agreement Documents unless Contractor gains from Owner prior express written approvals for any such variance. Contractor shall bear any costs and fees related to such substitution.

5. Records. Contractor shall keep a complete set of accounts and records on a cost accounting basis, conforming to generally accepted accounting principles for the construction industry, showing all receipts and expenditures under this Agreement. Owner shall have the right to audit and shall be afforded access upon reasonable notice to Contractor to all Contractor's records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda and similar data relating to this Agreement for a minimum period of three years after final payment, or for the minimum period of record retention set forth in Owner's agreement with its lender, or required by applicable law governing the Project, whichever period is longer.

6. Confidential Information. All plans, drawings, specifications and the subject matter contained therein and all other information received by Contractor in connection with performance of this Agreement involve valuable property rights of Owner and shall be held confidential by Contractor, shall remain the property of Owner and shall not be used by Contractor for any purposes other than those for which they have been supplied or prepared. Contractor agrees that it, its employees, agents, subcontractors, materialmen and suppliers will keep confidential the making of this Agreement and the terms hereof. Contractor agrees not to use for publicity purposes any photographs drawings and /or materials in connection with the performance of this Agreement without obtaining the prior written consent of Owner and upon completion of this Agreement, Contractor shall return all material given Contractor as aforesaid. Contractor agrees to include a confidentiality provision substantially similar to this Section 6 in its agreements with its employees, agents, subcontractors, materialmen and suppliers.

7. Warranty. Contractor warrants to the Owner that materials and equipment furnished under this Agreement will be new, unless otherwise required by the Agreement Documents, of good quality, free from defects of workmanship or materials and will conform to the requirements of the Agreement Documents, and that the Work performed hereunder will be good and workmanlike, free from defects and will conform to the requirements of the Agreement Documents, and Owner shall have good title, free of encumbrances, to all material and equipment included in the Work. Work (workmanship or materials) not conforming to these requirements, including substitutions not properly approved or authorized, may be considered defective.

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Contractor shall defend, pay all costs incurred, and hold Owner and CM harmless from Contractor's failure to adhere to or follow this Agreement including, but not limited to, claims concerning delays or defects in Work.

8. Correction of Defective Work. Prior to and within one year of Substantial Completion (as defined herein), or within such longer period to the extent required by the Agreement Documents, Contractor shall, within 48 hours' of receipt of written notice from Contractor that the Work is not in conformance with the Agreement Documents, correct the defective Work at its own cost and time and bear the expense of the additional services required for the correction of any defective Work, including the correction, removal or replacement of the defective Work and any damage caused to other parts of the work or the Project affected by the defective Work. If Contractor fails to correct the defective Work within such 48 hour period, Owner may, without further notice and in addition to any other remedies provided under the Agreement Documents, commence correction of such defective Work on Contractor's account. If the defective Work creates an emergency requiring an immediate response, the 48 hour period identified herein shall be deemed inapplicable. Any time period for the duty to correct work referenced herein or in the Agreement Documents applies only to Contractor's obligation to correct such defective work upon demand and is not intended to constitute a period of limitations for any other rights or remedies Contractor may have regarding Contractor's obligations under the Agreement Documents.

9. Time. Contractor acknowledges that it is bound by the scheduling requirements of the Agreement Documents and those of the Project (cumulatively, the "Project Schedule"), which may be amended from time to time prior to the time when the Project achieves "Substantial Completion" which is defined as the time when Work has progressed to the point such that Owner may, in its reasonable discretion, use and occupy Work for its intended purpose. Contractor agrees to promptly begin Work as soon as notified by CM and shall diligently and continuously prosecute and complete the Work in accordance with the requirements of the Agreement Documents including but not limited to the date of Substantial Completion, the Project Schedule, and any other milestone dates set forth therein. Contractor agrees to cooperate with, and coordinate its Work activities so as not to interfere with those parties performing work at the Site, including Owner's separate contractors, so that the Project can be completed pursuant to the Project Schedule in an orderly and coordinated manner without disruption.

Within ten (10) days after execution of the Agreement, Contractor shall prepare and submit to CM (for Owner's approval) a detailed schedule for the performance of the Work ("Work Schedule"). The Work Schedule must conform to all requirements of this Agreement including, without limitation, the Project Schedule. The Work Schedule must account for the work of other contractors and, because the work of other contractors will inherently depend on the timeliness of Contractor's performance, adjustments to the Work Schedule may be required for an orderly performance of the Work to accomplish Substantial Completion of all Work by the Substantial Completion Date.

Contractor shall maintain, and update at the intervals required by CM, the Work Schedule throughout the performance of the Work, and at times requested by CM. All updates to the Work Schedule shall be in accordance with the time and sequence provided for by the Project Schedule as it may be adjusted. Any updates to the Work Schedule shall not relieve Contractor of its obligation to perform as required by the Project Schedule. Contractor warrants that its Work Schedule, as may be amended to accommodate the Project Schedule then in effect, will allow the Project to progress in accordance with the Project Schedule. By submitting the Work Schedule and any requested updates thereto Contractor represents that the Work Schedule and such other schedules, updates, revisions and reports it prepares are reasonable when considering all conditions and factors bearing on the performance of the Work and accurately reflect Contractor's reasonable expectations as to the sequence and duration of Work items, productivity, projected and actual completion of any Work item or activity, and delays or problems expected or encountered and specified float time. Contractor shall maintain the personnel, material and equipment as required to assure the various stages of the Work are completed as required by the Work Schedule. Contractor agrees to re-sequence its work, accelerate its efforts through Saturday / weekend work, weekday overtime and/or provide multiple crews if required to maintain or facilitate the Work Schedule. Contractor acknowledges that Contractor's timely performance of the Work is an essential condition of the Agreement and agrees that any failure to perform and complete the Work consistent with such dates shall be a material default of the Agreement. If Contractor fails to adhere to the Work Schedule, misses any milestone in any such schedule, fails to accelerate or re-sequence when requested to accommodate the Project Schedule, or if Contractor abandons the Work, suspends its Work, or fails to have sufficient workers on site and productively employed for three (3) days or more, Owner may, without prior notice and without waiving any other right or remedy available in law or equity, terminate this Agreement or take steps necessary to complete or expedite the Work, including supplementing Contractor's efforts by completing the Work or any portion thereof by using Owner's own resources or hiring other contractors, at the expense of Contractor.

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Contractor shall give timely notices to authorities pertaining to the Work and shall be responsible for all permits, fees, licenses, assessments, inspections, testing and taxes necessary to complete the Work.

Owner shall not be liable to Contractor for any delay, disruption, or interference to the Work caused by the act, omission, neglect or default of the Contractor or its respective employees, agents, subcontractors, materialmen and suppliers, or by any other cause beyond Owner's direct control. Contractor shall be entitled to such extensions of time to the extent they are applicable to Work, but only to the extent where Work on the critical path of the Work Schedule is delayed, and the Contractor did not cause the delay or the Contractor could not have anticipated, avoided or mitigated the effect of the delay, and to no other extensions of time for delays beyond Owner's control. Contractor shall not be entitled to and shall make no other claim for damages, including but not limited to direct, consequential or incidental damages, arising out of or relating to delays, disruptions, suspensions, accelerations, inefficiencies, or impacts upon the Work.

The Contractor and Owner agree that in the event Contractor fails to complete the Work within the time required by the Work Schedule, or otherwise causes the Project to be delayed in achieving Substantial Completion under the Project Schedule, the Contractor shall pay to the Owner as damages for delay, and not as a penalty, the sum of \$1,000 per day for every calendar day of delay caused by Contractor.

10. Changes. When Owner orders changes to the Work in a writing signed by CM or the Owner, Contractor, without nullifying this Agreement, shall make any and all changes in the Work, which are within the general scope of this Agreement, whether additive or deductive, irrespective of the root of such change. Upon receipt of a request for change issued by the CM or Owner, or if Contractor becomes aware of any event or circumstance which Contractor believes necessitates a change in the Agreement Amount, the Project Schedule, or any other provision of the Agreement, Contractor shall submit a written request to Owner for an adjustment to the Agreement Amount, Project Schedule, or other provision of the Agreement Contractor believes is affected thereby using the form included in Exhibit G ("Request for Change"). Contractor's Request for Change shall include documentation sufficient to enable CM and Owner to determine the factors necessitating the adjustment(s) being requested, including without limitation a price breakdown itemized as requested by CM and/or Owner and in sufficient detail to permit an analysis of all material, labor, equipment, and contract costs, and information in sufficient detail to permit an analysis of the proposed adjustment to the Agreement Amount, Project Schedule, or other provision of the Agreement which may be affected. Contractor's Request for Change shall be provided to CM and Owner no later than seven (7) days of receipt of such written order or the occurrence of such event or circumstance which Contractor believes necessitates a change. Contractor's timely submission of Request for Change is a condition precedent to Contractor's recovery. Contractor's failure to submit a Request for Change in the time provided herein shall be deemed a waiver of Contractor's right to recover for any change, delay, resequencing, disruption, or interference to the Work. If, upon review, CM finds Contractor's Request for Change without merit, Contractor may proceed to prosecute its Claim in accordance with the dispute resolution provisions of this Agreement.

Charges for overhead and profit for changed self-performed work are permitted for no more than 10 percent (10%) and 5 percent (5%) for Subcontractors. The percentage markup allowed for the Performance and Payment Bond, if applicable, shall be one percent (1%) of the total cost for the change.

No extra work or claim or request for additional compensation under this Agreement or payment obligations will be due, become due, or will be recognized or paid by Owner unless, before said additional Work or material is furnished, Owner, CM and Contractor execute a written Change Order as those terms are defined and developed in this Agreement. A Change Order is a written instrument issued after execution of the Agreement signed by Owner, CM, and Contractor on the form provided in Exhibit H, stating their agreement upon all of the following: the scope of the change in the Work; the extent of the adjustment to the Agreement Amount; and the extent of the adjustment to the Project Schedule, if any. All changes in the Work authorized by applicable Change Order shall be performed under the applicable conditions of the Agreement Documents. CM and/or Owner and Contractor shall negotiate in good faith and as expeditiously as possible the appropriate adjustments for such changes.

The increase or decrease in the Agreement Amount resulting from a change in the Work shall be determined by one or more of the following methods: (1) Unit prices set forth in the Agreement or as subsequently agreed to between the parties (If unit prices are set forth in the Agreement Documents or are subsequently agreed to by the parties, but application of such unit prices will cause substantial inequity to Owner or Contractor because of differences in the character or quantity of such unit items as originally contemplated, such unit prices shall be equitably adjusted); (2) A mutually accepted, lump sum, properly

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itemized and supported by sufficient substantiating data to permit evaluation by CM and Owner; or (3) A cost reimbursable basis providing for recovery of costs, fees and any other markups set forth in the Agreement.

All changes in the Work authorized by Change Order shall be performed under the applicable conditions of the Agreement Documents. No contentions of additional or changed work will be recognized under this Agreement and consequently no payment obligation will be due, become due, or will be recognized or paid by Owner unless, before said additional work or material is furnished Owner's Authorized Representative executes a written Change Order. Timesheets, work tickets, field documents or other related Contractor documents, irrespective of whether signed by Owner's on-site personnel, project management, or any Owner employee, agent, consultant or other individual, shall not constitute a Change Order hereunder, shall neither modify nor alter any term of this Agreement, or its terms, nor serve as a course of dealing to modify this Agreement, and shall serve only to acknowledge performance of work. No individual or entity has any authority to order work or changes on behalf of Owner other than Owner's Authorized Representative.

11. Contractor's On-Site Presence. Before performing any Work at the Site, each employee of Contractor or Contractor's agents, subcontractors, materialmen and suppliers must report in-person to CM or his designee. Contractor shall maintain at the Project a superintendent, foreman or other such construction manager and such individual, by such placement, is hereby authorized to make agreements for or otherwise act on behalf of Contractor. Contractor shall attend any and all meetings for which CM or Owner requests Contractor's presence. Contractor shall not place signs of any kind upon the Site without CM's or Owner's prior written approval.

12. Contractor Furnished Materials. All equipment, supplies, materials, and other items furnished by Owner ("Owner Furnished Materials"), if any, as part of the Work will be installed or incorporated into the Work at the expense of Contractor, unless otherwise indicated herein. Contractor shall verify the quantity and condition of such Owner Furnished Materials when delivered to it, acknowledge receipt thereof in writing to CM, and immediately report any damage or shortage to CM. Title to Owner Furnished Materials shall at all times remain with Owner. Contractor, upon delivery and acceptance of any Owner Furnished Material, assumes the risk of, and shall be responsible for, any loss thereof or damage thereto.

13. Protection of Persons and Property. Contractor shall comply in all respects with any safety policies and/or obligations demanded of Contractor in the Agreement Documents. Without limiting and only in addition to the foregoing, Contractor agrees to the remaining obligations in this section and will at all times be solely responsible for the safety and well-being of its employees, for its work and for complying with all applicable laws, ordinances, codes and regulations in connection with the Work to be performed hereunder, including those relating to safety of all persons and property even if CM or Owner have implemented any safety program or regulations at the Project or jobsite. Contractor shall ensure each of its employees, and the employees or agents of its agents, subcontractors, materialmen, suppliers, or anyone that is present on the Project site that is the responsibility of Contractor, at a minimum, properly wears hardhats, safety glasses, shirts with sleeves, full-length pants and boots at all times. Any person that fails to comply in all respects with any safety policies and/or safety requirements of this Agreement may be provided one warning before being excluded from working or visiting the Project.

Contractor shall take all reasonable precautions for the safety of, and shall provide all necessary protection to prevent damage, injury or loss to: (i) individuals at the Project and other persons who may be affected thereby; (ii) all Work and all materials and equipment to be incorporated therein; and (iii) other property at the Site or adjacent thereto. Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and orders of any public authority bearing on the safety of persons and property and their protection from damage, injury or loss. Contractor shall notify CM and Owner immediately following any accident and promptly confirm the notice in writing. Contractor shall be liable to Owner and CM for and will promptly remedy all damage or loss to any property caused in whole or in part by Contractor, or anyone directly or indirectly employed by Contractor, or by anyone for whose acts Contractor may be liable.

Until such time as the Work is completed and finally accepted by Owner, Contractor shall bear the risk of loss for damage to, or loss or destruction of the Work, and such materials or equipment, and Contractor shall, at its expense, repair or replace to Contractor's satisfaction, all damage to, or loss or destruction of, the Work or such materials or equipment which results from any cause whatsoever.

Contractor shall implement, communicate and enforce a policy designed to ensure the safety of all workers on the Site and complies with all federal, state and local safety statutes, regulations, ordinances, rules and codes governing the Work. Contractor shall defend, indemnify and hold Owner and CM harmless from and against fines and penalties imposed upon or

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affecting Contractor resulting from, relating to or concerning Work and/or Contractor's failure to comply with applicable safety laws, ordinances or regulations. CM and/or Owner may deduct the amounts of any unpaid penalties, fines or fees, along with any attorneys' fees or costs incurred by Contractor, from amounts otherwise due Contractor.

Contractor shall comply with all applicable laws, ordinances, codes and regulations related to hazardous substances, including the provision of Material Safety Data Sheets for all hazardous substances brought onto the Site by Contractor or any of its employees, subcontractors, materialmen, suppliers, or agents. In the event Contractor causes hazardous substances to be brought to the Site, through Contractor's own acts or omissions or those of its employees, subcontractors, materialmen, suppliers, or agents or any other person for whom Contractor is responsible, Contractor shall further provide any additional precautions needed to protect individuals that may be affected by such hazardous substances.

No materials, appliances, supplies or equipment delivered for the benefit of the Project may be removed from the job site without Contractor's prior written consent.

Contractor agrees to perform all patching of any character arising from Work. Any failure in this regard may be performed or supplemented by Owner at Contractor's expense. Prior to undertaking any cutting or drilling operations, Contractor shall verify that no structural or other damage will be caused by the cutting or drilling process. No structural member shall be cut or drilled without prior written approval from CM.

14. Notices. All reporting, notices or communications required or permitted to be given under this Agreement will be in writing and will be delivered by email to the following email addresses:

For Owner:	For CM:	For Contractor:
To the Email address listed on Page 1 of this Agreement, with a copy to Mark Shayotovich at <u>mshayotovich@plainfield.k12.in.us</u>	To the Email address listed on Page 1 of this Agreement	To the Email address listed on Page 1 of this Agreement

Notices will be deemed effective on the date the notice is sent by email. If a party sending an email notice under this Agreement receives a machine-generated message that delivery has failed, then for that notice to be valid, the sender must, no later than ten business days after sending the email message, deliver a tangible copy of that notice (by FedEx, UPS, or USPS) with end-to-end tracking.

15. Duty to Facilitate Jobsite Communications for Non-English-Speaking Individuals. In addition to and without limiting or modifying Contractor's performance and safety-related obligations in this Agreement and the Agreement Documents, Contractor has a duty to facilitate jobsite communications involving Contractor, its employee and its agents. If Contractor chooses to employ and/or rely upon individuals who CM reasonably believes cannot adequately comprehend written and spoken English so as to promote a safe work environment, Contractor shall, at all times that such non-English speaking individual(s) are present on the jobsite, maintain, at Contractor's expense, a translator at the Site who can interpret to and from English the language spoken or understood by such non-English speaking individual(s). This requirement is a matter of job-site safety and Contractor is free to employ any such individual so long as the conditions herein are consistently met.

16. Immigration Law Compliance. Contractor shall employ only United States citizens and aliens who are authorized to work in the United States and shall not unlawfully discriminate on the basis of citizenship or national origin. Contractor acknowledges and agrees that in compliance with the Immigration Reform and Control Act of 1986, each new employee of Contractor, as a condition of employment, must complete the Employment Eligibility Verification Form I-9 and present documentation establishing identity and employment eligibility. Contractor agrees to require that all agents, subcontractors, materialmen and suppliers be subject to the same terms of the Agreement Documents regarding immigration law compliance.

17. E-Verify. The Contractor and subcontractors shall fully comply with all E-verify requirements set forth in Ind. Code 22-5-1.7. Accordingly, the Contractor shall enroll in and verify the work eligibility status of all newly hired employees of the Contractor through the E-Verify program; provided, however, the Contractor is not required to verify the work eligibility status of all newly hired employees of the Contractor through the E-Verify program if the E-Verify program no longer exists.

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The Contractor shall sign an affidavit affirming that the Contractor does not knowingly employ an unauthorized alien. The Contractor and subcontractors shall not knowingly employ or contract with an unauthorized alien or retain an employee or contract with a person that the Contractor or Subcontractor subsequently learns is an unauthorized alien. If the Contractor violates this Section, the Owner shall require the Contractor to remedy the violation not later than thirty (30) days after the Owner notifies the Contractor. If the Contractor fails to remedy the violation within the thirty (30) day period, the Owner shall terminate this Agreement for breach of Contract. If the Owner terminates this Agreement, the Contractor shall, in addition to any other contractual remedies, be liable to the Owner for actual damages. There is a rebuttable presumption that the Contractor did not knowingly employ an unauthorized alien if the Contractor verified the work eligibility status of the employee through the E-Verify Program. If the Contractor employs or contracts with an unauthorized alien but the Owner determines that terminating this Agreement would be detrimental to the public interest or public property, the Owner may allow this Agreement to remain in effect until the Owner procures a new contractor. The Contractor shall, prior to performing any of the Work, require any Subcontractor to certify to the Contractor that the Subcontractor does not knowingly employ or contract with an unauthorized alien and has enrolled in the E-Verify Program. The Contractor shall maintain on file a certification from each Subcontractor throughout the duration of the Project. If the Contractor determines that a Subcontractor is in violation of this Section, the Contractor may terminate its Subcontract with the Subcontractor for such violation. Such termination may not be considered a breach of this Agreement by the Contractor or the Subcontractor. Execution of the provided Exhibit J, E-Verify Program Compliance Affidavit, with this Agreement is a requirement of this section.

18. Background Checks. Contractor shall, to the extent applicable, comply with the Owner's criminal history background and child protection index check policy(s) and shall comply with all applicable laws regarding criminal history background and child protection index checks and requirements.

19. Drug-Free Workplace. Owner and Contractor are committed to providing all workers a drug-free workplace. To ensure a drug-free workplace, all individuals working on-site on behalf of Contractor (whether directly employed by or retained by Contractor or one of its agents, subcontractors, materialmen or suppliers) shall participate in a program of both annual and random drug-testing. Each employee working on-site on behalf of Contractor (whether directly employed by or retained by Contractor or one of its agents, subcontractors, materialmen or suppliers) must be able to produce proof, upon Contractor's request, demonstrating: (a) that the employee is tested on an annual basis by a facility approved by the National Institute for Drug Abuse ("NIDA"), (b) that the employee, within the 12 month period preceding the request, was tested by a NIDA-approved facility and was determined to be free of illegal substances, (c) that the employee has agreed to submit to random drug testing by a NIDA-approved testing facility upon not more than three business days' prior notice to the employee, and (d) that the employee has not refused a request for random drug testing.

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

Only materials and equipment that are to be used directly in the Work and in the immediate future shall be brought to and stored on the Project site by the Contractor. Equipment no longer required for the Work shall be promptly removed from the Project. Contractor shall be solely responsible for the Project remaining secure at all times and for the protection of materials, tools, and equipment stored at the Project site from weather, theft, damage, and all other adversity.

The Contractor shall keep the Project site, all roads, sidewalks, parking areas, and thoroughfares on and adjacent to the Project free from obstructions which might present a hazard, nuisance, or interference with vehicular or pedestrian traffic. When construction operations necessitate the closing of traffic lanes or sidewalks, the Contractor shall be responsible for arranging such closing in advance with the authorities having jurisdiction, the Owner and any adjacent property owners. The Contractor shall provide adequate barricades, signs, flagmen, traffic control personnel, and other devices for traffic guides and public safety. The Work shall be performed to the fullest extent reasonably possible in such a manner that areas adjacent to the site of the Work shall be free from all debris, building materials, and equipment likely to cause hazardous conditions.

The Contractor shall not permit any of its or its Subcontractors' employees to use any existing facilities at the Project site, including without limitation, lavatories, toilets, entrances, and parking areas other than those designated by the Owner. All the workers of Contractor and its subcontractors, whatever tier, at the Project site shall be clearly identified by company badges, t-shirts or other acceptable identification. Without limitation by any other provision of the Contract Documents, the

EXHIBIT B – Terms and Conditions of Project Agreement

Contractor shall comply with any and all rules and regulations promulgated by the Owner in connection with the use and occupancy of the Project site as well as any applicable policies of the Owner, all as may be amended by the Owner from time to time.

21. Clean Up. Contractor shall clean and continuously keep its portion of the Project and surrounding area clean and free of debris, including, but not limited to, regularly removing construction trash, waste and debris, and the removal of all dirt and mud from any and all roadway surfaces both on the Site and at the Site's ingress and egress points. Upon Substantial Completion of the Work, or any portion of the Work, Contractor shall remove all debris, trash, construction wastes, materials, equipment, machinery and tools arising from the Work or applicable portions thereof to permit Owner to occupy the Project or that portion of the Project for its intended use. If Contractor fails to clean up as provided herein, Contractor shall nonetheless be financially responsible for the such clean up and CM may adjust or deduct from applications for payment all resulting cleanup costs incurred by Owner or on Owner's behalf.

22. Right of Occupancy. Whenever it may be useful or necessary to do so, CM or Owner shall be permitted to occupy and use any portion of the Work which has been either partially or fully completed by Contractor before final inspection and acceptance thereof by the Owner, but such use or occupation shall not relieve Contractor of its warranty of said Work and materials nor of its obligation to make good at its own expense any defect in materials and workmanship which may occur or develop prior to Contractor's release from responsibility to the Owner; provided, however, that Contractor shall not be responsible for any damage thereto that is due to or caused by the negligence of Owner during such period of use.

23. Conduct. Contractor's employees, agents, subcontractors, materialmen, suppliers, persons, and/or supervisors who are or may be involved in the performance of the Work ("Contractor Personnel") shall conduct themselves in a manner that is lawful, courteous, businesslike and respectful of all others. Owner and CM shall have the right to require removal of any Contractor Personnel failing to comply with this conduct provision. Contractor Personnel shall not utilize any constructed or partially constructed improvements for personal use.

24. Indemnity. To the fullest extent permitted by law of the State of Indiana, the Contractor shall indemnify and hold harmless the Owner, Contractor, and their respective agents and employees ("Indemnified Parties") from and against any and all loss, cost, claim, suit, cause of action, damage or expense of every kind and nature (including, without limitation, fines, penalties, remedial obligations, court costs and expenses and reasonable attorney's fees, including attorneys' fees incurred in the enforcement of this indemnity clause)(collectively "Losses") related to, in connection with, or resulting from: (a) actual or alleged failure of Contractor or its employees, agents, subcontractors, materialmen and suppliers to comply with applicable law, applicable codes and standards or safety requirements under this Agreement; (b) actual or asserted violation or infringement of any domestic or foreign patents, copyrights or trademarks or other intellectual property, or any improper use of confidential information or other proprietary rights that may be attributable to Contractor or any employee, agent, subcontractor, materialmen and supplier in connection with the Work; (c) contamination or pollution arising out of acts or omissions of Contractor's or any employee's, agent's, subcontractor's, materialmen's or supplier's use, handling or disposal of hazardous materials brought onto the site, the facility site, the adjacent property or any other property by Contractor or any employee, agent, subcontractor, materialmen and supplier; (d) claims by any governmental instrumentality as a result of a failure by Contractor or any employee, agent, subcontractor, materialmen and supplier to pay taxes; (e) failure of Contractor to make payments to any employee, agent, subcontractor, materialmen and supplier which is not the result of failure by Contractor to timely pay Contractor; (f) breach by Contractor of any covenant, representation, or warranty under this Agreement, and (g) bodily or personal injury (including sickness to or death of persons and losses therefrom to relatives or dependents) of any person and damage to or destruction of property of any person or entity in any way directly or indirectly arising out of or relating to the Work, but only to the extent that such injury or death or property damage or destruction is caused by the negligence of the Contractor's or its agent's, subcontractor's, materialmen's or supplier's personnel. Contractor shall defend at its expense (including attorney fees, expert fees, court costs and other expenses) the Indemnified Parties from any claims, demands, actions or causes of action, whether such claim, demand, action or cause of action is asserted in a legal, judicial, arbitral or administrative proceeding or action or by notice without institution of such legal, judicial, arbitral or administrative proceeding or action, in connection with Contractor's or any employee's, agent's, subcontractor's, materialmen's or supplier's (i) violation of applicable law, (ii) infringement of intellectual property rights, (iii) contamination or pollution, (iv) failure to pay taxes, (v) failure to pay any employee, agent, subcontractor, materialmen or supplier which is not the result of failure by Owner to timely pay Contractor, (vi) negligence, gross negligence or willful misconduct alleged to result in property damage or personal injury (or death), and (vii) breach of any covenant, representation, or warranty of Contractor under this Agreement. The duty to defend is separate from the duty to indemnify and regardless of the degree or

EXHIBIT B – Terms and Conditions of Project Agreement

proportion of negligence or comparative fault by Contractor's or any agent's, subcontractor's, materialmen's or supplier's employees alleged. Owner shall give notice to Contractor within fifteen (15) days after receiving notice of the commencement of any claim or legal action for which Owner seeks indemnification and defense. Owner's failure or delay in giving such notice will reduce Contractor's liability only by the amount of damages directly attributable to such failure or delay. Contractor shall not settle or compromise any claim or legal action without Owner's written consent, not to be unreasonably withheld, delayed or conditioned. Owner may at its expense participate in the defense of any such matters, but such participation will not limit or affect Contractor's obligations herein. In the event of the failure of the Contractor to perform fully in accordance with the defense obligations under this section, Owner may, at its option, and without relieving the Contractor of its obligations hereunder, so perform, but all damages, costs and expenses (including all reasonable attorneys' fees and litigation or arbitration expenses, settlement payments and judgments) so incurred by Owner in that event shall be reimbursed by the Contractor to Owner, together with interest on same from the date any such cost and expense was paid by Owner until reimbursed by the Contractor at the interest rate provided by applicable law. Contractor's duties to defend, hold harmless, and indemnify the Indemnified Parties shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or its agents, subcontractors, materialmen or suppliers under worker's compensation acts, disability benefit acts, or other employee benefit acts. All release, defense and indemnity obligations provided for in this Agreement shall survive termination, expiration, or cancellation of the Agreement. In the event that any indemnity provisions in this Agreement are contrary to the law governing this Agreement, then the indemnity obligations applicable hereunder shall be applied to the maximum extent allowed by applicable law. Contractor's indemnity and defense obligations for personal injury, illness or death or property damage shall apply regardless of whether any Indemnified Parties' were concurrently negligent, it being agreed that in this event, Contractor's respective liability or responsibility shall be determined in accordance with the principles of comparative negligence. In the event the laws (whether by statute or court decision) of the State of Indiana provide that contracts or provisions for indemnification of a party's own negligence are against public policy or are otherwise void and unenforceable, the obligation for Contractor to defend, indemnify and hold harmless the Indemnified Parties against claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from the performance of the Work and due or alleged to be due by the negligent acts or omissions of the Contractor, or any of Contractor's employees, agents, subcontractors, materialmen or suppliers, anyone employed by them or anyone for whose acts they may be liable, will be deemed to be a severable distinct obligation. Contractor shall require that its agents, subcontractors, materialmen and suppliers also indemnify and defend Contractor, Owner, CM, and any other persons that Contractor is required to indemnify and defend under the Agreement Documents, to the same extent that Contractor is required to indemnify and defend such persons.

25. Insurance. Contractor shall procure and maintain the insurance coverage required by the Agreement Documents and as set forth in Exhibits I. Contractor's insurance must be in effect before Work commences and must remain in effect through the longer of the warranty period expressed in the Agreement Documents or the time period provided in Exhibit I. Work on the Site may not begin nor will any payment be due to Contractor until Contractor has secured such insurance and delivered to CM and Owner a certificate of insurance fulfilling the requirement(s) expressed in the Agreement Documents. Failure to secure and maintain the insurance identified in this Agreement (and related Exhibits) or provide notices herein will be a material breach of this Agreement. Any delays or related effects associated with failure to deliver the required documentation will be borne solely by Contractor.

To the fullest extent permitted by law, Contractor, for itself and on behalf of its insurers waives all rights of subrogation against Owner and CM, their agents and employees, as respects loss, damage, claims, suits or demands howsoever caused: (a) to real or personal property, vehicles, equipment and tools owned, leased or used by Contractor or Contractor's employees, agents, subcontractors, materialmen and suppliers; and (b) to the extent such loss, damage, claims, suits or demands are, or should be, afforded coverage by the Contractor's insurance maintained as required by this Agreement or any other insurance (except professional liability to which this requirement does not apply) maintained by Contractor. This waiver shall apply to all first party property, equipment, vehicle and worker's compensation claims, and to all third-party liability claims. This waiver shall apply to all deductibles, retentions or self-insured layers applicable to the required or any other insurance maintained by Contractor. If necessary, Contractor agrees to endorse the required insurance policies to permit waivers of subrogation in favor of Owner and CM. Contractor further agrees to hold harmless and indemnify Owner and CM for any loss or expense incurred as a result of Contractor's failure to obtain such waivers of subrogation.

Material suppliers and equipment suppliers contracted by Contractor, if delivering to jobsite, must adhere to the insurance requirements herein.

EXHIBIT B – Terms and Conditions of Project Agreement

Without any obligation to do so, should CM or Owner become aware of Contractor's failure to procure or maintain the insurance required by this Agreement, Owner may obtain such insurance on Contractor's behalf and deduct from payment(s) otherwise due and owing those amounts expended in obtaining the required insurance policies.

26. Termination for Convenience. Owner may terminate this Agreement at any time for its convenience and without cause by providing written notice to Contractor. Within three (3) days of notification of termination, this Agreement shall be terminated and Contractor shall immediately stop Work, follow all of CM's and/or Owner's instructions and mitigate all costs. In the event of a termination for convenience Owner's liability to Contractor shall be limited to the extent of Contractor's proven costs for Work performed on-site and accepted by Owner. Contractor shall not be entitled to overhead or profit on Work not executed.

27. Termination for Cause. If at any time Contractor: (a) fails or refuses to supply sufficient labor, materials, tools, equipment or supervision; (b) fails or refuses to perform the Work promptly and diligently; (c) fails to meet the Work Schedule; (d) causes delay, disruption, interference or stops the work of Owner or any other contractors; (e) fails or refuses to perform any of its obligations under this Agreement; (f) commits an act or omission that is a breach or default of this Agreement; or (g) becomes bankrupt, insolvent, or goes into liquidation (either voluntarily or under an order of a court of competent jurisdiction), or makes a general assignment for the benefit of creditors, or otherwise evidences financial incapacity; then in any of such events, each of which shall constitute a material default under this Agreement, Owner shall have the right, in addition to all other rights and remedies provided under this Agreement or by law, after three (3) days' written notice to Contractor: (1) to order Contractor to add manpower or to work overtime or additional shifts at no additional cost to Owner; (2) to delay payment of all or part of the Agreement Amount until Contractor conforms to the Work Schedule; (3) to take over and perform through Owner, or through third parties selected by Owner, the Work until, in CM's and/or Owner's judgment, Contractor's default has been cured, and deduct from the Agreement Amount the cost thereof plus a management fee of twenty percent (20%), which is a fair reimbursement of Owner's resources to manage Contractor's obligations and not a liquidated damage; (4) to augment Contractor's forces with additional labor, service and materials until, in CM's and/or Owner's judgment, Contractor's default has been cured and deduct from the Agreement Amount the cost thereof plus a management fee of twenty percent (20%); and/or (5) to terminate all or any portion of Contractor's right to proceed under the Agreement and to enter upon the premises and take possession, for the purpose of completing that portion of the Work affected by such termination, of all Contractor's records, drawings, documents, materials, tools and equipment and all other items relating to that subject portion of the Work, including materials stored off-site for use in completing the Work. In case of such termination of Contractor, Contractor shall not be entitled to receive any further payment under this Agreement with respect to such portion of the Work until that portion of the Work shall be wholly completed to the satisfaction of CM and Owner, and shall have been accepted by them, at which time, if the unpaid balance of the amount to be paid under this Agreement shall exceed the cost and expense incurred by Owner in completing said portion of the Work, such excess shall be paid by Owner to Contractor as set forth below; but if such cost and expense shall exceed such unpaid balance, then Contractor shall pay the difference to Owner as set forth below. Such cost and expense shall include not only the cost of completing said portion of the subject portion of the Work to the satisfaction of CM and Owner, and of performing and furnishing all labor, services, materials, equipment, and other items required therefore, but also all losses, damages, costs and expenses, including reasonable attorneys' fees and disbursements sustained, incurred or suffered by reason of or resulting from Contractor's default. If the unpaid balance of the Agreement Amount exceeds the cost incurred by Owner, plus a management fee of twenty percent (20%), and no claims arising from the Work are threatened or pending, Contractor will be paid the excess less any amounts Contractor owes Owner for any other project; but if such cost plus the 20% management fee exceeds the unpaid balance, then Contractor shall pay the difference to Owner within ten (10) days of written demand by Owner or CM.

In addition to the costs specified in the immediately preceding paragraph, CM and/or Owner may deduct from the Agreement Amount and/or otherwise recover from Contractor an amount sufficient to indemnify and hold Owner and CM harmless from any loss or liability arising out of the Work or other involvement in the Project, including, but not limited to, the costs of any claims by others resulting from Contractor's acts or omissions including any judgment or award to or settlement with the claiming party and reasonable attorneys' fees and disbursements incurred defending or resolving such claims.

In the event it is determined that Owner wrongfully terminated Contractor for cause, then the termination shall be treated as a termination for convenience and Contractor's remedy shall be as described in Section 23 of this Agreement.

EXHIBIT B – Terms and Conditions of Project Agreement

28. Labor Relations; Prevailing Wage. Contractor agrees to be bound by and comply with all applicable federal, state and local laws and regulations bearing on labor or employment, including but not limited to all provisions of the Fair Labor Standards Act, the Americans with Disabilities Act, the federal Family and Medical Leave Act, and the Affordable Care Act. Contractor shall indemnify, defend and hold Owner and CM harmless from and against, all claims, suits, losses, causes of action, damages, liabilities, taxes, fines, penalties and expenses, including attorneys' fees, arising from or related to Contractor's failure to comply with applicable law.

Contractor accepts the duty to maintain harmony between labor groups. In the event of a strike, stoppage or other disruption of any work at the Project resulting from a dispute involving or affecting the labor employed by Contractor or its employees, agents, subcontractors, materialmen and suppliers, Owner may immediately terminate this Agreement. Where Owner terminates Contractor under this provision, Owner shall compensate Contractor for the value of the labor and material theretofore furnished or delivered to the Site proportioned upon the Agreement amount, but Contractor will not be paid and shall not be entitled to incidental or consequential damages, compensation for prospective profits on portions of the project not performed or any costs associated with materials not furnished to the Site.

29. Disadvantaged, Minority, Women, Disabled Veteran, Business Enterprises. Contractor hereby acknowledges that it is familiar with all DBE/MBE/WBE/DVBE requirements pertaining to the Project. If Contractor claims status as a DBE/MBE/WBE/DVBE Contractor shall take all steps necessary and shall make all necessary records available to CM and Owner to assure that Contractor is in compliance with such requirements. In the event that any subcontractor or employee, agent, subcontractor, materialmen or supplier of Contractor is designated as or is required to be a DBE/MBE/WBE/DVBE, Contractor agrees to be responsible for insuring that said employee, agent, subcontractor, materialmen or supplier meets all applicable requirements. Contractor acknowledges that Owner and CM are relying upon Contractor's representations regarding the validity of Contractor's status, if any, as a DBE/MBE/WBE/DVBE and that misrepresentation of the status of Contractor or any of its employees, agents, subcontractors, materialmen and supplier is a material breach and grounds for immediate termination of this Agreement. Contractor shall save, hold harmless, indemnify and defend Owner and CM from any and all loss, liability, claims, demands, suits at law or in equity, judgments (including attorneys' fees and court costs) and awards, arising out of or related to Contractor's not having or losing the DBE/MBE/WBE/DVBE status it represented it possessed.

30. 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 Agreement Documents or geotechnical report or (2) unknown subsurface 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 Agreement Documents, the Contractor shall promptly provide notice to the CM and Owner before conditions are disturbed and in no event later than two business days after first observance of the conditions. CM will promptly investigate such conditions and, if it determines that the conditions 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, CM will recommend an equitable adjustment in the Agreement Sum or Agreement Time, or both, which shall be subject to Owner's approval. If CM determines that the conditions at the site are not materially different from those indicated in the Agreement Documents or that the physical conditions were not of an unusual nature that the Contractor should have discovered such conditions before signing the Agreement and that no change in the terms of the Agreement is justified, CM shall promptly notify the Owner and Contractor in writing, stating the reasons. If the Contractor disputes CM's determination or recommendation, Contractor may proceed as provided in Section 30.

31. Patents and Royalties. Contractor shall pay all royalties and patent license fees applicable to Work. Contractor agrees to indemnify and hold harmless Owner and CM from and against any and all loss, liability, damages and expenses (including cost of defense, settlement, legal fees and disbursements) arising out of claims or litigation on account of infringement or alleged infringement of any letters patent or patent rights by reason of the Work or any product used by Contractor.

32. Independent Contractor. Contractor is an independent contractor of Owner. Nothing contained in this Agreement shall be construed to create the relationship of employer and employee, principal and agent, partnership or joint venture, or any other fiduciary relationship. Contractor has no authority to bind Owner or CM or create obligations on the part of Owner or CM. Contractor shall, at its sole cost and expense, and without increase in the Agreement Amount, comply with all laws, rules, ordinances and regulations of all governing bodies having jurisdiction over the Work; obtain all necessary permits and licenses

EXHIBIT B – Terms and Conditions of Project Agreement

therefor; pay all manufacturers' taxes, sales taxes, use taxes, processing taxes, and all federal and state taxes, insurance and contributions for social security and unemployment.

33. Claims and Dispute Resolution. Within ten (10) days of the occurrence of any event for which Contractor claims it is entitled to additional compensation or an extension of time, Contractor shall compile and present to Owner and CM such quantified claim along with the following supporting documentation to permit timely and appropriate evaluation of the claim, determination of responsibility and any remaining opportunity for mitigation and any failure to timely provide this information shall be cause for denial: (1) a narrative of the circumstances which gave rise to the Claim, including the start date of the event or events involved and the actual, or anticipated, finish date; (2) detailed identification of the Work (e.g., activity codes from the Work Schedule) affected by the circumstances which gave rise to the Claims; (3) detailed calculation of amount of the Claim; (4) time impact analysis, consistent with critical path methodology for scheduling and demonstrating the impact to the Work Schedule and the actual delay to the critical path of the Work Schedule; (5) copies of the Contractor's daily log for each day of impact; (6) copies of relevant correspondence and other information regarding or supporting Contractor entitlement; (7) copies of Contractor's payroll records for labor impacts claimed by Contractor and any employee, agent, subcontractor, materialmen or supplier affected by the event or events; (8) copies of invoices for material impacts claimed by the Contractor and any employee, agent, subcontractor, materialmen and supplier affected by the event or events; (9) copies of equipment records, or rental invoices, for any equipment, impacts claimed by the Contractor and any employee, agent, subcontractor, materialmen and supplier affected by the event or events; (10) copies of the most recent income statement, including segregated general and administrative expenses for the most recent reporting period, and for the Agreement Time, if available, and similar information for any Contractor and employee, agent, subcontractor, materialmen and supplier claim included; and (11) a statement, signed by an authorized representative of the Contractor, certifying that the Claim is made in good faith, the supporting data is accurate and complete to the best of the Contractor's knowledge and belief and the amount, time or other matter requested accurately reflects the entire remedy for the claim and is a fair, reasonable and necessary adjustment for which the Contractor believes the Owner is liable in accordance with the Agreement Documents.

Any Party may from time to time call a special meeting for the resolution of disputes that would have a material impact on the cost or progress of the Project. Such meeting shall be held at the Contractor's offices within three (3) working Days of written request therefore, which request shall specify in reasonable detail the nature of the dispute. The meeting shall be attended by CM, the Contractor's Authorized Representative and any other person who may be affected in any material respect by the resolution of such dispute. Such Authorized Representatives shall have authority to settle the dispute and shall attempt in good faith to resolve the dispute. If the dispute has not been resolved within five (5) working Days after the special meeting has been held, a mediator, mutually acceptable to the Parties and experienced in construction matters shall be appointed. The cost of the mediator shall be shared by the Parties. Any controversy or dispute not resolved through mediation, including all claims, counterclaims, disputes or other matter in question arising out of or related to this Agreement, or the alleged breach thereof by either party (except for claims which have been waived under the terms of the Agreement) shall be resolved through binding arbitration. The parties agree this Agreement involves interstate commerce and the parties invoke the Federal Arbitration Act in their commitment to arbitrate. This agreement to arbitrate and any other agreement or consent to arbitrate entered into will be specifically enforceable under the prevailing law of any court having jurisdiction over the Project, the parties and any dispute arising with respect to any of the foregoing. The parties irrevocably waive the right to trial by jury or trial by judge. The demand for arbitration shall be filed in writing with the other party to this Agreement. The demand for arbitration shall be filed within thirty (30) days of the occurrence of the event giving rise to such claim(s), dispute(s) or other matter in question and in no event shall any demand be made after the date when institution of legal or equitable proceedings based upon such claim or other dispute or matter in question would be barred by the applicable statute of limitations. Upon service of the demand for arbitration, the parties shall endeavor to agree upon and select a neutral third party to serve as their arbitrator. If the parties cannot agree upon a neutral third party to serve as their arbitrator within ten (10) days of the service of the written demand for arbitration, either party may file the demand for arbitration with the American Arbitration Association ("AAA") or JAMS to promptly facilitate the selection and assignment of a neutral third party to serve as the arbitrator. The parties desire to resolve disputes expediently and economically. Notwithstanding any other agreement or rule of procedure, the parties agree: disputes shall be resolved by a single arbitrator rather than a panel of neutrals; the final evidentiary hearing before the arbitrator shall be conducted not more than ninety (90) days from the selection/appointment of the neutral third party to serve as the arbitrator; prior to the final evidentiary hearing each party shall be limited in discovery to five interrogatories, five requests for production of documents, two fact depositions and two expert depositions; and the hearing shall be conducted in the jurisdiction where the work was performed and as close to the Project as is convenient to the parties and the arbitrator. In all instances of dispute, Contractor shall continue performance

EXHIBIT B – Terms and Conditions of Project Agreement

of all obligations hereunder despite any dispute that may develop and Contractor shall pay Owner's costs and legal fees incurred enforcing or defending this Agreement. The award rendered by the arbitrator shall be consistent with the agreement of the parties, in writing, and include: (i) a concise breakdown of the award; (ii) a written explanation of the award specifically citing any applicable documents and agreement provisions deemed applicable and relied upon when making the award. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject only to the controlling law of the jurisdiction where the arbitration is conducted relating to vacating or modifying an arbitral award. The fees and expenses of the arbitrator and any arbitration service shall be shared equally by the parties. In all instances of dispute, Contractor shall continue performance of all obligations hereunder despite any dispute that may develop and Contractor shall pay Owner's costs and legal fees incurred enforcing or defending this Agreement.

34. Taxes. Contractor shall be responsible for all sales tax, withholding taxes upon its agents and employees, FICA, unemployment compensation and any taxes upon the labor and materials furnished pursuant to the Agreement. The Owner is Indiana Sales Tax exempt and an Indiana Sales Tax Exemption form from the Owner will be provided.

35. Lawful employees. Contractor warrants that all of its employees and the employees of its agents, subcontractors, suppliers and materialmen are, and throughout the course of the Project will be, lawfully employed under all Federal, State and Local, laws, regulations, rules, orders, codes and ordinances.

36. Non-discrimination. Contractor shall fulfill the obligations of this Agreement in a manner free from all forms of discrimination made unlawful or otherwise prohibited by or recommended against by governmental or quasi-governmental authorities having jurisdiction at the Project.

37. No Waiver. The failure of Owner or CM to insist, in any one or more instances, on the performance of any of the obligations required or rights granted under the Agreement Documents shall not be construed as a waiver or relinquishment of such obligation or right with respect to future performance.

38. Headings. The headings used in this Agreement, or any other Agreement Document, are for ease of reference only and shall not in any way be construed to limit or alter the meaning of any provision.

39. Assignment and Subcontracting. Neither this Agreement nor any right, privilege or obligation hereunder shall be assigned, sublet, subcontracted or transferred in whole or in part by Contractor without prior written consent of the Owner, and any attempted assignment, subletting, subcontracting or transfer thereof without the written consent of the Owner shall be void.

Contractor must receive written approval from CM prior to subcontracting the Work or any portion thereof. The subcontracting of all or any part of the Work by Contractor shall not relieve Contractor from any of the obligations or conditions of this Agreement. The acts and omissions of each employee, agent, subcontractor, materialmen and supplier and all persons either directly or indirectly acting for each employee, agent, subcontractor, materialmen and supplier shall be deemed to be the acts and omissions of Contractor, and Contractor shall remain liable and responsible to Owner hereunder as if no subcontract had been made. Contractor shall bind all employees, agents, subcontractors, materialmen and suppliers to the provisions of the Agreement Documents applicable to the subcontracted Work.

40. Choice of Law. This Agreement shall be construed, enforced, and performed in accordance with the laws of the state where the Project is located without regard to that state's principles of conflicts of laws.

41. Jointly Drafted. The parties expressly agree that this Agreement was jointly drafted, and that they both had opportunity to negotiate its terms and to obtain the assistance of counsel in reviewing its terms prior to execution. Therefore, this Agreement shall be construed neither against nor in favor of either party due to it being considered the drafter.

42. Subcontractor Compliance. All agents, subcontractors, materialmen and suppliers are subject to Owner's prior written approval. Contractor, as soon as practicable after execution of this Agreement, shall notify the Owner and CM of the employees, agents, subcontractors, materialmen and suppliers proposed for each of the principal portions of the Work. Contractor shall not contract with any agent, subcontractor, materialmen or supplier to whom the Owner or CM has made reasonable written objection within ten (10) days after receipt of the Contractor's list of agents, subcontractors, materialmen

EXHIBIT B – Terms and Conditions of Project Agreement

and suppliers. Contractor agrees to require all approved agents, subcontractors, materialmen and suppliers to agree, in writing, to adhere to all requirements as stated herein.

43. CM. Unless otherwise specified herein, Contractor shall communicate to Owner all matters related to the Project and this Agreement through CM. Contractor shall receive and take all communications and directives from CM as if received directly from Owner. Notwithstanding the foregoing, nothing in this Agreement shall be construed to (a) create any contractual arrangement or relationship between Contractor and CM; or (b) make Contractor or CM a third-party beneficiary to any contract between the Owner and Contractor or Owner and CM. CM will not have control over, or charge of, 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 Agreement Documents and will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Agreement Documents. CM will have no control over or charge of or be responsible for acts or omissions of the Contractor, , or Contractor's agents, employees, subcontractors, materialmen or suppliers, or of any other persons or entities performing portions of the Work. The Contractor shall not be relieved of obligations to perform the Work in accordance with the Agreement Documents either by activities or duties of CM in administration of the Agreement, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

44. Counterparts. This Agreement may be executed in one or more counterparts each of which is deemed an original and together constitute one document. Owner and Contractor covenant and agree that the signatures executing this Agreement, provided by facsimile or electronic transmission, shall stand as and for the original, and Owner and Contractor agree to be bound thereby.

45. Entire Agreement. This Agreement reflects the complete and full agreement between the parties and there exist no other agreements or understandings, whether verbal or written. Contractor's bid, proposal other exclusionary or limiting language are not part of this Agreement.

EXHIBIT C – Application for Payment Form

APPLICATION AND CERTIFICATION FOR PAYMENT

PAGE ONE OF

PAGES

TO OWNER:

PROJECT:

APPLICATION NO:

Distribution to:

☐ OWNER☐ ARCHITECT☐ CONTRACTOR

FROM CONTRACTOR:

VIA ARCHITECT:

PERIOD TO:

PROJECT NOS:

CONTRACT FOR:

CONTRACT DATE:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract. Continuation Sheet, G703, is attached.

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

1. ORIGINAL CONTRACT SUM \$ _____
2. Net change by Change Orders \$ _____
3. CONTRACT SUM TO DATE (Line 1 + 2) \$ _____
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) \$ _____
5. RETAINAGE:
 - a. % of Completed Work \$ _____
(Column D + E on G703)
 - b. % of Stored Material \$ _____
(Column F on G703)
 - Total Retainage (Lines 5a + 5b or Total in Column I of G703) \$ _____
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total) \$ _____
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate) \$ _____
8. CURRENT PAYMENT DUE \$ _____
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6) \$ _____

CONTRACTOR:

By: _____ Date: _____

State of: Indiana

County of: Vigo

Subscribed and sworn to before me this _____ day of _____

Notary Public:

My Commission expires: _____

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED\$ _____

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner		
Total approved this Month		
TOTALS		
NET CHANGES by Change Order		

EXHIBIT D – Contractor's Schedule of Values

CONTINUATION SHEET

AIA DOCUMENT G703

PAGE OF PAGES

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing
Contractor's signed certification is attached.

APPLICATION NO:

APPLICATION DATE:

PERIOD TO:

ARCHITECT'S PROJECT NO:

In tabulations below, amounts are stated to the nearest dollar.

Use Column I on Contracts where variable retainage for line items may apply.

A ITEM NO.	B DESCRIPTION OF WORK	C SCHEDULED VALUE	D WORK COMPLETED		F MATERIALS PRESENTLY STORED (NOT IN D OR E)	G		H BALANCE TO FINISH (C - G)	I RETAINAGE (IF VARIABLE RATE)
			FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD		TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G + C)		
1									\$0.00
2									\$0.00
3									\$0.00
4									\$0.00
5									\$0.00
6									\$0.00
7									\$0.00
8									\$0.00
9									\$0.00
10									\$0.00
11									\$0.00
12									\$0.00
13									\$0.00
14									\$0.00
15									\$0.00
16									\$0.00
17									\$0.00
18									\$0.00
19									\$0.00
20									\$0.00
21									\$0.00
22									\$0.00
23									\$0.00
24									\$0.00
25									\$0.00
26									\$0.00
27									\$0.00
28									\$0.00
29									\$0.00
30									\$0.00

AIA DOCUMENT G703 - CONTINUATION SHEET FOR G702 - 1982 EDITION - AIA - 61982
THE AMERICAN INSTITUTE OF ARCHITECTS, 1735 NEW YORK AVENUE, NEW WASHINGTON, D.C. 20006-0232

G703-1982

CONTINUATION SHEET

AIA DOCUMENT G703

PAGE OF PAGES

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signed certification is attached.

APPLICATION NO:

APPLICATION DATE:

In tabulations below, amounts are stated to the nearest dollar.

PERIOD TO:

Use Column I on Contracts where variable retainage for line items may apply.

ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED		MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	%(G + C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
			FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD					
31									\$0.00
32									\$0.00
33									\$0.00
34									\$0.00
35									\$0.00
36									\$0.00
37									\$0.00
38									\$0.00
39									\$0.00
40									\$0.00
41									\$0.00
42									\$0.00
43									\$0.00
44									\$0.00
45									\$0.00
46									\$0.00
47									\$0.00
48									\$0.00
49									\$0.00
50									\$0.00
51									\$0.00
52									\$0.00
53									\$0.00
54									\$0.00
55									\$0.00
56									\$0.00
57									\$0.00
58									\$0.00
59									\$0.00
60									\$0.00

AIA DOCUMENT G703 - CONTINUATION SHEET FOR G702 - 1992 EDITION - AIA - 61992
THE AMERICAN INSTITUTE OF ARCHITECTS, 1735 NEW YORK AVENUE, N.W. WASHINGTON, D.C. 20006-5232

G703-1992

CONTINUATION SHEET*AIA DOCUMENT G703*

PAGE OF PAGES

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signed certification is attached.

APPLICATION NO:

APPLICATION DATE:

PERIOD TO:

In tabulations below, amounts are stated to the nearest dollar.

Use Column I on Contracts where variable retainage for line items may apply.

ARCHITECT'S PROJECT NO:

A ITEM NO.	B DESCRIPTION OF WORK	C SCHEDULED VALUE	D WORK COMPLETED		F MATERIALS PRESENTLY STORED (NOT IN D OR E)	G		H BALANCE TO FINISH (C - G)	I RETAINAGE (IF VARIABLE RATE)
			FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD		TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G + C)		
61									\$0.00
	GRAND TOTALS								\$0.00
									\$0.00

G703-1992

THE AMERICAN INSTITUTE OF ARCHITECTS, 1735 NEW YORK AVENUE, N.W. WASHINGTON, D.C. 20006-5282

AIA DOCUMENT G703 - CONTINUATION SHEET FOR G702 - 1992 EDITION - AIA - ©1992
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G703-1992

EXHIBIT E – Lien Waiver in Support of Progress Payments
PARTIAL WAIVER OF LIEN CONDITIONED ON RECEIPT OF PAYMENT

“Contractor” _____
 “Project:” Brentwood Elementary Renovations
 1630 W. Oliver Ave
 Plainfield, IN 46168
 “Owner” Plainfield Community School Corporation

This Partial Waiver is made by Contractor as of the date indicated below, a contractor or supplier to Hendricks County, Indiana Board of County Commissioners (“Owner”), in connection with construction of improvements for and to the Project.

1. Contractor represents that the following are true and accurate statements concerning the price of, and payments received for, the work, labor, services, materials, supplies and/or equipment performed and/or furnished by or on behalf of Contractor in connection with the Project (“Work”):

Date of the current application for payment:	_____	“Application Date”
Total of All Payments Previously Received:	\$ _____	
Current application for payment:	\$ _____	“Requested Payment”
Accrued Retainage	\$ _____	“Accrued Retainage”

2. Contractor represents that it has received full and final payment for all Work performed or furnished on or before the date of the most recently submitted Partial Waiver (the “Paid-Through Date”), if any, except for Accrued Retainage. Contractor hereby unconditionally waives, releases and forever discharges the Project, Owner, general contractor (if one exists), the Contractor, and their respective owners, parent companies, affiliates, successors, assigns, agents, employees, lenders and sureties (hereinafter “Releasees”) of and from all causes of action, suits, debts, accounts, bonds, contracts, promises, damages, liens, encumbrances, judgments, claims and demands whatsoever, in law or equity, known or unknown, accrued or unaccrued, which Contractor ever had, now has or might hereafter have (hereinafter “Claims”), that are in any way connected with or related to Work performed or furnished on or before the Paid-Through Date, without waiving Contractor’s claim for payment of Accrued Retainage.

3. Contractor seeks the Requested Payment as all amount due for all Work performed during the period between the Paid-Through Date and Application Date (the “Applicable Payment Period”). Conditioned only on the receipt of the Requested Payment, Contractor hereby waives, releases and forever discharges the Releasees of and from all Claims that are in any way connected with or related to Work performed or furnished before or during the Applicable Payment Period, without waiving Contractor’s claim for payment of Accrued Retainage.

4. Contractor represents that it has fully paid all employees, agents, subcontractors, materialmen and suppliers and others entitled to payment for Work performed or furnished before Paid-Through Date and warrants that it has completed all work required under the above-identified Agreement and all changes and amendments thereto, if any; and that it has complied with all the terms and conditions of said Agreement. To the greatest extent permitted by law, Contractor agrees to defend, indemnify and hold harmless the Releasees from and against all Claims that are in any way connected with or related to Work performed or furnished by or on behalf of Contractor.

CONTRACTOR

By: _____
 Name: _____
 Title: _____
 Date: _____

State of:

County of:

SUBSCRIBED and SWORN before me the _____ day of _____, 20__, by _____, who is personally known to me.

 Name:
 Notary Public

My commission expires: _____

EXHIBIT F – Lien Waiver in Support of Final Payment
FINAL WAIVER OF LIEN CONDITIONED ON RECEIPT OF PAYMENT

“Contractor” _____
 “Project:” Brentwood Elementary Renovations
 1630 W. Oliver Ave.
 Plainfield, IN 46168
 “Owner” Plainfield Community School Corporation

This Final Waiver is made by Contractor as of the date indicated below, a contractor or supplier to Hendricks County, Indiana Board of Commissioners (“Owner”), in connection with construction of improvements for and to the Project.

2. Contractor represents that the following are true and accurate statements concerning the price of, and payments received for, the work, labor, services, materials, supplies and/or equipment performed and/or furnished by or on behalf of Contractor in connection with the Project (“Work”):

Date of the current application for payment: _____ “Application Date”
 Total of All Payments Previously Received: \$ _____
 Current application for payment: \$ _____ “Requested Payment”

2. Contractor represents that it has received full and final payment for all Work performed or furnished except for Requested Payment. Contractor hereby unconditionally waives, releases and forever discharges the Project, Owner, general contractor (if one exists), the Contractor, and their respective owners, parent companies, affiliates, successors, assigns, agents, employees, lenders and sureties (hereinafter “Releasees”) of and from all causes of action, suits, debts, accounts, bonds, contracts, promises, damages, liens, encumbrances, judgments, claims and demands whatsoever, in law or equity, known or unknown, accrued or unaccrued, which Contractor ever had, now has or might hereafter have (“Claims”), that are in any way connected with or related to the Project, without waiving Contractor’s claim for the Requested Payment.

3. Contractor seeks the Requested Payment as all amount due for all Work performed for the Project. Conditioned only on the receipt of the Requested Payment, Contractor hereby waives, releases and forever discharges the Releasees of and from all Claims that are in any way connected with or related to the Project.

4. Contractor represents that it has fully paid all employees, agents, subcontractors, materialmen and suppliers and others entitled to payment for Work performed or furnished for or to the Project. And warrants that it has completed all work required under the above-identified Agreement and all changes and amendments thereto, if any; and that it has complied with all the terms and conditions of said Agreement. To the greatest extent permitted by law, Contractor agrees to defend, indemnify and hold harmless the Releasees from and against all Claims that are in any way connected with or related to Work performed or furnished by or on behalf of Contractor.

CONTRACTOR

By: _____
 Name: _____
 Title: _____
 Date: _____

State of:
 County of:

SUBSCRIBED and SWORN before me the _____ day of _____, 20____, by
 _____, who is personally known to me.

 Name:
 Notary Public

My commission expires: _____

EXHIBIT G – Contractor Request for Change

“Project:” Brentwood Elementary Renovations
985 Longfellow Lane
Plainfield, IN 46168

“Owner”: Plainfield Community School Corporation

“CM”: C.H. Garmong & Son, Inc.

“Contractor”: [Name]
[Address]

Effective Date: _____, 20____

REQUEST FOR CHANGE NO. _____

Contractor submits this Request for Change as of the Effective Date and hereby requests the terms of the agreement entered into by and between Owner and Contractor for the Project (the “Agreement”) change as follows:

[DESCRIPTION OF CHANGE]

for which the Agreement Amount is (increased / decreased) by: \$

and for which the Project Schedule is (increased / decreased) by: _____days.

This Request for Change seeks the final adjustment for any and all amounts due or to become due to Contractor for the changes or work referred to herein. In consideration for a Change Order executed consistent with this Request for Change, Contractor will release all other claims, if any except those claims previously submitted in writing in strict accordance with the Agreement for additional compensation under the Agreement, including without limitation any rights Contractor may have for additional compensation arising out of delays or disruption of the Project Schedule as may have arisen prior to the date of such Change Order.

All other terms of the Agreement will remain in full force and effect and are not modified or abrogated by this Change Order.

SUBMITTED BY:

CONTRACTOR:

Signed: _____

Printed: _____

Title: _____

Date: _____

EXHIBIT H –Change Order Form

“Project:” Brentwood Elementary Renovations
985 Longfellow Lane
Plainfield, IN 46168

“Owner”: Plainfield Community School Corporation

“CM”: C.H. Garmong & Son, Inc.

“Contractor”: [Name]
[Address]

Effective Date: _____, 20__

AGREEMENT FOR CHANGE ORDER NO. _____

This Change Order is entered into by and between Owner and Contractor as of the Effective Date and hereby changes the terms of the Agreement entered into by and between Owner and Contractor for the Project (the “Agreement”) as follows:

Scope:

Amount:

1. [Description of Change]

\$

Total

\$

for which the Agreement Amount is (increased / decreased/unchanged) by: \$
and for which the Project Schedule is (increased / decreased/unchanged) by: _____ days.

1. Except as otherwise expressly provided herein, Contractor agrees to perform the work described above in accordance with all of the terms and conditions of the Agreement.
2. Contractor’s payment applications or invoices must show any charges for the work in this Change Order separately and identified by the Change Order number.
3. This Change Order represents the final adjustment for any and all amounts due or to become due to Contractor for the changes or work referred to herein. Contractor further releases all other claims, if any, for additional compensation under the Agreement or for additional time related to the work in this Change Order, including without limitation any rights Contractor’s agents, subcontractors, materialmen and suppliers may have for additional compensation arising out of delays or disruption of Contractor’s time for performance.
4. All other terms of the Agreement remain in full force and effect and are not modified or abrogated by this Change Order.

Original Agreement Sum was	\$0.00
Net Change by Previously Authorized Change Orders	\$0.00
The Agreement Sum Prior to this Change Order was	<u>\$0.00</u>
The Agreement Sum (increased/decreased/unchanged) by this Change Order in the Amount of	\$0.00
The New Agreement Sum including this Change Order will be	<u>\$0.00</u>

SEEN AND AGREED TO BY:

Plainfield Community School Corporation

C.H. Garmong & Son, Inc.

By: _____

By: _____

By: _____

Its: _____

Its: _____

Its: _____

Date: _____

Date: _____

Date: _____

"Owner"

"Contractor"

"CM"

EXHIBIT I - Insurance Requirements

1. General Requirements. Contractor shall, at its sole expense, maintain in effect at all times, as required under the Agreement Documents, insurance coverage with limits not less than those required by the Agreement Documents so as to protect CM, Owner, and their respective employees, agents and invitees, from claims of any kind which may arise out of or result from Contractor's performance of the Work, whether performed individually or collectively by Contractor, any of Contractor's employees, agents, subcontractors, materialman or suppliers, or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable. The stated limits of insurance required by this Exhibit are minimums only and it shall be the Contractor's exclusive responsibility to determine what additional limits are adequate, and the length of time the coverage shall be maintained, to fully meet its obligations under this Agreement. The minimum limits may be basic policy limits or any combination of primary limits and umbrella limits. Contractor shall pay all deductibles and self-insured retention amounts associated with the required insurance. The amount of deductible and self-insured retention for the insurance coverage required by the Contracts Documents shall not exceed \$5,000 per occurrence. No form or endorsement shall be deemed equivalent to a form or endorsement specified herein unless Contractor determines that such form or endorsement is equivalent and acceptable. Contractor shall provide proof of coverage including, but not limited to, a current Certificate of Insurance upon request by Contractor. Contractor shall provide Owner with written notice within five (5) business days of first knowing or having reason to know that any insurance required by the Agreement Documents will expire, be cancelled or be modified. Contractor shall keep all coverages required hereunder for a period of three (3) years or for the statute of limitations or repose applicable to breach of contract and/or tort claims in the state in which the Project is located, whichever is longer.

2. Standards. Insurance coverage shall be procured from reputable insurers licensed to do business in the state in which the Project is located, and such insurers shall maintain a current A.M. Best rating of at least "A," a Financial Size Category of a "VII" or better, and being Treasury rated at a level satisfactory to Owner. All insurance policies shall be of an "Occurrence" type except Professional Liability Insurance coverage. "Claims Made" type policies shall not be permitted otherwise.

3. Certificates of Insurance. Contractor shall furnish to Owner and CM evidence of the insurance coverage required to be maintained by Contractor and its agents, subcontractors, materialmen and suppliers hereunder, including Certificates of Insurance issued by the insurance carrier, prior to Contractor commencing performance of the Work. The Certificates of Insurance shall state that Owner will be notified in writing thirty (30) days prior to a cancellation, material change, or non-renewal of insurance.

4. Minimum Limits.

a. Contractor will carry and maintain in full force and effect, insurance with minimum limits, as noted below, in such company or companies as are acceptable to Owner:

- Commercial General Liability insurance with the following minimum limits:

\$1,000,000 Each Occurrence/\$2,000,000 General Aggregate

\$2,000,000 Products & Completed Operations Liability Each Occurrence and Aggregate

\$1,000,000 Personal and Advertising Injury Each Occurrence

- Professional Liability insurance covering performance of the professional services with the following minimum limits:

\$1,000,000 Each Occurrence/\$1,000,000 General Aggregate

- Auto Liability insurance with the following minimum limits:

\$1,000,000 Hired/Non-owned Automobile Liability

\$1,000,000 Owned Automobile Liability

- Excess & Umbrella

\$4,000,000 Excess to General Liability, Auto Liability and Employers Liability

- Workers Compensation and Employers Liability with the following minimum limits:

Workers Compensation: Statutory per IC 22-3-2-14

Employers Liability:

\$1,000,000 Bodily Injury by Accident, Each Accident

\$1,000,000 Bodily Injury by Disease, Each Employee

\$1,000,000 Bodily Injury by Disease, Policy Limit

Commercial General Liability and Automobile policies must be written using the latest edition ISO forms and endorsed to add "Plainfield Community School Corporation (Owner); C.H. Garmong & Son, Inc. (Construction Manager) as additional insureds on a primary and non-contributory basis, including the Completed Operations Hazard. These are minimum limits and do not limit access to higher additional insured limits. Owner reserves the

right to require additional insurance coverages and/or higher limits for certain Contractor activities and operations. A waiver of subrogation will be provided in favor of the additional insureds above and for Workers Compensation. If any employees of Contractor will be on premises, those employees must be covered by Workers Compensation insurance with a waiver of subrogation in favor of Owner.

- b.** Contractor shall purchase such insurance as may be required for the protection of his own tools and construction equipment as he may desire. Owner does not assume any liability for temporary tools and equipment of others, prior to starting work, Contractor shall require his insurance carrier or agent to complete and return to Owner a Certificate of Insurance, in a form satisfactory to Owner, evidencing the required Insurance coverages for agents, subcontractors, materialmen and suppliers. However, Contractor's failure to provide such Certificate of Insurance prior to commencing work does not release Owner from liability from any claims whatsoever and Contractor hereby agrees to release, defend and hold harmless Owner for any liabilities arising from Work during such time and until such date when Contractor provides said Certificate of Insurance, which shall be backdated to the date Contractor's Work commenced.
- c.** The contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by Contractor.
- d.** Owner will purchase builder's risk insurance to insure the Project on a completed value basis in the amount of the replacement cost of the Project until Substantial Completion. The Builder's Risk policy shall include insurance for physical loss or damage to the Project, temporary buildings or falsework at the Project, and materials and equipment in transit.

EXHIBIT J**E-VERIFY PROGRAM COMPLIANCE AFFIDAVIT**

The undersigned being duly sworn upon (his)(her) oath, now says that I, _____ (Name),
_____ (Position) at _____ (Subcontractor Name), a subcontractor to
Garmong Construction, do hereby state that _____ (Subcontractor Name) does not
knowingly employ unauthorized aliens and participates in the E-Verify Program when it hires new
employees to confirm their work eligibility.

I swear or affirm, under penalties of perjury, that the foregoing statements are true.

Signature of affiant

Printed Name

Its: _____

(Appendix D – Sample Building Connected Bid Form – SUBMIT ONLINE)

I25-016: Plainfield Comm. School Corp. - New Storage Buildings

United States of America

CH Garmong & Son, Inc.
1502 Magnavox Way, Fort Wayne, IN 46804, United States of America

**Base Bid****Your Bid**

\$

Additional Information

Include additional information

B *I* U

General Acknowledgments

Mark "yes" to all yes/no questions »

BASE BID:

*The Bidder, having carefully examined the Bid Documents, and become fully familiar with all conditions affecting the Work as required from these documents hereby proposes to provide all material, labor, services, etc. required thereby.

☐ Yes ☐ No

* Bidder has participated in the virtual Pre-Bid or visited the site.

☐ Yes ☐ No**AGREEMENT:**

*The Bidder agree(s) to execute an agreement for work covered by this proposal on the form included in Section 00 52 14 Standard Form of Agreement of these Bid Documents, and in accordance with the other Contract Documents, provided that the Bidder is notified within ninety (90) days after due date. The Bidder further agrees that this proposal shall remain open during such ninety (90) day period. The Bidder acknowledges that Bidder understands Bid Documents and Appendices, and Bidder assumes full responsibility for the cost impact of same. Bidder also acknowledges that Owner reserves right to accept or reject any and all bids with or without cause, and/or to waive informalities in bidding.

☐ Yes ☐ No**COMPLETION DATE:**

* By submitting this Bid Form, the Bidder agrees to coordinate, staff, execute and expedite their work in accordance with the Project Schedule. All labor, material, equipment, services, shiftwork and overtime to achieve the Final Completion of the Project is included.

☐ Yes ☐ No**TAXES, PERMITS, BONDS AND FEES:**

* Bid sum includes all applicable taxes, permits, bonds and fees, required by all legal authorities at the location of the Work.

☐ Yes ☐ No**SCOPE OF WORK:**

* Bidder acknowledges all requirements set forth in this scope of work are included in the Bid.

☐ Yes ☐ No**ADDENDUM:**

* Bidder acknowledges the following Addenda

input response here

Bond Information

* Bidder has included the cost of Performance & Payment Bonds in their Bid Proposal.

☐ Yes ☐ No**Certifications****BID SUBMISSION REQUIREMENTS:**

* Bidder has attached Certification of Authorized Employment (Reference Specification Section 004510)

☐ Yes ☐ No

* Bidder has attached Indiana Form 96 (Reference Specification Section 004519)

☐ Yes ☐ No

* Bidder has attached Certification of Non-Investment in Iran

☐ Yes ☐ No

I25-016: Plainfield Comm. School Corp. - New Storage Buildings

United States of America

Disclaimers and Clarifications

Bids are to be submitted electronically via Building Connected.

Attachments

⊕ upload files

(Appendix E – Bidders Certification of Authorized Employment Form)

BIDDER'S CERTIFICATION OF AUTHORIZED EMPLOYMENT

In accordance with Indiana Code 22-5-1. 7 as amended, each Contractor in any tier of a public works project shall not knowingly employ unauthorized aliens. Every contractor shall enroll in and verify the work eligibility status of all employees hired after June 30, 2015 using the U.S. Citizenship and Immigration Services (USCIS) E-Verify program as defined in IC §22-5-1.7-3, unless the E-Verify program no longer exists.

The Prime Contractor shall require their Contractors who perform work under this Contract to certify to the Prime Contractor that the Contractor does not knowingly employ or contract with an unauthorized alien and that the Contractor has enrolled and is participating in the E-Verify program. The Prime Contractor agrees to maintain this certification throughout the duration of the term of a contract with a Contractor. The Prime Contractor and its Contractors at all levels must comply with all provisions of the statute or the Contract is subject to cancellation.

I hereby certify that I have read and understand the "Contractor's Certification of Authorized Employment" provision of the Contract Documents and that the undersigned, the proposed and the actual sub-contractors at all tiers shall comply with the provisions of the Statute on behalf of and as authorized by the Bidder. I affirm and depose that the Bidder and our Contractors shall not knowingly employ unauthorized aliens.

(Bidder - Please print full name of your proprietorship, partnership, or corporation)

(Signature of Authorized Officer or Agent)

(Printed Name and Title of Authorized Officer or Agent)

(Date)

(Appendix F – Indiana Form 96)



CONTRACTOR'S BID FOR PUBLIC WORK - FORM 96

State Form 52414 (R2 / 2-13) / Form 96 (Revised 2013)
Prescribed by State Board of Accounts

PART I

(To be completed for all bids. Please type or print)

Date (month, day, year): _____

1. Governmental Unit (Owner): _____

2. County : _____

3. Bidder (Firm): _____

Address: _____

City/State/ZIPcode: _____

4. Telephone Number: _____

5. Agent of Bidder (if applicable): _____

Pursuant to notices given, the undersigned offers to furnish labor and/or material necessary to complete the public works project of _____

(Governmental Unit) in accordance with plans and specifications prepared by _____

_____ and dated _____ for the sum of
_____ \$ _____

The undersigned further agrees to furnish a bond or certified check with this bid for an amount specified in the notice of the letting. If alternative bids apply, the undersigned submits a proposal for each in accordance with the notice. Any addendums attached will be specifically referenced at the applicable page.

If additional units of material included in the contract are needed, the cost of units must be the same as that shown in the original contract if accepted by the governmental unit. If the bid is to be awarded on a unit basis, the itemization of the units shall be shown on a separate attachment.

The contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the contract.

CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS (If applicable)

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States (I.C. 5-16-8-2). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

ACCEPTANCE

The above bid is accepted this _____ day of _____, _____, subject to the following conditions: _____

Contracting Authority Members:

_____	_____
_____	_____
_____	_____

PART II

(For projects of \$150,000 or more – IC 36-1-12-4)

Governmental Unit: _____

Bidder (Firm) _____

Date (month, day, year): _____

These statements to be submitted under oath by each bidder with and as a part of his bid. Attach additional pages for each section as needed.

SECTION I EXPERIENCE QUESTIONNAIRE

1. What public works projects has your organization completed for the period of one (1) year prior to the date of the current bid?

Contract Amount	Class of Work	Completion Date	Name and Address of Owner

2. What public works projects are now in process of construction by your organization?

Contract Amount	Class of Work	Expected Completion Date	Name and Address of Owner

3. Have you ever failed to complete any work awarded to you? _____ If so, where and why?

4. List references from private firms for which you have performed work.

SECTION II PLAN AND EQUIPMENT QUESTIONNAIRE

1. Explain your plan or layout for performing proposed work. *(Examples could include a narrative of when you could begin work, complete the project, number of workers, etc. and any other information which you believe would enable the governmental unit to consider your bid.)*

2. Please list the names and addresses of all subcontractors *(i.e. persons or firms outside your own firm who have performed part of the work)* that you have used on public works projects during the past five (5) years along with a brief description of the work done by each subcontractor.

3. If you intend to sublet any portion of the work, state the name and address of each subcontractor, equipment to be used by the subcontractor, and whether you will require a bond. However, if you are unable to currently provide a listing, please understand a listing must be provided prior to contract approval. Until the completion of the proposed project, you are under a continuing obligation to immediately notify the governmental unit in the event that you subsequently determine that you will use a subcontractor on the proposed project.

4. What equipment do you have available to use for the proposed project? Any equipment to be used by subcontractors may also be required to be listed by the governmental unit.

5. Have you entered into contracts or received offers for all materials which substantiate the prices used in preparing your proposal? If not, please explain the rationale used which would corroborate the prices listed.

SECTION III CONTRACTOR'S FINANCIAL STATEMENT

Attachment of bidder's financial statement is mandatory. Any bid submitted without said financial statement as required by statute shall thereby be rendered invalid. The financial statement provided hereunder to the governing body awarding the contract must be specific enough in detail so that said governing body can make a proper determination of the bidder's capability for completing the project if awarded.

SECTION IV CONTRACTOR'S NON – COLLUSION AFFIDAVIT

The undersigned bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to include anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly, any rebate, fee, gift, commission or thing of value on account of such sale.

SECTION V OATH AND AFFIRMATION

I HEREBY AFFIRM UNDER THE PENALTIES FOR PERJURY THAT THE FACTS AND INFORMATION CONTAINED IN THE FOREGOING BID FOR PUBLIC WORKS ARE TRUE AND CORRECT.

Dated at _____ this _____ day of _____, _____

(Name of Organization)

By _____

(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____)
COUNTY OF _____) ss

Before me, a Notary Public, personally appeared the above-named _____ and swore that the statements contained in the foregoing document are true and correct.

Subscribed and sworn to before me this _____ day of _____, _____.

Notary Public

My Commission Expires: _____

County of Residence: _____

BID OF

(Contractor)

(Address)

FOR
PUBLIC WORKS PROJECTS
OF

Filed

Action taken

(Appendix G – Certification of Non-Investment in Iran Form)

CERTIFICATION NON-INVESTMENT IN IRAN

The Undersigned understands that providing false certification may result in the consequences listed in IC 5-22-16.5-14, including termination of this Contract and denial of future contracts, as well as an imposition of a civil penalty.

I hereby affirm under the penalties for perjury that the facts and information contained in the foregoing are true and correct.

Dated at _____ this _____ day of _____, _____

(Name of Organization)

By _____
(Signature of Authorized Officer or Agent)

(Printed Name and Title of Authorized Officer or Agent)

ACKNOWLEDGEMENT

STATE OF _____)
)ss
COUNTY OF _____)

Before me, a Notary Public, personally appeared the above-named _____
and

swore that the statements contained in the foregoing document are true and correct.

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

Notary Public

My Commission Expires: _____

County of Residence: _____

(Appendix H – Bid Period Substitution Request Form)

BID PERIOD SUBSTITUTION REQUEST FORM

TO: _____

Project: _____

We hereby submit for your consideration the following product instead of the specified item for the above project: Section Paragraph Specified Item

Proposed
Substitution: _____

Attach complete technical data including laboratory tests if applicable.

Include complete information changes to Drawings and/or Specifications which proposed substitution require for proper installation.

Fill in Blanks Below, use additional sheets if necessary:

A. Does the substitution affect dimensions shown on Drawings?

B. Will the undersigned pay for changes to building design, including engineering and detailing costs caused by substitution, if any?

C. What effect does substitution have on other trades?

D. Differences between proposed substitution and specified item?

E. Manufacturer's guarantees of proposed and specified items are:

_____ Same _____ Different (explain on attachment)

The undersigned states that the function, appearance and quality are equivalent or superior to the specified item.

Submitted by:

Signature

Printed Name

Company: _____

Address: _____

Telephone: _____

For Use by Design Consultant

Accepted

Accepted as Noted

Not Accepted

Received too Late

By: _____

Date: _____

Remarks: _____

(Appendix I – Subcontractors & Products List)

NAME OF BIDDER _____

[illegible]

Name of Bidder:			Date:
Address:			
City/State/Zip:			
Telephone:			
By:			

SECTION 01 10 00 – SUMMARY

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Work covered by the Contract Documents.
 - 2. Type of Contract.
 - 3. Work phases.
 - 4. Work under other contracts.
 - 5. Products ordered in advance.
 - 6. Owner-furnished products.
 - 7. Use of premises.
 - 8. Owner's occupancy requirements.
 - 9. Work restrictions.
 - 10. Specification formats and conventions.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: PCCS New Storage Buildings
 - 1. Project Locations:
 - Brentwood Elementary: 1630 West Oliver Avenue, Plainfield, IN 46168
 - Clarks Creek Elementary: 401 Elm Drive, Plainfield, IN 46168
- B. Owner: Plainfield Community School Corporation
 - 1. Owner's Project Representative: John Robert Patterson, Garmong Construction Services, 3050 Poplar Street, Terre Haute, IN 47803
- C. Construction Manager: Garmong Construction Services.
 - 1. The Construction Manager has been engaged for this Project to serve as an advisor to the Owner and to aid in administering the Contract for Construction between Owner and each Contractor, according to a separate contract between Owner and Construction Manager.
 - 2. The Construction Manager for this Project is the Owner's Representative. In Divisions 1 through 33 Sections, the terms "Contractor" and "Prime Contractor" are synonymous.

1.4 TYPE OF CONTRACT

- A. Project will be constructed under multiple contracts as unified bids per school location. Each contract is performed concurrently and coordinated closely with construction activities of the Project under each contract.

1.5 USE OF PREMISES

- A. General: Each Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Each Contractor's use of premises is limited only by the Owner's right to perform work or to retain other contractors on portions of Project.

1.6 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed on site during normal business working hours of 7:30 a.m. to 4:00 p.m. (local time at Project site,) Monday through Friday, except otherwise indicated.
 - 1. Weekend Hours: With written permission of the Construction Manager.
 - 2. Early Morning Hours: With written permission of the Construction Manager.
 - 3. Hours for Utility Shutdowns: With written permission of the Construction Manager.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Construction Manager not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without the Construction Manager's written permission.
 - 3. Follow Owner's mandatory orientation requirements.
- C. Work Restrictions:
 - 1. Construction personnel shall be fully clothed, and shirts shall not be removed at any time.
 - 2. Radios or other electronic devices which create music and/or loud noise are not allowed at any time.
 - 3. Construction personnel shall only enter and exit the Project site via the construction gate, where a construction gate is indicated.
 - 4. Construction personnel shall only park in the areas designated for construction parking. Violators shall be towed at vehicle owner's expense.
 - 5. Construction personnel shall not leave construction work areas and enter areas occupied or being used by the Owner or public without permission from the Owner.
 - 6. Smoking and smokeless tobacco is prohibited in any portion of the building or any portion of the Project site.
 - 7. Any construction personnel violating safety (OSHA) rules shall be immediately removed from the Project site.
 - 8. Any construction personnel creating a disturbance or litter other than that produced by the Work shall be immediately removed from the Project site.
 - 9. These work restrictions shall become a part of all subcontracts as a contractual requirement.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 33-division format and CSI/CSC's "Master Format" numbering system.
 - 1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
 - 2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words

shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

END OF SECTION

SECTION 01 12 00 – MULTIPLE CONTRACT SUMMARY

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.
- B. Specific requirements for Work of each contract are also indicated in individual Specification Sections and on Drawings.
- C. The narrative description to follow is provided to assist the bidder in determining the various trade contracts /bid packages involved in the project.

1.03 ADMINISTRATIVE RESPONSIBILITIES OF CONTRACTORS AND CM

- A. Each Contractor shall read the Specifications and Drawings for other separate Contracts for fixed equipment and the like to be incorporated or attached or built into the work; and familiarize themselves with the requirements and responsibilities of other Contracts to enable the required coordination and supervision.
- B. Each Contractor shall also familiarize themselves with other items to be incorporated into the Work including equipment and Work by the Owner.
- C. Each Contractor shall cooperate with the Construction Manager in notifying them when the Work is at a stage to require the services of other Contractors and shall notify the Construction Manager if such other Contractors do not carry out their responsibilities in connection with such notification.
- D. Contractors shall cooperate with and assist the Construction Manager in the preparation of construction progress and procedures, scheduling of product deliveries, and their effect on the overall project progress and completion. Contractors shall cooperate in getting their Work and the Work of their subcontractors completed according to the construction schedule. Each Contractor shall immediately notify the Construction Manager of a delay in delivery of products or the scheduled date of completion that may affect the total progress of construction.

1.04 CONTRACTOR'S USE OF PREMISES

- A. General: During the construction period, the contractors jointly shall have full use of the premises for construction operations, including use of the site. Each Contractor's use of the premises is limited only by the Owner's right to perform work or to retain other Contractors on portions of the Project.
- B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy and use by the public.
2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site

1.05 OWNER'S RIGHT TO MAINTAIN OPERATIONS

- A. During the course of this Project, normal and customary functions and operations must be maintained. The Contract Documents are intended to define a strict separation between the activities of the Owner from the activities of the construction project.
- B. The Construction Manager, Architect, and Owner will not tolerate any visible or audible actions initiated or responded to by any employees of Contractors on this Project toward any employee of the Owner, or visitors. Violators shall be promptly removed from the site.
- C. Contractors shall be subject to such rules and regulations for the conduct of the Work as the Owner may establish. Employees shall be properly and completely clothed while working. Bare torsos, legs and feet will not be allowed. Possession or consumption of alcoholic beverages or drugs, tobacco or other noxious behavior on the site is strictly prohibited. Smoking, the use of tobacco products, and e-cigarettes are not permitted on the project. Violators shall be promptly removed from the site.

1.06 OCCUPANCY REQUIREMENTS

- A. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.
 1. The Construction Manager will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner occupancy.
 2. Party which obtained general building permit shall obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.
 3. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy, the Owner will operate and maintain mechanical and electrical systems serving occupied portions of the building.
 4. Upon occupancy, the Owner will assume responsibility for maintenance and custodial service for occupied portions of the building.

1.07 WORK BY OWNER

- A. The Owner intends to complete the following items of Work outside the provisions of these Contract Documents. Contractors shall not restrict or interfere with the Owner's right to the Project to accomplish this Work.
 1. Routine maintenance of facilities.

1.08 PERMITS, FEES, AND NOTICES

- A. The Construction Manager will secure the general building permit for the Owner. Each Contractor shall secure and pay for other permits, governmental fees, and licenses

necessary for the proper execution and completion of their Work, which are applicable at the time the Bids are received. Fees to relocate utilities on Owner's property shall be included in the Bid of the Contractor doing the relocation.

1. State filing fees for plan approval are the responsibility of the Owner and will be paid by the Owner.
 2. Each Contractor is responsible to coordinate inspections for their Scope of Work. Contractors are required to notify Construction Manager a minimum of forty-eight (48) hours prior to any inspections. Contractor shall provide documentation of the inspection results within twenty-four (24) hours of the inspection.
- B. Utility Tie-Ins shall be arranged with local utility company and other involved parties for minimum interruption of service.
- C. Shutdowns of existing systems shall be limited to minimum time required and scheduled with other involved parties. Provide two (2) days written notice of shutdown to Construction Manager and Owner.
- D. Inspections of installed work shall be performed by the governing authority as arranged for by the Contractor. Work shall not be covered until approved.

1.09 LABOR AND MATERIALS

- A. Unless otherwise specifically noted, 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 the proper execution and completion of their Work, whether temporary or permanent, and whether or not incorporated or to be incorporated in the Work.
1. Work may or may not be indicated in the Contract Documents.

1.10 VERIFICATION OF DIMENSIONS

- A. Verification of dimensions is required, the Contractor requiring said verification for the construction or fabrication of their material shall be the Contractor responsible for the procurement of the field information.

1.11 PROJECT SECURITY

- A. Each Contractor shall take all reasonable precautions to prevent injury, damage or loss to people and property in, on and adjacent to the project. This shall include not only their own work or property but that of other Contractors, the Construction Manager and the Owner.
- B. If deemed necessary by the Construction Manager, a project wide security program may be developed for the purpose of preventing damage or loss at the project site or property adjacent thereto. Once accepted by the Construction Manager, Contractors shall comply.

1.12 SCHEDULE OF CONTRACT RESPONSIBILITIES – SCOPE

- A. Contractors shall submit their proposals based on the work included under each contract area as listed herein. Include Work necessary for a complete project, as shown on the Drawings and called for in the Specifications.

- B. Questions concerning the phasing, or "Scope of Work" should be directed to the Construction Manager, who will be the interpreter and be responsible for this Schedule of Contract Responsibilities and Contract Breakdown, prior to submitting proposals and during construction.
- C. The requirements of Division 00 and 01 are a part of the Work of each contract area. The Contractor for any one contract area shall be familiar with the Work and requirements of all other contract areas.
- D. Certain Specification Sections describe Work to be performed under several contract areas. (Example: 061000 - Rough Carpentry.) Provide Work of this nature as required for each contract area whether or not enumerated in the Scope of Work.
- E. The following Scopes of Work are broken down by Specifications Section conforming basically to the CSI Masterformat. The Contractor is responsible for Work assigned and described as part of their contract without regard for where it is indicated in the Contract Documents.
- F. The Drawings and Specifications as furnished is for the convenience of the Contractor in preparing a proposal for this Project. However, each Contractor is responsible to review the complete set of Drawings and Specifications to assure that Work required to be installed to complete their phase of the Work is included in their proposal. This "Multiple Contract Summary" is a definition of the work as it is to be bid in separate contracts. Where a specific item of Work is not defined, but is normally inherent to a trade, or is included in the scope of the applicable technical revision, it will be the responsibility of that Contractor to include the Work in their proposal.
- G. This Specification Section is to aid each Contractor in defining the Scope of Work to be included in their proposal. However, omissions do not relieve the Contractor from including in their proposal that Work which will be required to complete their Contract. Each Contractor should read the "Scope of Work" completely to familiarize themselves with the Work of other Contractors that may have Work in adjacent areas and to coordinate the interfacing problems that may occur as the work is assembled and constructed.
- H. Where specific Work is to be completed under a particular phase of the Project and the Work is wholly or partially completed by other trades because of the type of work involved or jurisdictional trade agreements, the Contractor will be responsible to subcontract the Work as necessary to complete the Work included in their Contract. No delay in the Work will be allowed due to the failure of the Contractor to subcontract related work required by jurisdictional trade agreements.

1.13 COORDINATION OF WORK

- A. Each Contractor is responsible to coordinate their Work with the Work of other trades and other Contractors and requirements of the Owner. The Contractor must make space allowances for Work of other Contractors, provide necessary openings where indicated or implied by the Drawings and Specifications. Each Contractor is responsible to protect their own Work.

1.14 TIME OF COMMENCEMENT AND COMPLETION

- A. The Contractor shall commence work within ten (10) days after being notified in writing to proceed and shall complete the Work within the time limitations established in the Form of Agreement.

1. Construction shall be complete per the Preliminary Schedule.

1.15 WORK UNDER SEPARATE CONTRACTS

- A. Contracts are described in the Schedule of Contract Responsibilities included hereinafter; and each is recognized to be a major part of the project, with Work to be performed concurrently and in close coordination with Work of other Contracts.
- B. The "Contract Documents," as defined in the General Conditions, include "the Drawings." Although Drawings are grouped and identified by classification of the Work, Contractors shall be responsible for their Work as specified herein and as indicated on the Drawings. Although the majority of the Drawings are "to scale," Contractors are directed to use indicated dimensions for determining material quantities and for other reasons. No additional monies will be allowed due to Contractors using "scaling instruments" to determine material quantities or for other reasons.
- C. Separate Contracts will be awarded as per the individual- **"Scopes of Work"** (see Part 3 – Execution). Contractors shall include Work required by the Specifications and Drawings for each contract area.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL INFORMATION

- A. List of Bid Packages being Bid for this Project
1. Bid Package 01: Brentwood Elementary School.
2. Bid Package 02: Clarks Creek Elementary School
- B. There is no "General Contractor" on this Project. Garmong Construction Services is the Construction Manager as Advisor.

3.02 ASSIGNMENT OF DIVISION 01 GENERAL REQUIREMENTS

- A. Provided by Owner through the Construction Manager
1. General Construction Building Permit
2. 015139 TEMPORARY SANITARY FACILITIES
3. 015200 PROJECT OFFICE
4. 015260 RUBBISH CONTAINER
- B. Provided by all Contractors as applicable:
1. Trade permits
2. All material deliveries, handling, hoisting, and unloading
3. All demolition and disposal of existing items relative to their Contract

4. Copies of plans and specifications
5. All work corresponding with any concrete and masonry winter conditions / protection i.e. concrete blankets, masonry tented structures.
6. 011000 SUMMARY
7. 012600 CONTRACT MODIFICATION PROCEDURES
8. 012973 SCHEDULE OF VALUES
9. 012983 APPLICATION FOR PAYMENT
10. 013119 PROJECT MEETINGS
11. 013123 WEB BASED PROJECT MANAGEMENT
12. 013200 SCHEDULES AND REPORTS
13. 013300 SUBMITTAL PROCEDURES
14. 014000 QUALITY REQUIREMENTS
15. 014200 REFERENCES
16. 014510 TESTING LABORATORY SERVICES
17. 015000 TEMPORARY FACILITIES AND CONTROLS
18. 015113 TEMPORARY ELECTRICITY
19. 015116 TEMPORARY FIRE PROTECTION
20. 015123 TEMPORARY HVAC
21. 015136 TEMPORARY WATER
22. 015213 OFFICES SHEDS
23. 015400 CONSTRUCTION AIDS AND TEMPORARY ENCLOSURES
24. 015526 TRAFFIC MAINTENANCE
25. 015623 BARRICADES
26. 015639 TEMPORARY TREE AND PLANT PROTECTION
27. 015713 ENVIRONMENTAL PROTECTION
28. 015715 TEMPORARY EROSION AND SEDIMENTATION CONTROL
29. 015726 DUST CONTROL
30. 015729 WATER CONTROL
31. 016000 PRODUCT REQUIREMENTS
32. 017123 FIELD ENGINEERING
33. 017123.13 WORK LAYOUT
34. 017133.13 UTILITY PROTECTION
35. 017300 EXECUTION
36. 017329 CUTTING AND PATCHING
37. 017411 PROJECT SAFETY
38. 017413 PROJECT HOUSEKEEPING
39. 017419 FINAL CLEANING
40. 017700 CONTRACT CLOSEOUT

3.03 COMMON SCOPES OF WORK FOR ALL TRADES

- A. This project is sales tax exempt. Reference supplemental general conditions for details.
- B. Project superintendent will be the contact for scheduling of work activities.
- C. The contractor shall employ a competent foreman who shall be onsite fulltime during the progression of work. This foreman shall have full authority to manage project labor, manage equipment deliveries, and maintain the cm's project schedule. The fulltime foreman shall be the point of contact for field operations and shall attend the weekly progress meetings.
- D. All Contractors shall comply with storm water pollution prevention plan (swppp). Soil erosion control will be installed as a part of site development bid package. Any contractor

that damages or removes silt fence or any type of soil erosion control measure, for any reason including to perform work, is responsible to replace or repair it the same business day that it was damaged. Failure to do so same day will result in the immediate completion of this work by others, as directed by the CM, and all associated costs will be back-charged to the removing Contractor.

- E. Keep all roads, traffic routes, and parking areas clean and free of mud and debris at all times. All contractors are responsible for cleaning the streets of all mud and debris generated from their operations. Contractors violating this requirement are subject to fines & or back charges for cost of cleaning if roadways are not promptly cleaned after being notified by the CM.
- F. All work shall be completed in accordance with applicable local, state and federal codes, rules and regulations.
- G. Provide proof of identification of existing utilities (public or private) to CM prior to start of underground work. Private utility locates are the responsibility of the Contractor that is excavating, boring or saw cutting.
- H. Attendance at weekly progress meetings is mandatory when a trade is mobilized to the site. Failure to attend, without prior notification, will result in a \$100 deduct change order.
- I. All equipment placed on finished concrete must have protective material underneath to protect the concrete.
- J. Clean up, removal, & disposal from site to dumpster of all debris generated by this work daily. If the CM determines that the Contractor has failed to adhere to the CM's high standards of cleanup, the cm will send written notice of that determination to the Contractor. Such notice will include a list of the project areas or conditions requiring the Contractor's immediate cleanup. If the Contractor fails or refuses to clean up the project in response to such notice within twenty-four (24) hours after receipt thereof, the CM shall have the right, without further notice to the Contractor to hire other firms or persons to clean up the project to the CM's satisfaction. The cost of such project cleanup shall be deducted from the CM's payments to the Contractor. Such deductions shall not be deemed the CM's default of any payment provisions in the Contract Documents.
- K. Items of work for this scope may be shown on drawings and/or listed in the specifications of the Contract Documents. If any item of work is shown on either the drawings or specifications but not the other, it is included in the contract and the better quality or greater quantity of work shall be provided in accordance with the architect/engineer's instructions. No change order or extra to the contract will be allowed for any inconsistency when any item of work either is shown on the drawings/specifications regardless of the location in the drawings/ specifications.
- L. Contractor must coordinate a meeting with the onsite superintendent to inspect all surfaces to receive materials prior to commencement of work. Report in writing to the onsite superintendent, any condition that may potentially affect proper application. Do not commence work until such defects have been corrected. Commencement of work shall be construed as acceptance of the surfaces and therefore, the Contractor shall be fully responsible for satisfactory work as required herein. As such, after commencement of work Contractor cannot add changes orders to this contract.
- M. It is recognized and understood by the Contractor at the time of contract award, that Contractor was selected for their expertise and knowledge of this specialized work and it

was and is expected that the Contractor did and has included in their scope of work all items required to carry out the a/e's intent for a complete and functional system. The contract price will not be increased for any miscellaneous or incidental items required for the work to meet the intent of the architect's design, the Contract Documents, plans, specifications and code requirements.

- N. The drawings are diagrammatic and may not be complete in every detail. They reflect the intent of the architect/engineer to provide a complete working system in compliance with all applicable codes. This Contractor shall include any other equipment or devices necessary to provide a complete, functioning system. This Contractor shall include, as part of his work, the cost of re-routing his work, etc., due to the coordination procedure as part of his contract price.
- O. Additional description of the work may be included in the specification sections listed.
- P. The Contractors shall keep any and all excavations free of standing water. Each Contractor is to take containment measures to prevent the run-off of surface water into excavations and the ponding of water on-site. Any damage or additional cost incurred as a result of standing water or its penetration of the soils shall be borne, by the prime Contractor allowing/creating the situation where water accumulated.
- Q. The Prime Contractors are responsible for coordinating their subcontractors. The Construction Manager and the Prime Contractors shall coordinate and schedule the work of the prime contracts.
- R. All trades shall be responsible for meeting all osha requirements in the performance of their work.
- S. All cutting and threading locations are to be approved by the Construction Manager and must have adequate floor protection underneath to protect floors from scratching and discoloration. No cutting and threading in areas of exposed concrete finish floors.
- T. Contractors are responsible for the removal or demolition and replacement/rerouting of existing items/systems required to perform their scope of work regardless of specific inclusion in the contract documents.
- U. Onsite material storage will be limited and must be coordinated with the cm for available space.
- V. Contractors shall warranty their work for (12) months from the date of substantial completion. Warranties shall be inclusive of all workmanship/labor, material, and equipment. The owner reserves the right to start and otherwise utilize equipment prior to substantial completion. This shall no impede or affect the warranty requirements.
- W. Each Contractor shall enforce strict discipline and good order among their employees or other persons carrying out work of their contract and shall not permit employment of unfit person or persons or anyone not skilled in the task assigned to them
- X. Each Contractor shall give notices and comply with federal, state and local laws, ordinances, rules, regulations, and orders of public authorities bearing on the performance of their work. If a Contractor observes that the Contract Documents are at variance therewith, they shall promptly notify the Construction Manager in writing, and necessary changes shall be adjusted by appropriate notification. If a Contractor performs work knowing it to be contrary to such federal, state and local laws, ordinances, rules, and regulations,

and without such notice to the Construction Manager, they shall assume full responsibility therefore and shall bear the costs attributable thereto.

3.04 SPECIFIC SCOPES OF WORK FOR BID PACKAGES

A. Bid Package 01: Brentwood Elementary School

The scope of work generally includes, but shall not be limited to the following:

Division 00 and Division 01 and the following technical specifications developed by the Architect/Engineer apply to this bid package:

DIVISION 02	EXISTING CONDITIONS
DIVISION 03	CONCRETE
DIVISION 04	MASONRY
DIVISION 05	METALS
DIVISION 06	CARPENTRY
DIVISION 07	THERMAL & MOISTURE PROTECTION
DIVISION 08	OPENINGS
DIVISION 09	FINISHES
DIVISION 10	SPECIALTIES
DIVISION 11	EQUIPMENT
DIVISION 12	FURNISHINGS
DIVISION 13	SPECIAL CONSTRUCTION
DIVISION 14	CONVEYING EQUIPMENT
DIVISION 21	FIRE SUPPRESSION
DIVISION 22	PLUMBING
DIVISION 23	MECHANICAL
DIVISION 26	ELECTRICAL
DIVISION 27	COMMUNICATIONS
DIVISION 28	ELECTRONIC SAFETY AND SECURITY
DIVISION 31	EARTHWORK
DIVISION 32	SITE IMPROVEMENTS
DIVISION 33	UTILITIES

This Scope of Work describes and assigns Work to this Contractor as designated by the Construction Manager. This summary is issued as a guide to aid in the assignment of Work and is intended to clarify and/or further define the Scope of Work included in the Bid Documents. All work described or indicated in the respective Specifications Sections or Divisions listed above shall be included, except as specifically excluded herein.

General Items

1. Contractor is responsible for receiving, offloading, hoisting, inventorying, installing, all materials associated with the performance of this scope of work.
2. Contractor is responsible for verifying all quantities delivered to site and the timely delivery of said quantities. Construction Manager will not be responsible for incomplete deliveries or lost/misplaced material.
3. Patch, repair or replace defective work immediately as directed by

Architect/Engineer and Construction Manager. Contractor will be responsible for repairs resulting from defective workmanship and shall be required to achieve the specified tolerances.

4. Contractor is responsible for the removal of mud, loose fill and debris as necessary to allow placement of their work.
5. Contractor will be responsible for providing any necessary traffic control, for the Work, including flagmen, (if required) to assure an orderly flow of traffic in the area. Contractor is responsible to clean streets of any debris or spillage of material as a result of and during the performance of its work.
6. Provide, maintain, remove, and remediate concrete washout for any work included in this scope of work. Truck washdown is to be performed in an area designated by the Construction Manager. Excessive concrete must be hauled off-site and is NOT allowed to be placed in dumpsters. General trash dumpsters are provided by Construction Manager.

END OF BID PACKAGE 01 – BRENTWOOD ELEMENTARY SCHOOL SCOPE OF WORK

B. Bid Package 02: Clarks Creek Elementary School

The scope of work generally includes, but shall not be limited to the following:

Division 00 and Division 01 and the following technical specifications developed by the Architect/Engineer apply to this bid package:

DIVISION 02	EXISTING CONDITIONS
DIVISION 03	CONCRETE
DIVISION 04	MASONRY
DIVISION 05	METALS
DIVISION 06	CARPENTRY
DIVISION 07	THERMAL & MOISTURE PROTECTION
DIVISION 08	OPENINGS
DIVISION 09	FINISHES
DIVISION 10	SPECIALTIES
DIVISION 11	EQUIPMENT
DIVISION 12	FURNISHINGS
DIVISION 13	SPECIAL CONSTRUCTION
DIVISION 14	CONVEYING EQUIPMENT
DIVISION 21	FIRE SUPPRESSION
DIVISION 22	PLUMBING
DIVISION 23	MECHANICAL
DIVISION 26	ELECTRICAL
DIVISION 27	COMMUNICATIONS
DIVISION 28	ELECTRONIC SAFETY AND SECURITY
DIVISION 31	EARTHWORK
DIVISION 32	SITE IMPROVEMENTS
DIVISION 33	UTILITIES

This Scope of Work describes and assigns Work to this Contractor as designated by the Construction Manager. This summary is issued as a guide to aid in the assignment of Work and is intended to clarify and/or further define the Scope of Work included in the Bid Documents. All work described or indicated in the respective Specifications Sections or Divisions listed above shall be included, except as specifically excluded herein.

General Items

7. Contractor is responsible for receiving, offloading, hoisting, inventorying, installing, all materials associated with the performance of this scope of work.
8. Contractor is responsible for verifying all quantities delivered to site and the timely delivery of said quantities. Construction Manager will not be responsible for incomplete deliveries or lost/misplaced material.
9. Patch, repair or replace defective work immediately as directed by Architect/Engineer and Construction Manager. Contractor will be responsible for repairs resulting from defective workmanship and shall be required to achieve the specified tolerances.
10. Contractor is responsible for the removal of mud, loose fill and debris as necessary to allow placement of their work.

11. Contractor will be responsible for providing any necessary traffic control, for the Work, including flagmen, (if required) to assure an orderly flow of traffic in the area. Contractor is responsible to clean streets of any debris or spillage of material as a result of and during the performance of its work.
12. Provide, maintain, remove, and remediate concrete washout for any work included in this scope of work. Truck washdown is to be performed in an area designated by the Construction Manager. Excessive concrete must be hauled off-site and is NOT allowed to be placed in dumpsters. General trash dumpsters are provided by Construction Manager.

END OF BID PACKAGE 02 – CLARKS CREEK ELEMENTARY SCHOOL SCOPE OF WORK

END OF SECTION

SECTION 01 26 00 – CONTRACT MODIFICATION PROCEDURES

PART 1 – GENERAL

1.1 SUMMARY

- A. Proposal Request
- B. Request for Pricing
- C. Proceed Order
- D. Allowance Authorization
- E. Change Order
- F. Minor Changes in the Work
- G. Required Pricing Itemization and Allowable Mark Up
- H. Execution of Change Documents
- I. Correlation of Contractor Submittals

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PROPOSAL REQUESTS (PR)

- A. Proposal requests that require adjustment to the Contract Sum or Time if accepted will be issued by the Construction Manager, with detailed description of the proposed change and supplemental or revised Drawings and Specification as appropriate.
- B. Proposal Requests whether or not issued on AIA Documents G709 will be subsequently issued and tracked in the form of a Request for Proposal (RFP) by the Construction Manager.
- C. An issue number will be assigned by the Construction Manager.

3.2 CONSTRUCTION MANAGER INITIATED REQUEST FOR PROPOSAL (RFP)

- A. An RFP is a document issued by the Construction Manager to obtain pricing from Contractors on an issue that may impact the Contractors' Work, including Contract Time or Contract Sum.
- B. The Contractor shall utilize and refer to the RFP tracking number assigned by the Construction Manager, when responding, in writing, to the Construction Manager on all correspondence related to said RFP.

- C. The Contractor shall submit the name of the individual authorized to receive RFP documents and be responsible for informing others in Contractor's employ or Contractors of to the work.
- D. The Contractor shall advise the Construction Manager, in writing, of the impact of the RFP, if any, upon the Contractors Work, including any adjustment in the Contract Time or the Contract Sum within the lesser of seven (7) days of receipt of the RFP or the timeframe defined in the RFP.
- E. Failure to advise the Construction Manager, in writing, within the lesser of seven (7) days of receipt of the RFP or the timeframe defined in the RFP shall constitute a waiver of the Contractors right to assert a claim relating to the RFP.

3.3 PROCEED ORDER (PRO)

- A. The Construction Manager, with consent of the Owner may issue a document, instructing the Contractor to proceed with a change in the work, for subsequent inclusion in a Change Order. Proceed Orders are used on emergency items or work items that are critical in maintaining the construction schedule.
- B. All additional work must be approved in writing by the Project Manager. The Project Superintendent is limited to approval of \$500 of additional work on an emergency basis only.
- C. The document will describe changes in the work and will designate the method of determining any change in contract sum or contract time.
- D. The Contractor shall promptly execute the Proceed Order.
- E. For time and material Proceed Order work:
 - 1. Maintain detailed records of work done on a time and material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in work.
 - 2. The Construction Manager's on-site representative must verify and sign the Contractor's daily timesheets, not as approval for payment, but for record that work was completed per the Proceed Order. Proceed Order authorization number must be indicated on all Daily Time Sheets.
 - 3. The Construction Manager's on-site representative must sign these forms daily.
 - 4. Signed, completed sheets, including costs must be submitted to the Project Manager weekly.

3.4 ALLOWANCE AUTHORIZATION

- A. An allowance authorization will be issued based upon the Request for Proposal and/or the Proceed Order and the Contractor's price quotation as approved by the Construction Manager and Owner.

3.5 CHANGE ORDER

- A. A Change Order will be issued based upon the Request for Proposal and/or the Proceed Order, and Contractor's price quotation as approved by the Construction Manager, Architect and Owner.

3.6 MINOR CHANGES IN THE WORK

- A. The Construction Manager will advise of minor changes in the work not involving an adjustment to contract sum or contract time by issuing supplemental instructions as agreed upon by the Owner.
- B. The Construction Manager will issue the supplemental instructions in the form of a bulletin.
- C. The Contractor will have seven (7) days (in accordance with the General Conditions) to make a claim should they feel the instructions impact the Contractors Work including any adjustment in Contract Time or Contract Sum.

3.7 REQUIRED PRICING ITEMIZATION AND ALLOWABLE MARK UP

- A. For each change over \$500.00, the Contractor shall furnish a detailed, written proposal itemized according to the pricing guidelines set forth below as a condition precedent to the Owner's consideration of a Change Order request. Any Contractor, subcontractor and supplier pricing shall also be itemized according to these guidelines. All proposals shall be prepared in the categories and in the order listed below.
 - 1. Labor – All field labor shall be priced in compliance with the Schedule of Wages for this Project including all established payroll taxes, assessments and fringe benefits on the labor which may include, but is not limited to, FICA, Federal and State Unemployment, Health and Welfare, Pension Funds, Worker's Compensation and Apprentice Fund. The payroll is to be based on straight time only and is to include number of hours and rate of pay for each classification of work. If overtime is approved, the Contractor shall list only the straight time portion in this item. Labor costs will be considered only for the work in place. No labor cost associated with home office staff or field supervision will be considered.
 - 2. Equipment rentals – All charges for non-owned heavy or specialized equipment at up to 100% of the documented rental cost. No rental charges will be allowed for hand tools, minor equipment, scaffolds, etc. Downtime due to repairs, maintenance and weather delays will not be allowed.
 - 3. Owned equipment – All charges for owned, heavy or specialized equipment at up to 100% of the cost listed by the Associated Equipment Dealers Blue Book. No recovery will be allowed for hand tools, minor equipment, scaffolds, etc. Downtime due to repairs, maintenance and weather delays will not be allowed.
 - 4. Trucking – A reasonable delivery charge or per mile trucking charge for delivery of required materials or equipment. Charges for use of a pickup truck or service truck will not be allowed.

5. Materials – All materials purchased by the Contractor and incorporated into the changed Work, showing costs, quantities, or Unit Prices of all items, as appropriate. Reimbursement for material costs shall only be allowed in the amount of the Contractor's actual cost including any and all discounts, rebates and related credits.
- B. The following items are allowable with no overhead and profit:
1. The cost of extending the Bond and the cost of extending commercial general liability, builder's risk, and specialty coverage insurance.
 2. The premium portion only for approved overtime (labor and labor burden). The straight time portion is included in clauses A.1 above.
 3. Fees for permits, licenses, inspections, tests, etc.
- C. Costs which shall not be reimbursed for changed Work include the following:
1. Employee Retirement and Profit-Sharing Plans, regardless of how defined or described.
 2. Voluntary Employee Deductions.
- D. The cost of the Contractors' overhead, profit, and bond on Change Orders shall be:
1. For extra Work completed by the Contractor with their own labor, ten (10%) percent shall be added to Items 1, 2, 3, 4 and 5 of Subparagraph 3.7 A. as an allowance for overhead and profit.
 2. For extra Work completed by Subcontractors of the Contractor, five (5%) percent shall be added to Items 1, 2, 3, 4 and 5 of Subparagraph 3.07 A. as an allowance for overhead and profit.
 3. For extra Work completed by the Contractor, the percentage of markup allowed for the Performance and Payment Bond shall be one (1%) of the total cost for the change.

3.8 EXECUTION OF CHANGE DOCUMENTS

- A. Construction Manager will issue Change Orders and Allowance Authorizations for signature by all parties.
- B. Signed copies are to be returned to the Construction Manager within fourteen (14) days.

3.9 CORRELATION OF CONTRACTOR SUBMITTALS

- A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized change order and/or allowance authorization as a separate line item and adjust the contract sum (for Change Orders).

- B. Promptly submit revisions to Construction Schedule to reflect any change in contract time.
- C. Promptly enter changes in project record documents.

END OF SECTION

SECTION 01 29 73 – SCHEDULE OF VALUES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing each Contractor's Schedule of Values.
 - 1. Coordinate the Schedule of Values with the Applications for Payment, Project Schedule, Submittal Schedule, and List of Subcontracts.
- B. Progress payments will not be processed without an approved Schedule of Values on file.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 SCHEDULE OF VALUES

- A. Coordination: Each Contractor shall coordinate preparation of its Schedule of Values for its part of the Work with the Construction Manager's Project Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
 - a. Construction Manager's Project Schedule.
 - b. Application for Payment forms, including Continuation Sheets.
 - c. List of subcontractors.
 - d. Schedule of allowances.
 - e. Schedule of alternates.
 - f. List of products.
 - g. List of principal suppliers and fabricators.
 - h. Schedule of submittals.
 - 2. Within fifteen (15) days after the Pre-Construction Conference, each awarded Contractor shall submit to the Construction Manager a Schedule of Values, for approval, showing accurate costs for the items of work assigned to the Contractor, defined under *Section 01 12 00 – Multiple Contract Summary*.
 - 3. Sub-schedules: Where Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. The Schedule of Values shall include at a minimum a

line item for labor and material costs for each specification section assigned to the Contractor under *Section 01 12 00 –Multiple Contract Summary* and shall further divide the work into a sufficient number of individual work items to serve as an accurate basis for Contractor's Application for Payment. Each work item shall receive its prorated share of profit and overhead, including a line item for closeout. The Schedule of Values shall consist of a complete breakdown of the Contractor's contract sum showing the various items of work, divided so as to facilitate the approval of payments to the Contractor for Work completed. In addition to and conjunctive with the division of various items of work, the breakdown shall separate individual buildings within the project shall separate sitework from building(s) components and shall separate remodeling/renovation work from new construction work. The Schedule of Values shall be prepared in a format as directed by the Construction Manager, showing the breakdown of items of Work, and supported by such data to substantiate its correctness as the Construction Manager may require. The contract breakdown shall be the same form as that to be used in submitting requests for payments. Each item of Work shall have indicated a separate cost of labor and material. This schedule, when reviewed by the Construction Manager shall be used as the basis of approving payments along with establishing percentages of Work complete.

1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of the Architect.
 - c. Project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed.
 - a. Related Specification Section or Division.
 - b. Description of Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - h. Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
3. In addition to the sections assigned to the Contractor as defined above, Subcontractors shall include the following line items on their Schedule of Values:
 - a. Bonds: Performance, Labor and Material (if required).
 - b. Mobilization.
 - c. Demobilization.
 - d. Submittals in the amount of 2 percent of the Contract; however, not less than \$1,000.00 nor more than \$15,000.00.
 - e. Daily cleanup in the amount of 1 percent of the total contract amount.
 - f. Closeout in an amount equal to 2 percent of the Contract amount; however, not less than \$2,000.00 nor more than \$20,000.00.

4. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Break principal subcontract amounts down into several line items. Schedule of Values shall be coordinated with the Construction Schedules such that the percentages of Work completed closely relates to the values for the Work shown on the request for payments. At the beginning of the Project, the Contractor shall prepare a schedule of monthly progress payments showing the amount the Contractor may require for the Work proposed to be completed. The purpose of this schedule is to allow the Owner to determine what amounts of funds will be required to have available each month during the progress of construction for progress payments.
 5. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.
 6. If approved by the Construction Manager, provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.
 7. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 8. Unit-Cost Allowances: Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities from the best indication in the Contract Documents.
 9. Margins of Cost: Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at the Contractor's option.
 10. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Application for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.
- C. Schedule of Values shall be typed or printed on AIA Documents G732 - 2009 and G703-1992.
- D. Each Schedule of Values shall have the Contractor's name, Bid Package name and number, project name and number and shall be dated and signed.

- E. Should the Schedule of Values be "rejected, resubmit", resubmittal is due within five (5) days of receipt of rejected schedule.

END OF SECTION

SECTION 01 29 83 – APPLICATION FOR PAYMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing each Contractor's Applications for Payment.
 - 1. Coordinate the Applications for Payment with the Schedule of Values, Project Schedule, Submittal Schedule, and List of Subcontracts.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 APPLICATIONS FOR PAYMENT

- A. The Contractor shall submit to the Construction Manager, an itemized Application for Payment, supported by such data, such invoices, substantiating the Contractor's right to payment as the Construction Manager may require. The form of Application for Payment shall be AIA Document G732 - Application and Certification for Payment, support by AIA Document G703 - Continuation Sheet. Continuation Sheet (G703) shall be prepared the same as the Schedule of Values submitted by the Contractor and as approved.
- B. Each Application for Payment shall be consistent with previous applications and payments as certified by the Construction Manager and paid for by the Owner.
 - 1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
- C. Payment-Application Times: Each progress-payment date is indicated in the Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- D. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Construction Manager will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and the Construction Manager's Project Schedule. Use updated schedules, if revisions were made.
 - 2. Include amounts of fully executed Change Orders issued prior to the last day of the construction period covered by the application.

- E. Transmittal: Submit Application for Payment to the Construction Manager via email.
- F. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics lien from every entity who is lawfully entitled to file a mechanics lien from previous application for payment.
 - 1. Submit partial waivers on each item for the amount requested, less retention, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to the Construction Manager.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
 - 1. List of Sub-subcontractors.
 - 2. List of principal suppliers and fabricators.
 - 3. Schedule of Values.
 - 4. Submittal Schedule.
 - 5. List of Contractor's staff assignments
 - 6. Copies of permits as applicable.
 - 7. Copies of authorizations and licenses from governing authorities for performance of the Work.
 - 8. Certificates of insurance and insurance policies.
 - 9. HAZCOM/Safety Programs
 - 10. Executed Escrow Agreement (if applicable).
- H. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.
 - 1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
 - 2. Administrative actions and submittals that shall precede or coincide with this application include:
 - a. Occupancy permits and similar approvals. Occupancy permit shall be submitted by Construction Manager.
 - b. Warranties (guarantees) and maintenance agreements.
 - c. Test/adjust/balance records.
 - d. Maintenance instructions.
 - e. Meter readings.
 - f. Startup performance reports.
 - g. Changeover information related to Owner's occupancy, use, operation, and maintenance.
 - h. Final cleaning.
 - i. Advise on shifting insurance coverages.
 - j. List of incomplete Work, recognized as exceptions to Certificate of Substantial Completion.

- I. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:
 - 1. Completion of Project closeout requirements.
 - 2. Completion of items specified for completion after Substantial Completion.
 - 3. Ensure that unsettled claims will be settled.
 - 4. Ensure that incomplete Work is not accepted and will be completed without undue delay.
 - 5. Transmittal of required Project construction records to the Owner.
 - 6. Certified property survey.
 - 7. Proof that taxes, fees, and similar obligations were paid.
 - 8. Removal of temporary facilities and services.
 - 9. Removal of surplus materials, rubbish, and similar elements.
 - 10. Change of door locks to Owner's access.

- J. Release of Retainage: Documents to be submitted with the final Pay Application requesting release of retainage to include:
 - 1. AIA G732 – Application and Certification for Payment
 - 2. AIA G703 – Continuation Sheet
 - 3. Final Waiver of Lien
 - 4. AIA G706 – Contractor's Affidavit of Payment of Debts and Claims
 - 5. AIA G706a – Contractor's Affidavit of Release of Liens
 - 6. AIA G707 – Consent of Surety to Final Payment
 - a. AIA G707a – Consent of Surety to Partial Release of Retainage when applicable
 - 7. "No Asbestos" Letter
 - 8. Approved Certificate of Substantial Completion

END OF SECTION

SECTION 01 31 19 – PROJECT MEETINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:
 - 1. Pre-construction/partnering conferences
 - 2. Pre-installation conferences
 - 3. Progress meetings
 - 4. Pre-closeout meetings
- B. Each Contractor or awardee shall be required to have present at each of the following project meetings a representative acceptable to the Construction Manager. The designated representative shall have sufficient authority and knowledge to make decisions for the Contractor he is representing on matters affecting this Project.
- C. Contractor or representative unable to attend a specified meeting shall have an acceptable alternate representative designated or shall notify the Construction Manager not less than three (3) days prior to date of meeting.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PRE-CONSTRUCTION/PARTNERING CONFERENCE

- A. The purpose of this meeting is to develop a cohesive Project Team between the Contractors and Construction Manager out of what might potentially be an adversarial relationship. This facilitated conference is designed to establish common goals, communication strategies, dispute resolution practices and problem-solving mechanisms within the context of the Contract Documents.
- B. Team Members should have their principal project personnel attend the conference, to include the Project Manager, Site Superintendent/Field Personnel and key office staff involved in payment applications and closeout documentation. Contractors shall require their principal subcontractors to attend.
- C. Agenda: Discuss items of significance that could affect progress, including the following:

1. Discussion of construction schedule
 2. Critical work sequencing
 3. Designation of responsible personnel
 4. Processing of field decisions and Change Orders
 5. Procedures for processing Applications for Payment
 6. Distribution of Contract Documents
 7. Submittal of shop drawings, product data and samples
 8. Procedures for maintaining record documents
 9. Use of premises:
 - a. Office and storage areas.
 - b. Owner's requirements.
 10. Major equipment deliveries and priorities
 11. Safety and first-aid procedures
 12. Security procedures
 13. Housekeeping procedures
 14. Working hours
- D. Construction Manager shall prepare minutes and record significant discussions and agreements and disagreements of each conference, and the approved schedule. Construction Manager shall promptly distribute the record of the meeting to everyone concerned.

3.2 PRE-INSTALLATION CONFERENCES

- A. Conduct a pre-installation conference at the project site before each construction activity that requires coordination with other construction, and as outlined in the technical sections.
- B. Attendees: The Contractor, installing foreman, and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.
- C. The Contractor shall schedule conferences and advise the Construction Manager and Architect of scheduled meeting dates.
- D. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for the following:
1. Scope of Activity
 - a. Contractor and Superintendent Responsible for activity
 - b. Scope of work
 - c. Contract Documents
 - d. Related Change Orders, pending or potential changes
 - e. Purchases
 - f. Deliveries
 - g. Shop drawings, product data, and quality control samples
 - h. Review of mock up
 2. Activity Schedule
 - a. Duration
 - b. Proposed starting date

- c. Required predecessors and successor activities
 - d. Required Manpower (crew size)
 - e. Does activity as planned meet schedule intent?
 - f. Overtime/Weekend considerations to maintain schedule.
- 3. Special Conditions
 - a. Weather limitations
 - b. Manufacturer's recommendations
 - c. Warranty requirements
 - d. Compatibility of materials
 - e. Acceptability of substrates
 - f. Temporary facilities
 - g. Space and access limitations
 - h. Governing regulations
 - i. Protection
 - j. Possible conflicts
- 4. Safety and Housekeeping
 - a. Review of Precautions related to activity
 - b. Competent Person
 - c. OSHA requirements
 - d. Housekeeping considerations and standards
- 5. Closeout Requirements
 - a. Inspecting and testing requirements
 - b. Required performance results
 - c. Recording requirements
 - d. Punch List Expectations (Zero Punch List)
 - e. Warranty
 - f. Extra Stock
 - g. Owner Training
- E. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.
- F. Contractors shall review and comply with required pre-installation conferences outlined in the Contract Documents. (See individual Specification Sections.)

3.3 PROGRESS MEETINGS

- A. Progress meetings will be established on a biweekly basis, or more frequent as determined by the Construction Manager, to review the progress of construction, possible delays, problems, and projected construction activity. The Contractor is required to attend progress meetings. Contractors failing to be represented at project meetings, when specifically requested, will be taken into consideration when payment applications are being considered for approval by the Construction Manager. Contractor shall be charged \$100.00 for each unexcused absence as determined by the Construction Manager. A deduct Change Order for these changes will be issued prior to contract closeout. This in no way relieves the Contractors for coordination due to lack of attendance.

1. Notice of said meetings will originate in the office of the Construction Manager.
2. Contractor shall require his principal Contractors to attend.
3. The progress and schedule of each involved Contractor shall be coordinated at this meeting. The representatives of the Contractor present shall have the authority to change the Contractor's work schedule or authorize work with the consent of the Construction Manager. If the Contractor fails to attend this meeting, it shall be his responsibility to obtain the information discussed at the meeting. Meeting notes and the most current construction schedule will be distributed and available via the web-based project management software. Attendance at these meetings is required for Contractors' payments.

B. Minimum Agenda shall be as follows:

1. Review work progress since last meeting
2. Note field observations, problems, and decisions
3. Identify problems which impede planned progress
4. Review off-site fabrication problems
5. Develop corrective measure and procedures to regain planned schedule
6. Revise construction schedule as indicated
7. Plan progress during next work period
8. Review submittal schedules, expedite as required to maintain schedule
 - a. Tracking of material deliveries
9. Maintaining of quality and work standards.
10. Review changes proposed by Owner for effect on construction schedule.
11. Complete other current business
12. Documentation of information for payment requests.

3.4 PRE-CLOSEOUT MEETING

- A. When the work or designated portion thereof is 70% substantially complete, by billing, the Construction Manager will conduct a Pre-Closeout Meeting.
- B. Minimum agenda will be to review *Section 01 77 00 – Contract Closeout*.
 1. O & M Data – Required at 75% Completion
 2. Prerequisites to Substantial Completion
 3. Pricing for all RFP's
 4. Punch Lists
 5. Record Drawings
 6. Start to Finalize Change Orders
 7. Extra Stock
 8. Owner's Training
 9. Final Payment Application
- C. Contractors are to attend this "Progress Meeting" for Pre-Closeout.

END OF SECTION

SECTION 01 31 23 – WEB-BASED PROJECT MANAGEMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. *Section 01 26 00 – Contract Modification Procedures* for administrative and procedural requirements for handling and processing Contract modifications.
- C. *Section 01 33 00 – Submittal Procedures* for administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

1.2 SUMMARY

- A. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project.
- B. Contractor shall participate in the use of a web-based project management tool, Procore, providing collaboration between the Owner, Construction Manager and Architect/Engineer.

1.3 DEFINITIONS

- A. Procore: Web-based project management tool accessed by <https://www.procore.com/>
- B. Team Member: A representative of the Owner, Construction Manager, Architect/Engineer, or Contractor with a Procore user account.

1.4 WEB-BASED PROJECT MANAGEMENT TOOL

- A. Usage:
 - 1. Utilization of the Procore web-based project management tool shall be implemented and administered by the Construction Manager.
 - 2. Participation of the Architect/Engineer and Contractor is mandatory; others as determined by the Construction Manager.
 - 3. Construction Manager shall provide the Architect/Engineer and Contractor with access to the Procore Project website.
 - 4. All participants are required to have access to the internet and the Microsoft Internet Explorer browser (version 6.0 or higher). Broadband connection to the internet (cable modem, ISDN, DSL, etc.) is recommended, but not required.
 - 5. Contractor shall provide their field Supervisors with an internet capable device (laptop, iPad, tablet, etc.) to utilize during the Project.

B. Training:

1. Procore offers a free, on-line certification training program to Project team members. <https://learn.procore.com/>
2. Contractors are responsible for becoming proficient with the detailed use of Procore.

C. Functions: Procore will be utilized for the following Project Management Function:

1. Posting Project notices
2. Correspondence logging
 - a. Letters between Owner, Architect/Engineer, Construction Manager and Contractors will be sent via Procore.
3. Messaging between team members
4. Email to contacts outside of team members
5. Meetings
 - a. Agendas
 - b. Documentation and minutes
 - c. Item Tracking
 - d. Scheduling
6. Discussions
7. Document Management
 - a. Architect Supplemental Instructions (ASI)
 - b. Change Items (Requests for Proposals/Proceed Orders/Change Orders)
 - c. Construction Reports
 - d. Daily Reports
 - e. Punch List
 - f. Request for Information (RFI)
 - g. Submittals
 - h. Transmittals

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 00 – SCHEDULES AND REPORTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. The Work of this Section shall be included as a part of the Contract Documents of each Contractors on this Project. Where such Work applies to only one Contractors, it shall be defined as to which Contractors the Work belongs.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for schedules and reports required for proper performance of the Work, including:
 - 1. Construction schedule
 - 2. Submittal schedule
 - 3. Project Phasing Plan

1.3 PRELIMINARY GUIDELINE SCHEDULE

- A. A Preliminary Guideline Schedule is included as an Appendix showing milestone activities for the Project, as well as anticipated completion date.
 - 1. Prior to bidding Project, Contractors shall review the Preliminary Guideline Schedule to determine if the intent of the schedule can be met.
 - 2. The Preliminary Guideline Schedule is to be used for bidding reference only; however, the indicated completion date must be accomplished by all Contractors.
- B. Sequence of Work will be determined by the Preliminary Guideline Project Schedule.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 CONSTRUCTION SCHEDULES

- A. Within fifteen (15) days of the Pre-construction Meeting, each Contractor is to assemble all necessary information and dates concerning his activities, and those of his Subcontractors and Suppliers and submit such information in the form required by the Construction Manager. Each Contractor shall submit the following schedule information to the Construction Manager as a minimum:
 - 1. A bar chart schedule of all activities contained in the Contractor's Scope of Work. This schedule shall include activity descriptions and durations for all activities in workdays (as opposed to calendar day) for shop drawings, fabrication, delivery and installation of products, materials, and equipment. The activities on the schedule

must be at a level of detail approved by the Construction Manager and agree with the terminology and building sequencing established by the Preliminary Guideline Schedule.

2. Identification of precedent relationships between the Contractor's activities and those of other Contractors based on a thorough review of the Contract Drawings and details showing interface between Contracts.
 3. Graphic diagrams indicating the proposed direction of work whenever applicable or if requested by the Construction Manager.
 4. Assumed crew size, equipment, production rates, and similar data used to arrive at adequate durations and sequences.
 5. If a Contractor cannot provide a complete schedule of all of his activities within fifteen (15) days after Pre-construction Meeting, the Contractor may, after Construction Manager's written approval, provide a work plan for the first forty-five (45) days after award. The Contractor's final schedule shall be complete and submitted to the Construction Manager prior to the 30th day after the Pre-construction Meeting.
- B. In collaboration with the various Contractors associated with the Work, the Construction Manager will compile all Contractor schedules and develop a project master construction schedule, which integrates activities of Architect, Construction Manager, Contractors, Subcontractors, and Suppliers and meets the time requirements. The sequence of all work activities shall be determined by the Construction Manager and reviewed by all Contractors. This schedule will become the project plan for construction.
- C. Contractors' schedule activities may be re-sequenced, and the schedule adjusted provided all Work is completed within the stated milestone dates and if the Construction Manager and affected Contractors are notified of the change within five (5) calendar days of receipt of the schedule; otherwise, the project master construction schedule shall be deemed accepted by all parties and becomes a contractual requirement for each Contractor.
- D. The project construction schedule will be developed by the Construction Manager, consistent with the Preliminary Guideline Schedule and utilizing the Contractors' construction schedules provided by the separate Contractors.
1. Contractor shall provide the Construction Manager with information and data to prepare a working day construction schedule and sequence of events for each work activity included in his bid category within fifteen (15) days after the Pre-construction Meeting. The Contractor shall cooperate with the Construction Manager in establishing a final overall project schedule which meets the specified completion date.
 2. After the project schedule has been established, Contractors shall work overtime, nights, and weekends, if necessary, to maintain their portion of the schedule.
 - a. Overtime, night, and weekend work will be at no additional cost to the Construction Manager or Owner.

- b. Failure of the Contractor to maintain his portion of the schedule will be grounds for the Construction Manager to withhold all or part of any payments which may become due to the Contractor for work completed.
 - 3. The Contractor is responsible to expedite all approvals and deliveries of material so as not to delay job progress.
 - 4. The Contractor shall begin all phases of his work as quickly as physically possible, but not to impede or jeopardize the work of other Contractors.
 - 5. Phases of the work may be started prior to the scheduled start dates if coordinated with other Contractors, and, if approved through the Construction Manager.
 - 6. The Contractor shall cooperate fully with the Construction Manager in the coordination of the work with all other Contractors and the convenience of the Owner as indicated in the Specifications.
- E. Each Contractor's work shall be executed at such a rate as to ensure meeting the specified milestone dates for Substantial Completion. By execution of the Contract, a Contractor represents he has analyzed the Work, the materials and methods involved, the systems of the building, availability of qualified mechanics and unskilled labor, restrictions of the site, constraints imposed, his own work load and capacity to perform the Work and agrees that the specified dates are reasonable considering the existing conditions prevailing in the locality of the Work, including weather conditions, and other factors, with reasonable allowance for variations from average or ideal conditions.
- F. The Construction Manager will utilize the project master construction schedule to plan, coordinate, and manage all construction activities of Contractors, Subcontractors, and Suppliers. All Contractors are to complete all Work in accordance with this schedule.
- G. The Construction Manager will hold periodic progress meetings at the jobsite. Field supervisors from each Contractor working on the site are to attend all such meetings. Each Contractor is to provide services of responsible personnel to provide necessary scheduling and manpower information. Each Contractor shall be responsible for being familiar with the schedule, how it will affect or modify his operations including his coordination with the activities of other Contractors. Each Contractor shall prepare a short interval schedule generally covering a four-week period to coordinate with the activities of other Contractors, activities of subcontractors and suppliers. The short interval schedules shall be prepared and be submitted 24 hours prior to the job progress meetings, or as required by the Construction Manager. The Construction Manager will update the project master construction schedule and post these updates on the web-based project management software.
- H. Whenever it becomes apparent that any activity completion date may not be met, the responsible Contractor(s) are to take some or all of the following actions at no additional cost to the Owner or Construction Manager.
- 1. Increase construction manpower to put the project back on schedule.

2. Increase the number of working hours per shift, shifts per working day, working days per week, amount of construction equipment, or any combination, which will place the project back on schedule.
 3. Reschedule activities to achieve maximum practical concurrency and place the project back on schedule.
- I. If the Contractor fails to take any of the above actions, the Construction Manager may take action to attempt to put the project back on schedule and deduct cost of such actions from monies due or to become due the Contractor.
 - J. The Construction Manager will manage the project. Time extensions may be granted to various Contractors when delays that affect final completion date have been caused by inability of another Contractor to meet his time commitments; however, neither Owner nor Construction Manager will assume responsibility to any Contractor for compensation, damages, or other costs due to delays.

3.2 SUBMITTAL SCHEDULE

- A. Within fifteen (15) days of the Pre-Construction Meeting, each Contractor shall submit their schedule of submittals.
 1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Construction Schedule.
 2. The contractor shall provide the following information:
 - a. Scheduled date for the first submittal (due date)
 - b. Name of the Subcontractor (under comments)
 - c. Fabrication time

3.3 SITE LOGISTICS PLAN

- A. The Construction Manager shall prepare a Site Logistics Plan for Contractors. Contractors will be required to work within the constraints identified on the site logistics plan for the performance of work. Onsite storage will be limited to space available at the Construction Managers discretion.
- B. The Contractor shall confine operations at the site to areas within the areas indicated and as approved on the use of the Site Logistics Plan, and as permitted by law, ordinances, and permits. Site shall not be unreasonably encumbered with materials, products, or construction equipment.
- C. The Construction Manager in reviewing use of the site shall include access to proposed building for construction purposes, storage of materials and products on campus (at CM's discretion), Superintendent parking, Labor force parking (offsite at Hunt Road parking lot), temporary facilities including offices (limited space, requires CM approval prior to delivery), storage, and workshop sheds or portable trailers, and unloading space.
- D. Where a temporary fence is to be provided, the Construction Manager shall show any additional area needed in the Contractor's use of the site beyond that which may be indicated on the Drawings.

- E. The Construction Manager will indicate to the other Contractors after award of Contract which portions of the existing parking lot and nonpaved areas can be used for construction activities. Damage to existing parking lot or unpaved areas shall be paid for by the Contractor responsible for damage.
- F. The campus will remain operational for the Owner's use. Work within the jobsite will be scheduled to the extent possible with compatible work in other areas to minimize additional mobilizations.

END OF SECTION

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:
 - 1. Shop drawings
 - 2. Product data
 - 3. Samples

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 SUBMITTAL PROCEDURE

- A. Submittals, including those specified herein to be submitted to the Architect, excluding those directed to a specific individual, shall be submitted via the web base project management software for review. Construction Manager will forward required submittals to the Architect for review. Prior to bidding Project, Contractor shall review the guideline schedule to determine if the intent of the schedule can be met.
- B. Contractors on this Project shall provide submittals in accordance with the requirements of this Section. Where a submittal is required by a Contractor, but assistance needed from others, Contractors shall participate and cooperate to expedite each submittal.
- C. Submittals will be processed using a web-based electronic system, Procore. All Contractors are required to utilize this system.
- D. Where submission of samples, shop drawings, or other items are required from suppliers or subcontractors, it shall be the responsibility of the Contractor for whom the subcontractor is executing the Work to see that the submittal items required are complete and properly submitted and corrected and resubmitted at the time and in the order required so as not to delay the progress of the Work.
- E. The Contractor shall check shop drawings, product data, samples, and other submittals and submit them to the Construction Manager with a letter of transmittal giving their approval, comments, and suggestions.

- F. All shop drawings and product data are to be submitted electronically. Each electronic submittal transmittal shall include the following information:
1. Date submitted
 2. Project title and number
 3. Contractor's name and address
 4. Identification by Specification Section and quantity submitted for each submittal including name of Contractors, manufacturer, or supplier
 5. Notification of deviations from the Contract Documents for each submittal
 6. Contractor's written approval marked on each submittal.
- G. The Contractor shall prepare, review, and stamp with his approval and submit, with reasonable promptness or within the specified time periods and in orderly sequence so as to cause no delay in the Work or in the Work of another Contractor, submittals required by these Contract Documents or subsequently required by modifications.
- H. All electronic image files are to be submitted in PDF file format. Submittals sent in a manner different than described above will require prior approval from the Construction Manager.
- I. The Contractor is to limit each electronic submittal to the requirement designated on the submittal log. Compile all sheets of each submittal into a single electronic file.
- J. The Architect/Engineer will review electronic submittals, making any comments necessary, mark the submittal with the appropriate approval or rejection and return to the Contractor. Comments will consist of annotations applied electronically to the file or transmittal form. Re-submittals are processed using the same procedure as the original submittal.
- K. The Construction Manager and Architect shall review and take action on submittals with reasonable promptness, so as to cause no delay in the progress. A reasonable period of time in accordance with approved project schedule for review of and action taken on submittals shall be as specified herein, but in no case shall it be less than 10 calendar days from the time it is received by the Architect until the time the submittal is marked and forwarded or returned. Shop drawings and product data will be returned to the Contractor electronically. Contractors shall allow sufficient mailing time for submittal samples.
- L. A list of required shop drawings and product data will be provided to the Contractor, for use as a checklist. Color sample submittals are required to be submitted as physical samples or color charts and in conjunction with product data and/or shop drawings. All shop drawings and product data submittals are to be completed within 120 days of the Pre- Construction Meeting or within a shorter, more immediate timeframe as required by the Project Schedule.
- M. Upon receipt of final approval of any submittal, the Contractor shall provide hard copies if required by the Construction Manager.

3.2 SHOP DRAWINGS

- A. The Contractor shall perform no portion of the Work requiring submittal and review of shop drawings, product data, samples or similar submittals until the respective submittal has been approved by the Architect. Such Work shall be in accordance with approved submittals.

- B. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
 - 1. Architect will furnish Contractor digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
 - a. Architect makes no representation as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings may be available from the Architect for a cost as determined by the Architect. Verify availability through the Construction Manager.
 - c. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement
 - d. Drawings will be transferred by CD-R or electronic mailing.
- C. Shop drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data which are prepared by the Contractor or subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.
 - 1. Advertising brochures will not be accepted as shop drawings.
 - 2. Erection and setting drawings as referred to in these Specifications will be considered as shop drawings and shall be submitted along with detailed shop drawings.
 - 3. Where schedules are required to indicate locations, they shall be submitted as part of the shop drawings package for that item.
 - 4. Shop drawings and schedules shall repeat the identification shown on the Contract Drawings.
- D. The Contractor shall check all shop drawings, product data, samples and other submittals and submit them for approval to the Construction Manager. Product Data and shop drawings are to be submitted electronically to the Construction Manager utilizing the electronic submittal process, provided by the Construction Manager, giving their approval and/or comments and suggestions. Samples and color selections are to be submitted by mail or delivery. Failure to use the Electronic or paper Submittal Transmittal Record will result in submittals being returned "without action". Include the following information:
 - 1. Dimensions
 - 2. Identification of products and materials included by sheet and detail number
 - 3. Compliance with specified standards
 - 4. Notation of coordination requirements
 - 5. Notation of dimensions established by field measurements

- E. Preparation of Submittals: Provide permanent marking on each submittal to identify project, date, Contractor, submittal name, and similar information to distinguish it from other submittals. Show Contractor's executed review and approval marking and provide space for Architect's "action" marking.
- F. By approving and submitting shop drawings, the Contractor thereby represents that he has determined and verified field measurements, field construction criteria, materials, catalog numbers, and similar data, and that he has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents prior to submitting.
- G. The Contractor shall make corrections required by the Architect and shall resubmit the required shop drawings until appropriately marked. All resubmittals shall be resubmitted by the Contractor within 14 days of receipt. The Contractor shall direct specific attention in writing or on resubmitted shop drawings to revisions other than the corrections requested by the Architect on previous submissions.
- H. The Architect will review shop drawings only for conformance with the design concept of the Project and with the information given in the Contract Documents. The Architect's review of a separate item shall not indicate review of an assembly in which the item functions.
- I. The Architect's review of shop drawings shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has informed the Construction Manager in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation, nor shall the Architect's action relieve the Contractor from responsibility for errors or omissions in the shop drawings.
- J. The Architect's review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and qualities, or for substantiating instructions 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 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 it is a component.
- K. Notations and remarks added to shop drawings by the Architect are to ensure compliance with Drawings and Specifications and do not imply a requested or approved change to contract cost.
- L. Should deviations, discrepancies, or conflicts between shop and Contract Documents be discovered, either prior to or after review, Contract Documents shall control and be followed. If any discrepancies are discovered, the Construction Manager shall be notified immediately.

3.3 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.
- B. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:
 - 1. Manufacturer's printed recommendations
 - 2. Compliance with trade association standards
 - 3. Compliance with recognized testing agency standards
 - 4. Application of testing agency labels and seals
 - 5. Notation of dimensions verified by field measurement
 - 6. Notation of coordination requirements
- C. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
 - 1. Preliminary Submittal: Submit a preliminary single copy of Product Data where selection of options is required.
 - 2. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

3.4 SAMPLES

- A. The Contractor shall submit to the Architect through Construction Manager physical samples to illustrate materials or workmanship, colors, and textures, and establish standards by which the Work will be judged.
- B. Submit full size, fully fabricated samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
- C. Mount or display samples in the manner to facilitate review of qualities indicated. Prepare samples to match the Architect's sample. Include the following:
 - 1. Specification Section number and reference
 - 2. Generic description of the sample
 - 3. Sample source
 - 4. Product name or name of the manufacturer
 - 5. Compliance with recognized standards
 - 6. Availability and delivery time
- D. Submit samples for review of size, kind, color, pattern, and texture. Submit samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

1. Where variation in color, pattern, texture, and other characteristics are inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.
 2. Refer to other Specification Sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
- E. By approving and submitting samples, the Contractor thereby represents that he has determined and verified materials, catalog numbers, and similar data, and that he has checked and coordinated each sample with the requirements of the Work and of the Contract Documents prior to submitting to the Architect.
- F. The Contractor shall resubmit the required number of correct or new samples until approved. All resubmittals shall be resubmitted by the Contractor within 14 days of receipt. The Contractor shall direct specific attention in writing or on resubmitted samples to revisions other than the changes requested by the Architect on previous submissions.
- G. The Architect will review samples but only for conformance with the design concept of the Project and with the information given in the Contract Documents. The Architect's review of a separate item shall not indicate approval of an assembly in which the item functions.
- H. The Architect's action shall not relieve the Contractor of responsibility for deviations from the requirements of the Contract Documents unless the Contractor has informed the Architect in writing of the deviation at the time of submission and the Architect has given written approval to the specific deviation, nor shall the Architect's action relieve the Contractor from responsibility for errors or omissions in the samples.
- I. Unless otherwise specified, samples shall be in triplicate and of adequate size to show function, equality, type, color, range, finish, and texture of material. When requested full technical information and certified test data shall be supplied.
1. Each sample shall be labeled, bearing material name and quality, the Contractor's name, date, project name, and other pertinent data.
 2. Transportation charges to and from the Architect's office must be prepaid on samples forwarded.
- J. Materials shall not be ordered until final review is received in writing from the Construction Manager. Materials shall be furnished, equal in every respect to reviewed samples. Where color or shade cannot be guaranteed, the maximum deviation shall be indicated by the manufacturer. Work shall be in accordance with the final reviewed samples.

END OF SECTION

SECTION 014000 – QUALITY REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections and related actions do not limit Contractor's other quality-assurance and control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and control services required by Architect, Owner, Construction Manager or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
 - 1. Division 01 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 2. Divisions 02 through 33 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.

- C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
 - 1. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
- D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, ie., plant, mill, factory or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, or Sub-Contractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as “carpentry” does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name such as “carpenter”. It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

1.4 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to the Construction Manager for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are

minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to the Construction Manager for a decision before proceeding.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 INFORMATION SUBMITTALS

- A. Qualification Data: For Contractor's quality control personnel.
- B. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. Schedule of Tests and Inspections: Prepare in tabular form 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

3.2 REPORTS AND DOCUMENTS

- A. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue
 - 2. Project title and number
 - 3. Name, address, and telephone number of testing agency
 - 4. Dates and locations of samples and tests or inspections
 - 5. Names of individuals making tests and inspections
 - 6. Description of the Work and test and inspection method
 - 7. Identification of product and Specification Section
 - 8. Complete test or inspection data
 - 9. Test and inspection results and an interpretation of test results
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements
 - 12. Name and signature of laboratory inspector
 - 13. Recommendations on re-testing and re-inspecting
- B. Permits, Licenses and Certificates: For Owner's records, submit to the Construction Manager copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence,

records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

3.3 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in- service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in- service performance, as well as sufficient production capacity to produce the required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce the required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly or product that is similar to those indicated for this Project in material, design and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy the qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
 - 3. Meet requirements of ASTM E329, current edition "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as used in Construction."

4. Laboratory qualifications for inspection, sampling and testing of soils and aggregates shall be comparable to the requirements of ASTM E329.
 5. Testing Equipment: Calibrated at maximum 12-month intervals by devices of accuracy acceptable to the Architect.
 6. Submit documentation of specified requirements.
 7. All testing and inspection performed by testing laboratory shall be under direct supervision of a professional engineer licensed in the state where Project is located. This professional engineer shall submit a letter certifying that all testing services are in conformance with standards and specifications as specified in these Contract Documents. Letter shall also certify that all tested and inspected items and procedures conform to Contract Documents, except where specifically noted on inspection reports.
 8. All inspectors shall have at least one year of experience performing the type of inspections to be performed on this Project. The qualifications and experience of proposed inspectors shall be submitted to the Architect for approval prior to beginning of the testing.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform the same tasks for the Project.

- e. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not re-use products on Project.
- 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by the Architect or Construction Manager.
 - 2. Notify the Architect and Construction Manager seven (7) days in advance of dates and times when mockups will be constructed.
 - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction of the Project.
 - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 5. Obtain the Architect's and Construction Manager's approval of mockups before starting work, fabrication or construction.
 - a. Allow seven (7) days for initial review and each re-review of each mockup.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 7. Demolish and remove mockups when directed, unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

3.4 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Payment for these services will be the responsibility of the Owner.

3. Costs for re-testing and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor's Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspecting requested by the Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, as directed.
 7. Contractor shall retain testing services for building foundation and pavement soils and subgrade from testing engineer and author of geotechnical investigation, of record, per *Section 00 31 00 – Available Information to Bidders*.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures".
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Re-testing/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including re-testing and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

- F. Testing Agency Responsibilities: Cooperate with Architect, the Construction Manager and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect, the Construction Manager and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report of each test, inspection, and similar quality-control service through the Procore online Project collaboration website.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work
 - 2. Incidental labor and facilities necessary to facilitate tests and inspection
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test sample
 - 5. Preliminary design mix proposed for use for material mixes that require control by testing agency
 - 6. Security and protection for samples and for testing and inspecting equipment at Project site
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.

- J. Distribution: Distribute schedules to Construction Manager, testing agencies and each party involved in performance of portions of the Work where tests and inspections are required.

3.5 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
 - 1. Verifying that manufacturer maintains detailed fabrication and quality- control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 - 2. Notifying the Architect, Construction Manager and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 3. Submitting a certified written report of each test, inspection and similar quality-control service to the Architect, through the Construction Manager, with copy to Contractor and to authorities having jurisdiction.
 - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 - 6. Re-testing and re-inspecting corrected work.

3.6 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted
 - 2. Description of the Work tested or inspected
 - 3. Date test or inspection results were transmitted to the Architect
 - 4. Identification of testing agency or special inspector conducting test or inspection
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for the Architect's and Construction Manager's reference during normal working hours.

3.7 REPAIR AND PROTECTION

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

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching".
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are the Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 01 42 00 – REFERENCES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

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PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 014510 – TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. Related work specified in *Section 01 40 00 – Quality Requirements*
- C. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.

1.2 RELATED REQUIREMENTS

- A. The Owner, through the Construction Manager, will employ and pay for services of an independent testing laboratory to perform specified inspection, sampling, and testing services.
- B. Inspections and testing required by laws, ordinances, rules, regulations, or orders of public authorities: General Conditions.
- C. Certification of products and mill test reports: Respective Specifications Sections.
- D. Test, adjust, and balance of equipment: Respective Specification Sections.
- E. Inspection, sampling, and testing: Respective Specification Sections.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 QUALIFICATIONS OF LABORATORY AND SUBMITTALS

- A. Meet requirements of ASTM E329, current edition, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as used in Construction."
 - 1. The term "agency" as used in Section 4 of ASTM E329 shall mean the local or closest office of said agency.
- B. Laboratory qualifications for inspection, sampling, and testing of soils and aggregates shall be comparable to the requirements of ASTM E329.
- C. Testing Equipment.
 - 1. Calibrated at maximum 12-month intervals by devices of accuracy acceptable to the Architect.

- D. Submit documentation of specified requirements.

3.2 LABORATORY DUTIES, LIMITATIONS OF AUTHORITY

- A. Provide qualified personnel promptly on notice.
- B. Perform specified inspections, sampling and testing of materials and methods of construction.
 - 1. Comply with specified standards; ASTM, other recognized authorities, and as specified.
 - 2. Ascertain compliance with requirements of Contract Documents.
- C. Promptly notify Construction Manager, Architect, and Contractor of irregularities or deficiencies of Work which are observed during performance of services.
- D. Promptly submit electronic reports of inspections and tests to the Construction Manager through the online Project Management Software, Procore, including the following information, as applicable.
 - 1. Date issued
 - 2. Project title and number
 - 3. Testing laboratory name and address
 - 4. Name and signature of inspector
 - 5. Date of inspection or sampling
 - 6. Record of temperature and weather
 - 7. Date of test
 - 8. Identification of product and Specification Section
 - 9. Location in project
 - 10. Type of inspection or test
 - 11. Observations regarding compliance with Contract Documents
- E. Perform additional services as required by Owner.
- F. Laboratory is not authorized to:
 - 1. Release, revoke, alter, or enlarge on, requirements of Contract Documents
 - 2. Approve or accept any portion of Work
 - 3. Perform any duties of the Contractor

3.3 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel to provide access to Work and to manufacturer's operations.
- B. Assist laboratory personnel in obtaining samples at the site.
- C. Notify laboratory sufficiently in advance of operations to allow for their assignment of personnel and scheduling of tests.

- D. Should the Contractors fail to schedule laboratory services or fail to cancel laboratory services, if the need arises, all additional costs shall be borne by the Contractors.
- E. Employ and pay for services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required when initial tests indicate work does not comply with Contract Documents.
 - 1. Separate laboratory shall be approved by the Owner, Architect and the Construction Manager.

END OF SECTION

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 TEMPORARY EQUIPMENT AND WORK ITEMS

- A. Provide the following listed temporary equipment and work items; maintain and remove same at completion where applicable.
 - 1. Protective enclosures, concrete blankets, straw, etc., for specific items of work such as masonry, drywall, and concrete on the exterior and in the interior prior to the enclosure of the building while cold or inclement weather conditions are encountered while proceeding with work as scheduled.
 - 2. Grounded UL approved extension cords from work area to power source and any additional lighting required to perform the work, and as required by applicable laws, in addition to that provided in *Section 01 51 13 – Temporary Electricity*.
 - 3. Restoration of areas damaged by construction operations.
 - 4. Drinking water for own employees if otherwise not available.
 - 5. Receiving of materials at the site.
 - 6. Barricades for protection of people and property, including fall protection at roofs, warning signs, traffic control signs, flashers, etc., in addition to barricades specified in *Section 01 56 23 – Barricades*.
 - 7. Acceptable fire protection within five feet (5') of any burning, welding, cutting, or soldering operations.
 - 8. Replace barricades removed for convenience or for access to the work.
 - 9. Materials hoisting systems as required to expedite the work.
 - 10. Fences around excavations.

11. Ladders, scaffolding and similar items for own employees in addition to the facilities provided under *Section 01 54 00 – Construction Aids and Temporary Enclosures*.

B. The Contractor erecting structural steel shall provide wire rope perimeter cabling in accordance with OSHA Standards, at the perimeters of elevated floors, roofs, elevated floor openings, and mezzanines.

3.02 SPECIAL TOOL REQUIREMENTS

A. Furnish all necessary power and hand tools to properly perform the work.

B. Certain electrical power requirements will be furnished by the Electrical Bid Package *Section 01 51 13 – Temporary Electricity*. It is the individual Contractor's responsibility to make his own arrangements with the Bid Package Contractor in the event special power requirements are needed for his special tools.

END OF SECTION

SECTION 015113 – TEMPORARY ELECTRICITY

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 TEMPORARY ELECTRICAL AND LIGHTING

- A. Provide temporary electric service to each of the areas of construction and provide temporary lighting and power to be used by all trades for all construction work. Tie-in may be made to Owner's existing permanent service provided that such tie-in does not interfere with the Owner's use of the existing building. If power cannot be made available through Owner's existing service, arrange with utility company for temporary service.
 - 1. Maintain the temporary system, relocate the system as required for construction progress, and remove system at completion of Project.
- B. The energy cost of power consumed during construction shall be paid by the Owner.
- C. Provide a minimum of three (3) 200 AMP, 120/240 volt, single phase grounded system for temporary light and power distribution.
 - 1. The service amperage shall be adequate for the construction of the Project and the testing of the permanent equipment.
 - 2. Temporary lighting shall be sufficient to enable all trades to complete their work. Minimum lighting requirements are one (1) 150 watt A-21 lamp installed per room or in areas over 300 square feet, stringers shall be installed in rows twenty feet (20') apart with lights spaced fifteen feet (15') apart on the stringers. No more than eight (8) lamps shall be installed on any 20 amp circuit. Lamps for temporary lighting shall be provided and maintained by this Contractor at his expense. Every temporary lamp outlet must be properly lamped throughout construction; dark or burned-out lamps shall be immediately replaced. Number 12 wire may be used for temporary lighting circuits.
 - 3. Temporary power shall be sufficient to enable all trades to complete their work. A minimum of a two gang, duplex grounded convenience outlet having 3-wire grounded type receptacles shall be installed within seventy-five feet (75') of outside walls and one hundred fifty feet (150') spacing in any direction within the building. They shall be installed in such a manner that a 100' extension cord

connection can reach any part of the building, including enclosed areas, such as offices.

4. In addition to the above temporary power and lighting, provide and subsequently remove circuits for:
 - a. Temporary safety lighting and security lighting. Security lights to work at all hours of darkness; safety lighting shall be continuous during working hours.
 - b. Testing and checking permanent equipment.
 5. Complete temporary electrical system, including lighting, power outlets, wiring, etc. shall comply with all federal regulations as issued by the Department of Labor dealing with safety and health for construction projects, and any portions of state and local safety and health regulations that are more stringent.
- D. Provide minimum of 100 AMP service for the Construction Manager's Project office trailer.
- E. Contractors requiring power requirements other than the above or in Division 26, will make arrangements with the Electrical Bid Package Contractor and pay for any such electrical services. Such services are listed below but not limited to the examples shown:
1. Power to temporary offices.

3.2 MAINTENANCE AND REMOVALS

- A. All portions of electricity, lighting and warning systems, not part of the permanent systems, shall be removed when the period of usefulness is over. Relocate components as required to prevent interference with continuing construction. Restore any compromised surfaces and patch penetrations.

END OF SECTION

SECTION 01 51 16 – TEMPORARY FIRE PROTECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.

PART 2 – NOT USED

PART 3 – EXECUTION

3.1 TEMPORARY FIRE PROTECTION

- A. Provide adequate fire protection and fire prevention for the Project and in no case less than that required by applicable federal law(s).
 - 1. Minimum provisions, unless otherwise required by law(s), shall be 10# capacity ABC type fire extinguishers, plainly marked and easily accessible, in each area where work is in progress.
 - 2. Provide wood standards for fire extinguishers and emergency alarm stations.

END OF SECTION

SECTION 01 51 23 – TEMPORARY HEATING, VENTILATION AND COOLING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 TEMPORARY HEAT

- A. Temporary heat shall be provided for enclosed building spaces as required for installation of any material and for working conditions required by any trade or trades working on the Project. This does not include heat or protection as required by *Section 01 50 00 – Temporary Facilities and Controls*, Paragraph 3.1.A.2. The minimum period that temporary heat must be made available for enclosed spaces (not permanently heated) begins November 1 and ends May 15th each heating season.
- B. An enclosed building space shall be defined as having a roof and all exterior openings closed by either temporary or permanent means.
- C. The following temperatures shall be maintained:
 - 1. 50°F minimum during working hours and 40°F during non-working hours.
 - 2. For a period of seven (7) days prior to interior finishing (wall coverings, resilient tile, acoustical ceilings, etc.), and until final acceptance or occupancy by the Owner, spaces shall be kept 60°F to 75°F during working hours and 60°F minimum at all other times.
- D. After the building or any designated portion has been enclosed and temporary heat is required, the Contractor shall provide and maintain all temporary heating systems using one or more of the following methods:
 - 1. Portable heaters: smokeless type, thermostatically controlled, electric blower operated, of type approved by fire and health authorities for use without vents. This Contractor shall include necessary electrical wiring and controls. Relocate heaters and components as necessary to prevent interference with continuing construction.
 - 2. Temporary heating system consisting of approved electric or gas fired unit heaters, direct fired make-up air units, boilers and unit heaters or other similar approved equipment. All such units shall be properly vented to the exterior, piped, wired, thermostatically controlled and have all required safety controls.
 - 3. The permanent heating system and its component parts may be used for temporary heat where available. The building shall be in the finishing stages and

the permanent heating system must be installed as designed when used to supply temporary heat. This shall include permanent power wiring connections to a permanent power source. Provide all phases of operation, maintenance, control and items of like nature during the time the permanent system is used to furnish temporary heat.

- a. At the termination of the use of the permanent system as a temporary heating system, the system shall be thoroughly cleaned, equipped with new filters, new belts if required, etc., and any damage repaired or replaced.
- b. The use of the permanent heating system for temporary heat shall not affect the warranty period which begins on the date of Substantial Completion of the Project, not Substantial Completion by Phase.
- c. Refer to Division 23 for other requirements that may affect the use of the permanent system.

3.2 TEMPORARY VENTILATION AND COOLING

- A. Temporary ventilation and cooling shall be provided for enclosed building spaces as required for installation of finish building materials. The minimum period that temporary ventilation and cooling must be made available for building spaces receiving finish materials begins May 15th and ends September 30th each cooling season.
- B. For a period of seven (7) days prior to interior finishing (wall coverings, resilient tile, acoustical ceilings, etc.) maintain a maximum of 75°F with 50% relative humidity in that respective space until final acceptance or occupancy by the Owner.
- C. The permanent ventilation and cooling system components may be used for temporary ventilation and cooling where available. The building shall be in the finishing stages and the permanent system must be installed as designed when used to supply temporary ventilation or cooling. This shall include permanent wiring connections to a permanent power source. Provide all phases of operation, maintenance, control, and items of like nature during the time the permanent system is used to furnish temporary ventilation or cooling.
 1. At the termination of the use of the permanent system as a temporary ventilation or cooling system, the system shall be thoroughly cleaned, equipped with new filters, new belts if required, etc., and any damage repaired or replaced.
 2. The use of the permanent system for temporary ventilation or cooling shall not affect the warranty period which begins on the date of Substantial Completion of the Project, not Substantial Completion by Phase.
 3. Refer to Division 23 for other requirements that may affect the use of the permanent system.

3.3 COST OF FUEL AND ELECTRIC POWER

- A. The cost of all fuel and power consumed for temporary heat, ventilation and cooling will be paid by the Construction Manager. Equipment and tank rental is the responsibility of this Contractor.
- B. Refer to *Section 01 21 00 – Allowances* for a possible fuel allowance.

3.4 MAINTENANCE AND REMOVALS

- A. All portions of temporary heating, ventilation and cooling systems, not part of the permanent systems, shall be removed when the period of usefulness is over. Relocate components as required to prevent interference with continuing construction. Restore any compromised surfaces and patch penetrations. Keep temporary air filters in place and change as often as necessary. Install a clean set of permanent filters prior to air balancing.

END OF SECTION

SECTION 01 51 36 – TEMPORARY WATER

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 DRINKING WATER

- A. This Work shall be included by every Contractor and subcontractor.
- B. Provide chilled potable drinking water for all construction personnel in general location.

END OF SECTION

SECTION 01 51 39 – TEMPORARY SANITARY FACILITIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 TEMPORARY SANITARY FACILITIES

- A. Temporary sanitary facilities will be provided by the Construction Manager.
- B. Provide portable type toilets until sewer service is available.
- C. Maintain lavatories when existing facilities are approved for use.
- D. Adequate facilities shall be provided for all workmen on the Project and in no case less than those required by applicable federal law(s).
- E. The Construction Manager will provide necessary paper goods and soap.
- F. Keep facilities clean and sanitary

END OF SECTION

SECTION 01 52 00 – PROJECT OFFICE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to work of this Section.

1.2 TEMPORARY CONSTRUCTION MANAGER'S CONSTRUCTION OFFICE

- A. The Owner, through the Construction Manager, will provide and maintain adequate on-site office space for the representatives of the Construction Manager for their exclusive use and equipped as follows:
 - 1. Heated and air conditioned with operating windows and a locked door.
 - 2. Plan tables, racks for drawings, desks, chairs, file cabinets, and similar items.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 52 13 – OFFICES AND SHEDS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to work of this Section.

1.2 TEMPORARY STRUCTURES

- A. Temporary structures required for offices, storage, or other purposes in the performance of the Work, shall be located and erected only with approval of the Construction Manager and Owner and shall be removed and the premises shall be cleaned of all debris when directed. The vacated area shall be restored to its original condition when necessary.
- B. All temporary work sheds and offices, if of combustible construction, shall be located at least thirty feet (30') from the building.
- C. Contractors requiring power to temporary structures will make their own arrangements for such power.

PART 2 – PRODUCTS (NOT USED)

PART 3 – PRODUCTS (NOT USED)

END OF SECTION

SECTION 01 52 60 – RUBBISH CONTAINER

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 RUBBISH CONTAINER

- A. Construction Manager will provide dumpster type rubbish container or containers sized adequate for the general Project waste, debris, and rubbish for the life of the Project.
 - 1. Contractors are required to provide carts for transportation of debris to the rubbish container.
- B. Dispose of container contents weekly or at more frequent intervals if required by inadequate container capacity.

END OF SECTION

SECTION 01 54 00 – CONSTRUCTION AIDS AND TEMPORARY ENCLOSURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
- B. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 CONSTRUCTION AIDS

- A. Provide and maintain temporary gang ladders, stairs, ramps, runways, platforms and other such facilities and equipment for proper access to the Work for all Contracts, and in no case less than those required by applicable Federal, State, and local law(s).
- B. When permanent stair framing is in place, provide temporary treads, platforms, and railings for use by construction personnel.

3.2 TEMPORARY ENCLOSURES

- A. Provide plywood covered and insulated frames for window openings and hinged plywood or batten doors with locks to maintain temperatures necessary to perform the work and provide security.
 - 1. Provide protection against all kinds of adverse weather so that the building and materials will not be damaged, and against unauthorized entry.
 - 2. Protection shall be provided well in advance of finishing operations.
- B. Provide temporary enclosures to separate work areas from finished areas and from areas occupied by Owner; to prevent penetration of dust or moisture into finished and occupied areas, and to protect the public from construction work.
 - 1. Temporary partition and ceiling enclosures: framing and sheet materials which comply with structural and fire rating requirements of applicable codes and standards.
 - 2. Close joints between sheet materials, and seal edges and intersections with existing surfaces, to prevent penetration of dust or moisture.

3.3 RELOCATION AND REMOVAL

- A. Relocate as required by progress of construction, by storage or work requirements, and to accommodate legitimate requirements of Owner and other contractors employed at the site.
- B. Completely remove when construction needs can be met by use of permanent construction.
- C. Clean and repair damage caused by installation or by use.
- D. Restore existing facilities used for temporary purposes to specified or to original condition.
- E. Restore permanent facilities used for temporary purposes to specified condition.

END OF SECTION

DIVISION 3 - CONCRETE

SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents.
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

- D. Preinstallation Conference: Conduct conference at Project site, at least two weeks prior to concrete placement.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 - e. Finish flooring subcontractor(s).
 - 2. Review testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 1064 plain, fabricated from as-drawn steel wire into flat sheets.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I, gray. Supplement with the following:
 - a. Liquid Fly Ash (E5): ASTM C 494, Type S
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- B. Water: ASTM C 94 and potable.

2.4 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494, Type A.
 - 2. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 - 3. Plasticizing and Retarding Admixture: ASTM C 1017 Type II.
 - 4. E5 Internal Cure: ASTM C 494. Type S

2.5 VAPOR BARRIERS

- A. Sheet Vapor Barrier: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape. Minimum 15-mil thickness. Maximum 0.01 perms.

2.6 FIBER REINFORCEMENT

- A. Synthetic Micro-Fiber: fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III. Do not use fiber reinforcing in slabs scheduled to receive polished concrete finish.

2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.

- E. Curing:
 - 1. Internal Curing Compound: E5 Internal Cure, 4 fl. oz. per 100 lbs. of cementitious material.

2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips.

2.9 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Admixtures at Other Concrete: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 - 4. E5 Internal Cure, 4 fl. Oz. per 100 lbs. of cementitious material.
- C. Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength at 28 Days: As indicated on Drawings.
 - 2. Maximum Water-Cementitious Materials Ratio: As indicated on Drawings.
 - 3. Slump Limit: As indicated on Drawings.
 - 4. Air Content: As indicated on Drawings.
 - 5. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.5 lb/cu. yd.

2.10 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116 and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

2.13 LIQUID FLOOR TREATMENT

- A. Liquid Floor Treatment: Biodegradable micro grout that makes troweling smooth by reducing drag, and creates a denser, less permeable surface for resistance to liquid penetration and staining.
 - 1. Products:
 - a. Basis of design: E5 Catalyst, by Specification Products.
 - 2. Coverage: 800 – 1,000 sf/gal.

2.14 SEALERS

- A. Densifier: Environmentally friendly densifier that deeply penetrates and chemically reacts with concrete to evacuate existing contaminants and slows future penetration of chlorides, greases, oils and acids.
 - 1. Products:
 - a. Basis of design: E5 Protect, by Specification Products.
 - 2. Coverage: 2,000 sf/gal

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete where exposed.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.
- D. Avoid placing concrete if rain, snow, or frost is forecast within 24 hours. Protect fresh concrete from moisture and freezing.
- E. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendations.
- F. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- G. Cold-Weather Placement: Comply with ACI 306.1.
- H. Hot-Weather Placement: Comply with ACI 301.

3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 - 1. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.7 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces to receive trowel finish and non-slip broom finishes.
- C. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.
 2. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155 for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness F(L) 17; for slabs-on-grade.
 - b. Specified overall values of flatness, F(F) 30; and levelness, F(L) N.A.; with minimum local values of flatness, F(F) 24; and levelness, F(L) N.A.; for suspended slabs.
- E. Broom Finish: Apply a broom finish to exterior concrete stage floor, platforms, steps, ramps, and elsewhere as indicated. Coordinate finish of exterior walks, stoops, pavements, etc. with the Civil Drawings and Specifications.

3.8 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Curing Compounds: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION

SECTION 03 35 00 - CONCRETE SURFACE TREATMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes the following:
 - 1. Penetrating Liquid Floor Treatment (Concrete Sealer).

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Floor and slab treatments.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete Work 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. Manufacturer Qualifications: A firm experienced in manufacturing concrete surface treatment products and complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- C. Source Limitations: Obtain each type of material of the same brand from the same manufacturer.
- D. Mockups: Cast concrete slab-on-grade panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
 - 1. Build panel approximately 200 sq. ft. (18.6 sq. m) for slab-on-grade in the location indicated or, if not indicated, as directed by Architect.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.01 LIQUID FLOOR TREATMENTS

- A. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ChemMasters; Chemisil Plus.
 - b. ChemTec Int'l; ChemTec One.
 - c. Conspec by Dayton Superior; Intraseal.
 - d. Curecrete Distribution Inc.; Ashford Formula.
 - e. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
 - f. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
 - g. L&M Construction Chemicals, Inc.; Seal Hard.
 - h. Meadows, W. R., Inc.; LIQUI-HARD.
 - i. Nox-Crete Products Group; Duro-Nox.
 - j. Vexcon Chemicals, Inc.; Vexcon StarSeal PS Clear.
 - k. ProSoCo, Consolideck.

PART 3 - EXECUTION

3.01 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

3.02 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - 2. Do not apply to concrete that is less than 28 days' old.
 - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

3.03 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

DIVISION 4 - MASONRY

SECTION 01 55 00 – ACCESS ROADS AND PARKING AREAS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.

1.2 REQUIREMENTS INCLUDED

- A. Access Roads
- B. Construction Parking
- C. Existing Pavements and Parking Areas
- D. Permanent Pavements and Parking Facilities
- E. Maintenance
- F. Removal, Repair

PART 2 – PRODUCTS

2.1 MATERIALS

- A. For Temporary Construction: Contractor's option of crushed stone or gravel.
- B. For Permanent Construction: As specified in the Contract Documents.

PART 3 – EXECUTION

3.1 PROTECTION PREPARATION

- A. Clear areas to provide surface (and storm) drainage of premises and adjacent areas.
- B. When practicable, coordinate the use of permanent roads and parking areas with Paving Contractor.

3.2 ACCESS ROADS

- A. Construct temporary (all-weather) access roads from public thoroughfares to serve construction area, of a width and load- bearing capacity to provide unimpeded traffic for construction purposes.
- B. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.

- C. Extend and relocate as work progress requires, provide detours as necessary for unimpeded traffic flow.
- D. Location as indicated on Site Phasing and Pedestrian Pathway Plan.
- E. Provide unimpeded access for emergency vehicles. Maintain twenty-foot (20') width driveways with turning space between and around combustible materials.
- F. Provide and maintain access to fire hydrants and control valves free of obstructions.
- G. Contractors rutting the access road must back drag the access road daily.

3.3 PARKING

- A. Contractor vehicles will not be permitted to park on the public streets surrounding the Project site.
- B. Contractors will be allowed one (1) parking space on the Project site for their field supervisor's vehicle. No other vehicles will be allowed on the Project site.
- C. Contractor parking will be as indicated on Site Logistics Plan.
- D. Contractors will be responsible for all costs associated with parking and transporting their employees from the Contractor parking locations to the Project Site.

3.4 EXISTING PAVEMENTS AND PARKING AREAS

- A. Designated existing onsite streets and driveways may be used for construction traffic. Tracked vehicles are not allowed.

3.5 PERMANENT PAVEMENTS AND PARKING FACILITIES

- A. Prior to Substantial Completion, base for permanent roads and parking areas may be used for construction traffic. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

3.6 MAINTENANCE

- A. Maintain traffic and parking areas in sound condition, free of excavated material, construction equipment, products, mud, snow, and ice.
- B. Maintain existing and permanent 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.

3.7 REMOVAL, REPAIR

- A. Remove temporary materials and construction when permanent paving is usable.
- B. Remove underground work and compacted materials to a depth of two feet (2'); fill and grade site as specified.

- C. Repair existing and permanent facilities damaged by usage to original and specified condition.

END OF SECTION

SECTION 01 55 26 – TRAFFIC MAINTENANCE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. The Contractor shall maintain and protect vehicular and pedestrian traffic and the work while the contract is in force in accordance with the provisions of this section.
- B. The Contractor shall coordinate work under this contract with authorities having jurisdiction.
- C. Before starting any WORK on the Project, the Contractor shall submit, in writing to the Municipality or proper authority for approval, any revisions to the maintenance of traffic as shown on the plans. A copy of all such correspondence shall be sent to the Engineer. The Contractor shall attend a pre-construction conference with the proper authorities to discuss in detail his proposed work schedule and the pertinent points of any permits or agreements concerning the Work of this Project.
- D. Related Requirements:
 - 1. *Section 01 50 00 – Temporary Facilities and Controls.*
 - 2. *Section 01 60 00 – Product Requirements.*

1.3 SUBMITTALS

- A. Prior to mobilization, the Contractor shall submit to the Engineer for review any revisions to the maintenance of traffic as shown on the plans.

1.4 QUALITY ASSURANCE

A. Performance

- 1. In the event of the Contractor's failure to comply with these provisions, the Engineer may cause the same to be done and will deduct the cost of such work from any moneys due to or become due the Contractor under this agreement, but the performance of such work by the Engineer or at its instance shall serve in no way to release the Contractor from his general or particular liability for the safety of the public or of the Work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 TRAFFIC FACILITIES AND TRAFFIC CONTROL – GENERAL

- A. Facilities for vehicular and pedestrian traffic as required for the project, including all detours, temporary walks, roads, and traffic control devices, shall be constructed and maintained by the Contractor.
- B. During the progress of the Work, the Contractor shall make ample provisions for both vehicular and foot traffic on any public road and shall indemnify and save harmless the Engineer from any expense whatsoever due to his operations over said roadways.
- C. The provisions of this Section shall not in any way relieve the Contractor of any of his legal responsibilities or liabilities for the safety of the public. The Contractor shall provide and maintain safeguards, safety devices, and protective equipment and take any other needed actions that may be necessary to protect the public and property in connection with the WORK. The Contractor shall restore all original pavement markings, signs, and traffic control devices.

3.2 LOCAL TRAFFIC

- A. For local traffic, the Contractor shall provide and maintain in a safe condition, including snow and ice removal, such drives, temporary roadways, bypasses, sidewalks, or temporary structures as may be necessary to provide vehicular and pedestrian ingress and egress for the residents and facilities adjacent to the improvements.
- B. The Contractor shall also provide free access to all municipal, commercial, residential entrances, fire hydrants and water and gas valves located along the line of his work.
- C. The Contractor shall lay and maintain temporary driveways and trench crossings which in the opinion of the Engineer are necessary to maintain access to driveways and to reasonably accommodate the public at no additional cost to the Engineer.

3.3 THROUGH TRAFFIC

- A. During construction, the Contractor shall maintain the planned detour for through traffic. Emergency vehicle (police, ambulance, fire, etc.) shall be the only through traffic allowed. The Contractor must make allowances for the safe and timely passage of these emergency vehicles.
- B. When the street affected by Project construction is being used by traffic, including periods of suspension of the Work, the Contractor shall so maintain by the use of labor, equipment, and materials that portion of the street being used, such that it is smooth, free from holes, ruts, ridges, bumps, and dust. The street being used shall be provided with the necessary outlets to drain freely. Pipe trenches or other openings left in hard surface pavements shall be maintained with material as specified.
- C. The proper authorities shall have the right to enter upon that portion of the WORK where the Contractor is responsible for maintaining traffic to remove snow and ice and place abrasives at their own expense, as necessary. The Contractor shall be responsible for the removal of abrasives placed, for which no claim for additional compensation shall be allowed nor shall the Contractor be relieved in any way of his obligation for maintenance of traffic.
- D. The Contractor shall lay and maintain trench crossings such as in the opinion of the Engineer and the Engineer's Engineer are necessary to accommodate through traffic and the general public.

3.4 TRAFFIC CONTROL

- A. The installation, maintenance, and operation of all traffic controls and traffic control devices shall conform to the requirements of the "Indiana Manual of Uniform Traffic Control Devices for Streets and Highways", hereinafter call The Indiana Manual. Traffic control devices shall be provided with suitable supports of sufficient strength and stability.
- B. Faces of construction signs, barricades, vertical panels and drum banks shall be suitably reflectorized with INDOT and the Indiana Manual requirements.
- C. Traffic cones shall be a highly visible orange color. Pavement markings for traffic maintenance shall conform to INDOT standards.
- D. Barricades and channelizing devices such as cones, vertical panels, hazard markers, and drums shall be highly visible. They shall also be protected by adequate advance warning devices and by suitable lighting or reflectorization at night (between the hours of sunset to sunrise). All such devices shall be provided by the Contractor. Detour signs, traffic control signs, barricades, construction lighting, etc. shall be replaced whenever damaged, stolen or vandalized. Detour signs when not in use shall either be removed or covered to avoid motorist confusion.
- E. Equipment and material stored on the street shall be marked at all times. At night any such material or equipment stored between the side ditches, or between lines 5 feet behind any raised curbs, shall be clearly outlined with dependable lighted devices that are approved by the Engineer. In addition, the Contractor shall provide any other lights, barricades, etc. that may be needed for the protection of pedestrian traffic.

3.5 TRAFFIC MAINTAINED

- A. Where a street affected by Project construction is being used by traffic, including periods of suspension of the Work, the Contractor shall furnish and maintain pavement markings, lights, warning signs, road construction – traffic maintained signs and end construction signs, barricades, temporary guardrail, and such other traffic control devices, and watchmen and flaggers as may be necessary to maintain safe traffic conditions within the work limits.
- B. The Contractor shall furnish and erect regulatory signs and guide signs within the work limits on all traffic maintained projects. The responsibility for maintenance of these signs shall rest with the Contractor. The erection and removal of all regulatory signs shall be approved by the Engineer.
- C. Existing signs and traffic control devices within the work limits shall remain in use during the construction period. If the Contractor needs to relocate or modify existing signs or traffic control devices as a consequence of his Work, he shall provide suitable supports and may modify the devices with prior approval of the Engineer. Routine maintenance of existing traffic control devices will remain the responsibility of the maintaining agency. The function of existing Stop or Yield signs shall be retained at all times although their position may be adjusted. Existing signs that must be relocated laterally shall be placed in accordance with the Indiana Manual. The Contractor shall restore all relocated or modified signs to the position and condition which existed prior to construction.

- D. When an existing signal operation must be interrupted for a period, the Contractor shall provide a temporary traffic control method approved by the Engineer and the authority maintaining the signal.
- E. Whenever it is necessary for the Contractor to divert the flow of traffic from its normal channel into another channel, the channel for such diverted traffic shall be clearly marked by the CONTRACTOR with cones, drums, barricades, vertical panels, pavement markings, or flashing arrow panels. This method of marking shall also be used where work is being done adjacent to the part of the street or highway in use by the public or where work is being done on the shoulder where the roadway is being used by the public. During darkness hours, barricades and drums shall be supplemented with yellow flashing or steady burning electric warning lights in accordance with the Indiana Manual.
- F. The Contractor shall obtain the approval of the Engineer and the proper authorities before closing a traffic lane or establishing a one-way traffic operation.

3.6 PAVEMENT MARKING OPERATIONS

- A. Moving marking operations shall be performed by a truck equipped with necessary flashers and warning signs and shall be protected by a similarly equipped trailing vehicle or vehicles separated a sufficient distance to provide adequate advance warning to overtaking traffic. The marking operation should use the extreme left or right lane when possible. Where 3 or more lanes exist, the operation shall allow traffic to pass on one side only.
- B. Stationary marking operations in intersections, school zones, gores and other areas shall be protected with traffic control devices such as advance warning signs and cones.

3.7 FLAGGERS

- A. Whenever one-way traffic is established, at least 2 flaggers shall be used unless otherwise permitted by the Engineer, and signs, cones, barricades and other traffic control devices shall be erected by the Contractor in accordance with the Indiana Manual. Traffic control devices shall be reflectorized as previously noted herein. The Contractor shall maintain positive and quick means of communication between the flaggers at the opposite ends of the restricted area.
- B. Flaggers shall be equipped according to the standards for flagging traffic contained in the Indiana Manual. The red flag or the Stop/Slow sign shall be used. At night, flaggers stations shall be adequately illuminated, and flaggers shall use the reflectorized Stop/Slow or a red light approved by the Engineer.
- C. The control and regulation of traffic by the flaggers and performance of their duties shall conform to the standards in the Indiana Manual. The Contractor may, in lieu of flagger, or supplementing them, furnish, install and operate a temporary traffic signal or signals, for the purpose of regulating traffic, in accordance with a written agreement approved by the Engineer and the proper authorities.

3.8 GENERAL MAINTENANCE OF TRAFFIC

- A. Unless otherwise permitted, directed, or ordered by the Engineer, traffic shall be specifically maintained as follows:

1. Access for emergency vehicles is to be provided at all times on all streets affected by this Project. Provide temporary access for emergency vehicles through the site during the full road closure periods as specified below.
2. During paving operations, one lane of traffic must be maintained at all times. Flagmen are required to direct traffic in both directions.
3. All trenches and openings shall be backfilled as soon as possible or as specified, and the pavement restored.
4. The Contractor shall confer with the Engineer and all Municipalities, proper authority, local property Engineers and others who may be affected by the Project before starting any work at locations affecting said parties, and the carrying out of this Work with respect to traffic maintenance shall be covered by agreements reached at such conferences.
5. The location, design, and construction of driveways, roads, and access and egress points for construction equipment vehicles to public streets which may be required by the Contractor for construction on easements and other locations shall be approved by the Engineer. All such points shall be provided with adequate warning signs.
6. No parking or standing of vehicles on streets will be permitted.
7. The Contractor shall provide dust control on all streets in this project as per INDOT specifications.

END OF SECTION

SECTION 01 56 23 – BARRICADES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 BARRICADES

- A. Any Contractor creating a fall hazard not addressed above shall provide and maintain OSHA approved top rail, mid rail and toe boards at all elevated floor slab edges and openings.
 - 1. Maintain and relocate as the work progresses.
 - 2. Dismantle and discard when no longer of service.

END OF SECTION

SECTION 01 56 26 – FENCES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.

1.2 SCHEDULING

- A. Contractor shall provide temporary fencing to outline limits of site usage prior to start of work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 015626

SECTION 01 56 39 – TREE AND PLANT PROTECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.
 - 1. This Work shall be included as part of Bid Package No. 2 – Site Development.

1.2 JOB CONDITIONS

- A. Existing Conditions
 - 1. Inspect all trees and plants near building site.
- B. Scheduling
 - 1. Protective fencing shall be in place before commencement of any other work.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Fencing shall be new plastic snow-type fencing, 4' high. Posts shall be heavy-duty studded steel T-posts, 1-3/8" x 1-3/8" x 7/64" thick by 4' tall.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Trees to be protected shall have fencing placed completely around the tree at the full spread of the branches.
- B. Plants to remain shall have fencing placed completely around individual or groups of plants one foot (1') beyond edge of plants.
- C. Existing lawn and other areas to be left undisturbed shall have fencing placed where indicated or as required for protection.
- D. Space posts six feet (6') on center and drive three feet (3') into the ground. Fasten fence to each post with five (5) fasteners.
- E. Place warning signs on tree protective fencing stating "Do Not Store Materials Within Fence".

3.2 MAINTENANCE

- A. Maintain fencing in good repair until completion of the Project unless directed otherwise by the Construction Manager.
- B. Relocate fencing if necessary due to construction progress when directed by the Construction Manager.

- C. Remove fencing when directed by the Construction Manager.
- D. Any Contractor responsible for damages to the fence will be responsible to repair the damages.
 - 1. Contractor may make the repairs themselves.
 - 2. Construction Manager may make the repairs and charge the Contractor for the cost of the repairs.

END OF SECTION

SECTION 01 57 13 – ENVIRONMENTAL PROTECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 APPLICABLE REGULATIONS

- A. In order to prevent, and to provide for abatement and control of any environmental pollution arising from the construction activities of the Contractor and his Contractors in the performance of this Contract, they shall comply with all applicable federal, state, and local laws, and regulations concerning environmental pollution control and abatement as well as the specific requirements stated elsewhere in the Contract Documents.

3.2 RECORDING AND PRESERVING HISTORICAL AND ARCHAEOLOGICAL FINDS

- A. All items having any apparent historical or archaeological interest which are discovered during the course of any construction activities shall be carefully preserved. The Contractor shall leave the archaeological find undisturbed and shall immediately report the find to the Architect so that the proper authorities may be notified.

3.3 PROTECTION OF WATER RESOURCES

- A. The Contractor shall not pollute water resources with fuels, oils, bitumen, calcium chloride, acids, or harmful materials. It is the responsibility of the Contractor to investigate and comply with all applicable federal, state, county, and municipal laws concerning pollution of rivers and streams. All Work shall be performed in such a manner that objectionable conditions will not be created in water resources through or adjacent to the Project areas.
 - 1. Spillages: At all times of the year, special measures shall be taken to prevent chemicals, fuels, oils, grease, bituminous materials, waste washings, herbicides and insecticides, and cement from entering water resources.
 - 2. Disposal: If any waste material is dumped in unauthorized areas, the Contractor shall remove the material and restore the area to its original condition. If necessary, contaminated ground shall be excavated, disposed of as directed by the Construction Manager, and replaced with suitable fill material, compacted, and finished with topsoil, all at the expense of the Contractor.

3.4 PROTECTION OF FISH AND WILDLIFE

- A. The Contractor shall, at all times, perform all work and take the steps required to prevent any interference or disturbance to fish and wildlife. Fouling or polluting of water will not be permitted. Wash water and wastes shall be processed, filtered, ponded, or otherwise treated prior to their release into the storm sewers or streams.

3.5 PROTECTION OF MONUMENTS, MARKERS AND ARTWORK

- A. Monuments and markers shall be protected before beginning operations near them.

3.6 MAINTENANCE OF ENVIRONMENT PROTECTION CONTROL FACILITIES DURING
CONSTRUCTION

- A. During the life of this Contract, the Contractor shall maintain all facilities constructed for pollution control under this Contract as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

END OF SECTION

SECTION 01 57 15 – TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section describes erosion and sediment control and other control-related practices which shall be utilized during construction activities.
- B. This Section describes the required documentation to be prepared and signed by the Contractor before conducting construction operations, in accordance with the terms and conditions of the National Pollutant Discharge Elimination System (NPDES) Permit, as issued by the IDEM.
- C. Related Requirements:
 - 1. *Section 01 33 00 – Submittal Procedures.*
 - 2. *Section 01 77 00 – Contract Closeout.*

1.3 SUBMITTALS

- A. Submittals shall be in accordance with *Section 01 33 00 – Submittal Procedures.*
 - 1. Permitting for 327-IAC-15-5 (Rule 5) will be completed prior to beginning of construction period by Engineer and Owner. Contractor shall provide notice of construction start date to the Construction Manager 48 hours prior to commencing any earthwork activities on site.
 - 2. Prior to start of construction, provide contact information for on-site responsible individual who will be conducting required weekly self-inspections to the Construction Manager. Designated on-site responsible individual is required to forward or fax weekly self-inspection log reports to the SWCD. Copy of NOI must be posted on the jobsite in public view per the requirements of 327-IAC 15-5. B. Stormwater Pollution Prevention Plan (SWPPP):
 - 1. Contractor shall submit any revisions to the SWPPP to the Owner for approval prior to implementing changes.

1.4 Storm Water Pollution Prevention Plan (SWPPP)

- A. The Owner has prepared the SWPPP for this work pursuant to state and local requirements.
- B. The SWPPP is incorporated into this contract by reference.
- C. The Contractor shall be responsible for implementing the approved SWPPP.
- D. The Contractor shall meet with the Owner to discuss review and changes to the SWPPP prior to beginning field work.

- E. The Contractor shall maintain records on site demonstrating that NPDES requirements are being met, including all logs and records specified in the Permit.
- F. Per the requirements of the Permit, all controls will be inspected by the Contractor at least once every seven calendar days and within twenty-four (24) hours of any storm event that produces more than 0.5 inches of rain over the preceding twenty-four (24) hours.
- G. The Contractor shall maintain all control practices as needed to ensure continued performance of their intended function. The Contractor shall provide the name, address, and telephone number for the Contractor; the names of persons or firms responsible for maintenance and inspection of erosion and sediment control measures and all Subcontractors.
- H. The SWPPP shall be amended whenever there is a change in project design, stormwater control design or construction operations which have a significant effect on the potential for discharge of pollutants, or if the SWPPP proves to be ineffective in achieving the general objectives of minimizing construction-associated pollutants in storm water discharge. Upon approval of the amended SWPPP, both the Owner and the Contractor shall sign the amended SWPPP.
- I. The Contractor shall keep a copy of the Storm Water Pollution Prevention Plan, as amended, at the construction site or at the Contractor's office from the date that it became effective to the date of Project completion.
- J. The following notices shall be posted from the date that the SWPPP goes into effect until the date of final site stabilization.
 - 1. Copies of the Notices of Intent (NOI) submitted by the Owner and the Contractor and a brief project description as given in the SWPPP shall be posted at the construction site or at the Contractor's office in a prominent place for public viewing.
 - 2. Notice to drivers of equipment and vehicles, instructing them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post such notices at every stabilized construction exit area.
 - 3. In an easily visible location on the site, post a notice of waste disposal procedures.
 - 4. Notice of hazardous material handling and emergency procedures shall be posted with the NOI on site. Keep copies of Material Safety Data Sheets (MSDS) at a location on site that is known to all personnel.
 - 5. Keep a copy of each signed certification at the construction site or at the Contractor's office.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Storage of Construction Materials and Chemicals:
 - 1. Isolate sites where chemicals, cements, solvents, paints, or other potential water pollutants are stored in areas where they will not cause runoff pollution.
 - 2. Store all toxic chemicals and materials such as pesticides, paints, and acids in accordance with manufacturer's guidelines. Protect groundwater resources from leaching by placing a plastic mat, packed clay, tar paper, or other impervious materials on any areas where toxic liquids are to be opened and stored.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PREPARATION AND INSTALLATION

- A. No clearing and grubbing or rough cutting shall be permitted until erosion and sediment control systems are in place, other than site work specifically directed by the ENGINEER to allow soil testing and surveying.
- B. The Contractor shall be responsible for collecting, storing, hauling, and disposing of spoil, silt, and waste materials as specified in the SWPPP and in compliance with the applicable federal, state and local rules and regulations.
- C. The Contractor shall conduct all construction operations under this Contract in conformance with the erosion control practices described in the SWPPP. The Contractor shall conduct operations to minimize open cut areas that are not stabilized and shall stabilize areas immediately after final grading and backfill is complete. The Contractor shall make every effort to install and maintain temporary erosion control and stabilization measures to prevent flow events from scouring the site during construction. The Contractor is responsible for site restoration during construction activities for flow events that result in scour at no cost to the Owner.
- D. All trash cans, roll off containers, etc. shall be equipped with an impervious cover (lid, tarp, etc.) arranged to prevent the collection of rainwater and secured to prevent blowing away.

3.2 CLOSEOUT

- A. Provide in accordance with *Section 01 77 00 – Contract Closeout*.
- B. Contractor shall restore all erosion control measures to like new condition prior to leaving jobsite.

END OF SECTION

SECTION 01 57 26 – DUST CONTROL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to work of this Section.

1.2 QUALITY ASSURANCE

- A. Comply with the requirements of authorities having jurisdiction.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PROTECTION PREPARATION DUST CONTROL

- A. The Contractor will be required to maintain all excavations, embankments, stockpiles, haul roads, permanent access roads, plant sites, waste areas, borrow areas, and all other work areas on or off site free of dust.
- B. Approved temporary methods of stabilization consisting of sprinkling, chemical treatment, light bituminous treatment, or similar methods will be permitted to control dust. Sprinkling, to be approved, must be repeated at such intervals as to keep the disturbed area damp at all times; and the Contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Sprinkling that causes tracking of public roads will not be allowed and other approved methods must be used.

END OF SECTION

SECTION 015729 – WATER CONTROL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to work of this Section.

1.2 QUALITY ASSURANCE

- A. Comply with the requirements of authorities having jurisdiction.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PROTECTION PREPARATION DUST CONTROL WATER CONTROL

- A. Protect excavations, trenches and structure from damage by rainwater, ground water, backing-up of drains and sewers and from all other water. Provide pumps, well points, equipment and enclosures to provide protection for the Work.
- B. Install approved temporary erosion control devices when discharge velocity of pumping equipment causes soil erosion at the point of discharge.

END OF SECTION

SECTION 016000 – PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
 - 1. Product standards and quality
 - 2. Substitutions
 - 3. Manufacturer's directions
 - 4. Warranties
 - 5. Material delivery and responsibilities
 - 6. Protection
 - 7. Acceptance of equipment or systems
- B. It is the intent of the Specifications and Drawings to accomplish a complete and first-grade installation in which there shall be installed new materials and products of the latest and best design and manufacturer. Workmanship shall be thoroughly first- class and complete, executed by competent and experienced workmen.
- C. Equipment, specialties, and similar items shall be checked for compliance and fully approved prior to installation. Contractors are cautioned that work or equipment installed without approval is subject to condemnation, removal, and subsequent replacement with an approved item without extra remuneration.
- D. Related Work Specified Elsewhere
 - 1. *Section 002113 – Instructions to Bidders*
 - 2. *Section 013300 – Submittal Procedures*

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as “specialties,” “systems,” “structure,” “finishes,” “accessories,” and similar terms. Such terms are self-explanatory and have well recognized meanings in the construction industry.
 - 1. “Products” are items purchased for incorporation in the Work, whether purchased for the project or taken from previously purchased stock. The term “product” includes the terms “material,” “equipment,” “system,” and terms of similar intent.
 - 2. “Named Products” are items identified by the manufacturer’s product name, including make or model number or other designation, shown or listed in the

manufacturer's published product literature, that is current as of the date of the Contract Documents.

3. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed to form a part of the Work.
4. "Equipment" is a product with operational parts, whether motorized or manually operated, that require service connections, such as wiring or piping. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to work of this Section.

1.4 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
- B. Compatibility of Options: When the Contractor is given the option of selecting between 2 or more products for use on the project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
 1. Each Contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other prime or separate contractors.
 - a. Prime Contractors shall coordinate products used in penetration firestopping.
 2. If a dispute arises between Contractors over concurrently selectable, but incompatible products, the Architect will determine which products shall be retained and which are incompatible and must be replaced.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

5. Store products of the site in a manner that will facilitate inspection and measurement of quality or counting of units.
6. Store heavy materials away from the project structure in a manner that will not endanger the supporting construction.
7. Store products subject to damage by elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 – PRODUCTS

2.1 PRODUCT STANDARDS AND QUALITY

- A. The Contract is based on the materials, equipment, and methods described in the Contract Documents.
- B. Where in the Drawings and Specifications certain products, manufacturer's trade names, or catalog numbers are given, it is done for the expressed purpose of establishing a basis of quality, durability, and efficiency of design in harmony with the work outlined and is not intended for the purpose of limiting competition.
- C. The Architect will consider proposals for substitution of materials, equipment, and methods only when such proposals are accompanied by full and complete technical data and all other information required by the Architect to evaluate the proposed substitution.
- D. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this Work by the Architect.
 1. Refer to *Section 00 21 13 – Instructions to Bidders*.
- E. "Or equal":
 1. Where the phrase "or equal" or "or equal as approved by the Architect" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the Architect unless the item has been specifically approved for this Work by the Architect in an Addendum.
 2. The decision of the Architect shall be final.
- F. Availability of Specified Items:
 1. Verify prior to bidding that specified items will be available in time for installation during orderly and timely progress of the Work.
 2. In the event specified item or items will not be so available, so notify the Architect prior to receipt of bids.

3. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back charged as necessary and shall not be borne by the Owner.
- G. Separate Substitute Bids: Bidders may, if they wish, submit additional, completely separate bids using materials and methods other than those described in these Contract Documents, provided that substitutions are clearly identified and described and that the bid is in accordance with the provisions of the Contract Documents. Refer to *Section 00 21 13 – Instructions to Bidders*.
- H. Where the questions of appearance, artistic effect, or harmony of design are concerned, the Architect reserves the right to refuse approval of substituted products proposed to be substituted for that specified, if in his opinion the item to be substituted is not harmonious to the finished effect and appearance desired, as portrayed in the Drawings and Specifications. The Architect's said refusal to approve, established by this paragraph, is final and not subject to arbitration.

2.2 SUBSTITUTIONS

- A. Substitutions: Changes in products, materials of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests of substitutions. The following are not considered to be requests for substitutions.
 1. Substitutions requested during the bidding period, accepted by Addendum prior to award of the Contract, are included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
 2. Revisions to the Contract Documents requested by the Owner or Architect.
 3. Specified options of products and construction methods included in the Contract Documents.
 4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.
- B. Conditions: The Construction Manager will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Construction Manager. If the following conditions are not satisfied, the Architect will return the requests without action except to record noncompliance with these requirements:
 1. Extensive revisions to the Contract Documents are not required.
 2. Proposed changes are in keeping with the general intent of the Contract Documents.
 3. The request is timely, fully documented, and properly submitted.
 4. The specified product or method of construction cannot be provided within the Contract Time. The Architect will not consider the request if the product or

method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

5. The requested substitution offers the Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Owner must assume. The Owner's additional responsibilities may include compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner, and similar considerations.
6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
7. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.
8. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitutions provide the required warranty.
9. Where a proposed substitution involves more than one Contractor, each Contractor shall cooperate with the other Contractors involved to coordinate the Work, provide uniformity and consistency, and assure compatibility of products.

2.3 MANUFACTURER'S DIRECTIONS

- A. Manufactured products shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's printed directions, unless herein specified to the contrary. Where manufacturer's printed directions are available and where reference is made to manufacturer's directions in the Specifications, the Contractor shall submit two 2 copies of such directions through the Construction Manager to the Architect prior to the beginning of Work covered thereby.
- B. Where specific installation instructions are not part of these Specifications and Drawings, equipment shall be installed in strict accordance with instructions from the respective manufacturers. Where installation instructions included in these Specifications or Drawings are at a variance with instructions furnished by the equipment manufacturer, the Contractor shall make a written request for clarification from the Architect.
- C. In accepting or assenting to the use of apparatus or material, or make, or arrangement thereof, the Architect in no way waives the requirements of these Specifications or the warranty embodied therein.

2.4 WARRANTIES

- A. Specific warranties or bonds called for in the Contract Documents, in addition to that falling under the general warranty as set forth in General Conditions, shall be furnished in accordance with the requirements of the Specifications.

1. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and Contractors required to countersign special warranties with the Contractor.
2. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - a. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with the requirements of the Contract Documents.
- B. Each Contractor shall and does hereby agree to warrant for a period of one year, or for longer periods, where so provided in the Specifications, as evidenced by the date of Substantial Completion issued by the Construction Manager, products installed under the Contract to be of good quality in every respect and to remain so for periods described herein.
- C. Should defects develop in the aforesaid Work within the specified periods, due to faults in products or their workmanship, the Contractor hereby agrees to make repairs and do necessary Work to correct defective Work to the Architect's satisfaction, in accordance with the Contract Documents. Such repairs and corrective Work, including costs of making good other Work damaged by or otherwise affected by making repairs or corrective Work, shall be done without cost to the Owner or Construction Manager and at the entire cost and expense of the Contractor within fourteen (14) days after written notice to the Contractor by the Construction Manager.
 1. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.
 2. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- D. Nothing herein intends or implies that the warranty shall apply to Work which has been abused or neglected or improperly maintained by the Owner or his successor in interest.
- E. Where service on products is required under this Article, it shall be promptly provided when notified by the Owner and no additional charge shall be made, unless it can be established that the defect or malfunctioning was caused by abuse or accidental damage not to be expected under conditions of ordinary wear and tear.
- F. In the event movement in the adjoining structure or components causes malfunctioning, the Contractor responsible for the original installation of the adjoining structure or

components shall provide such repair, replacement, or correction necessary to provide for proper functioning to bring the equipment back into the same operating condition as approved at the completion of the building.

- G. The manufacturer and supplier expressly warrant that each item of equipment furnished by him and installed in this Project is suitable for the application shown and specified in the Contract Documents and includes features, accessories, and performing characteristics listed in the manufacturer's catalog in force on the date bids are requested for the Work. This warranty is intended as an assurance by the manufacturer that his equipment is not being misapplied and is fit and sufficient for the service intended. This warranty is in addition to and not in limitation of other warranties or remedies required by law or by the Contract Documents. It shall be the responsibility of the Contractor for the particular equipment to obtain this warranty in writing.
- H. In case the Contractor fails to do Work so ordered, the Construction Manager may have work done and charge the cost thereof against monies retained as provided for in the Agreement and, if said retained monies shall be insufficient to pay such cost or if no money is available, the Contractor and his Sureties shall agree to pay to the Construction Manager the cost of such Work.
- I. Warranties shall commence from the date of Substantial Completion for the entire project and not from completion of a single phase.

2.5 MATERIAL DELIVERY AND RESPONSIBILITIES

- A. Each Contractor shall be responsible for the materials he orders for delivery to the jobsite. Responsibility includes, but is not limited to, receiving, unloading, storing, protecting, and setting in place, ready for final connections. Each Contractor will coordinate jobsite storage with the Construction Manager.
 - 1. The Construction Manager will not be responsible for deliveries related to the construction or operation of the Contractor. The Construction Manager cannot sign delivery forms for the Contractor.
- B. Contractors shall insure that products are delivered to the Project in accordance with the Construction Schedule of the Project. In determining date of delivery, sufficient time shall be allowed for shop drawings and sample approvals, including the possibility of having to resubmit improperly prepared submittals or products other than those specified and the necessary fabrication or procurement time along with the delivery method and distance involved.

2.6 PROTECTION

- A. Each Contractor shall protect building elements and products when subject to damage. Should workmen or other persons employed or commissioned by one Contractor be responsible for damage, the entire cost of repairing said damage shall be assumed by said individual Contractor. Should damage be done by a person or persons not employed or commissioned by a Contractor, the respective Contractors shall make repairs and charge the cost to the guilty person or persons. The affected Contractors shall be responsible for collecting such charges. If the person or persons responsible for damage

cannot be discovered, full and satisfactory repairs shall be made by the respective Contractor, and the cost of Work shall be prorated against each Contractor.

- B. The respective Contractors shall protect their products prior to installation and final acceptance. Storage shall be dry, clean, and safe. Materials or equipment damaged, deteriorated, rusted, or defaced due to improper storage, shall be repaired, refinished, or replaced, as required by the Architect. Products lost through theft or mishandling shall be replaced by the Contractor without cost to the Construction Manager.

2.7 ACCEPTANCE OF EQUIPMENT OR SYSTEMS

- A. The Construction Manager will not accept the start of the warranty period on systems or equipment until Substantial Completion is issued to the respective Contractor(s) for Owner's occupancy of the building, in part or whole. Each Contractor shall make such provisions as required to extend the manufacturer's warranty from the time of initial operation of systems or equipment until Substantial Completion is given in writing for the entire project.

PART 3 – EXECTION (NOT USED)

END OF SECTION

SECTION 01 71 23 – FIELD ENGINEERING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to work of this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for field engineering services including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Anchor bolt location survey.

1.3 SUBMITTALS

- A. Qualification Data: For land surveyor to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names, and addresses of architects, owners, and Construction Managers and other information specified.
- B. Record Log: upon request
- C. Anchor Bolt Survey: upon completion of the Anchor Bolt installation.
- D. Certified Survey of foundation walls and site improvements: upon completion.
- E. Report discrepancies found during Construction Layout to the Architect and Construction Manager in writing before proceeding with the work.
- F. Request for Information: Upon discovery of items needing clarification in the Contract Documents.

1.4 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in the jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate

and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping, and underground electrical services.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

3.02 PREPARATION

- A. Existing Utility Information: Furnish information to Construction Manager that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Within sufficient time as to not delay the construction schedule, take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to existing construction, verify dimensions of existing construction by field measurements before proceeding with the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Construction Manager. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.03 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.
- B. General: The Contractor shall engage a land surveyor to establish benchmarks and set control points. The Prime Contractors shall lay out their Work using accepted surveying practices.
 1. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

2. Inform installers of lines and levels to which they must comply.
 3. Check the location, level and plumb, of every major element as the Work progresses.
 4. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
 5. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Anchor Bolt Survey Location: On completion of anchor bolt installation and prior to erecting steel, the Bid Package #1 Concrete Contractor shall prepare a certified survey showing dimensions, locations, angles, and elevation of anchor bolts.
- F. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Make the log available for reference by Architect and Construction Manager.

3.04 FIELD ENGINEERING

- A. Identification: Construction Manager will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
1. Do not change or relocate existing benchmarks or control points without prior written approval of Construction Manager. Report lost or destroyed permanent benchmarks or control points to Construction Manager before proceeding.
 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

END OF SECTION

SECTION 01 71 23.13 – WORK LAYOUT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to work of this Section.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 EXAMINATION LAYOUT

- A. Each Contractor shall be responsible for the layout of his work and the coordination of his work with other trades.
- B. Verify all grades, lines, levels and dimensions as shown on Drawings and report any errors or inconsistencies to the Construction Manager before commencing work.
- C. Dimensions shall not be scaled from the Drawings.

END OF SECTION

SECTION 01 71 33.13 – UTILITY PROTECTION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to this Section.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PROTECTION

- A. Existing utility lines and structures indicated or known, and utility lines constructed for this Project shall be protected from damage during construction operations.
- B. Locate and flag all lines and structures before beginning excavation and other construction operations.

3.2 REMOVAL AND RELOCATION

- A. When utility lines and structures that are to be removed or relocated are encountered within the area of operations, notify the Construction Manager, and affected utility in ample time for the necessary measures to be taken to prevent interruption of the services.

3.3 UNKNOWN LOCATIONS

- A. Damage to existing utility lines or structures not indicated or known shall be reported immediately to the Construction Manager and the affected utility. If determined that repairs are required under the Contract, the cost of such repairs will be covered by Change Order.
- B. Record locations of utility lines or structures on "Project Record Drawings" maintained at the jobsite by the Construction Manager.

END OF SECTION

SECTION 01 73 00 – EXECUTION

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Progress cleaning.
 - 6. Starting and adjusting.
 - 7. Protection of installed construction.
 - 8. Correction of the Work.
- B. Related Requirements:
 - 1. *Section 01 10 00 – Summary* for coordination of Owner's separate contracts, and limits on use of Project site.
 - 2. *Section 01 33 00 – Submittal Procedures* for submitting surveys.
 - 3. *Section 01 77 00 – Closeout Procedures* for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 PREINSTALLATION MEETINGS

- A. Layout Conference: Conduct conference at Project site.
 - 1. Prior to establishing layout of new perimeter and structural column grid(s), review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:
 - a. Contractor's superintendent.
 - b. Professional surveyor responsible for performing Project surveying and layout.
 - c. Professional surveyor responsible for performing site survey serving as basis for Project design.

2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
3. Review requirements for including layouts on Shop Drawings and other submittals.
4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Professional Engineer Qualifications: Refer to *Section 01 40 00 – Quality Requirements*.
- C. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Plumbing piping systems.
 - f. Mechanical systems piping and ducts.
 - g. Control systems.
 - h. Communication systems.
 - i. Fire-detection and -alarm systems.
 - j. Conveying systems.
 - k. Electrical wiring systems.
 - l. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.
- C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in *Section 01 31 00 – Project Management and Coordination*.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect promptly.
- B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points

- promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb, and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.

- D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts,

and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

3.6 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of Work to be cut.

- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in *Section 01 10 00 – Summary*.
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall

coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in *Section 01 74 19 – Construction Waste Management and Disposal*.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in *Section 01 40 00 – Quality Requirements*.
- E. Refer to each individual specification and *Section 01 65 50 – Starting and Placing Equipment in Operation* for specific requirements.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Restore permanent facilities used during construction to their specified condition.
- D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

SECTION 01 73 29 – CUTTING AND PATCHING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to work of this Section.

- 1. Each Bid Package is responsible for their own cutting and patching.

1.2 CUTTING AND PATCHING

- A. Definition: "Cutting and Patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.

- 1. "Cutting and patching" is performed for the coordination of the Work, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.
 - 2. Cutting performed during the manufacture of products, or during the initial fabrication, erection or installation process is not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations is also not considered to be "cutting and patching".
 - 3. "Demolition" and "Selective Demolition" are recognized as related - but - separate categories of work, which may or may not require cutting and patching as defined in this Section; refer to "Demolition" and "Selective Demolition" Sections of Division 2.

- B. Refer to other Sections of these Specifications for specific cutting and patching requirements and limitations applicable to individual units of work.

- 1. Unless otherwise specified, requirements of this Section apply to mechanical and electrical work. Refer to fire suppression, plumbing, heating, ventilating, air conditioning, electrical, communications, and electronic safety/security specifications for additional requirements and limitations on cutting and patching of mechanical and electrical work.

1.3 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural work in a manner that would result in a reduction of load-carrying capacity or of load-deflection ratio.
- B. Before cutting and patching the following categories of work, obtain the Architect/Engineer's approval to proceed with cutting and patching as described in the procedural proposal for cutting and patching:

- 1. Structural steel

2. Miscellaneous structural metals, including lintels, equipment supports, stair systems and similar categories of work
 3. Structural concrete
 4. Foundation construction
 5. Timber and primary wood framing
 6. Bearing and retaining walls
 7. Structural decking
 8. Piping, ductwork, vessels and equipment
 9. Structural systems of special construction, as specified by Division-13 Sections
- C. Operational and Safety Limitations: Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity to perform in the manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life or decreased safety.
- D. Before cutting and patching the following elements of work, and similar work elements here directed, obtain the Architect/Engineer's approval to proceed with cutting and patching as proposed in the proposal for cutting and patching.
- E. Visual Requirements: Do not cut and patch work exposed on the building's exterior or in its occupied spaces, in a manner that would, in the Architect/Engineer's opinion result in lessening the building's aesthetic qualities. Do not cut and patch work in a manner that would result in substantial visual evidence of cut and patch work. Remove and replace work judged by the Architect/Engineer to be cut and patched in a visually unsatisfactory manner.

1.4 SUBMITTALS

- A. Procedural Proposal for Cutting and Patching: Where prior approval of cutting and patching is required, submit proposed procedures for this work well in advance of the time work will be performed and request approval to proceed. Include the following information, as applicable, in the submittal:
1. Describe nature of the work and how it is to be performed, indicating why cutting and patching cannot be avoided. Describe anticipated results of the work in terms of changes to existing work, including structural, operational and visual changes as well as other significant elements.
 2. List products to be used and firms that will perform work.
 3. Give dates when work is expected to be performed.
 4. List utilities that will be disturbed or otherwise affected by work, including those that will be relocated and those that will be out of service temporarily. Indicate how long utility service will be disrupted.
 5. Where cutting and patching of structural work involves the addition of reinforcement, submit details and engineering calculations to show how that reinforcement is integrated with original structure to satisfy requirements.

6. Approval by the Architect/Engineer to proceed with cutting and patching of work does not waive the Architect/Engineer's right to later require complete removal and replacement of work found to be cut and patched in an unsatisfactory manner.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. General: Except as otherwise indicated, or as directed by Architect/Engineer, use materials for cutting and patching that are identical to existing materials. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal or better performance characteristics.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Before cutting, examine the surfaces to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

3.2 PREPARATION

- A. Temporary Support: To prevent failure, provide temporary support of work to be cut.
- B. Protection: Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the Project that may be exposed during cutting and patching operations.
 1. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- C. Take precautions not to cut existing pipe, conduit or duct serving the building but scheduled to be relocated until provisions have been made to bypass them.
- D. Scanning is required for cutting existing slabs, cast-in-place walls, and masonry.

3.3 PERFORMANCES

- A. General: Employ skilled workmen to perform cutting and patching work. Except as otherwise indicated or as approved by the Architect/Engineer, proceed with cutting and patching at the earliest feasible time and complete work without delay.
- B. Cutting: Cut the work using methods that are least likely to damage Work to be retained or adjoining Work. Where possible, review proposed procedures with the original installer; comply with original installer's recommendations.
 1. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and

masonry using a cutting machine such as a carborundum saw or core drill to ensure a neat hole. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

2. Comply with requirements of applicable Section of Division 2 where cutting and patching is required in excavating and backfilling.
 3. Bypass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated, or abandoned. Cut-off conduit and piping in wall or partitions to be removed. After bypass and cutting, cap, valve or plug and seal tight remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.
- C. Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.
1. Where feasible, inspect and test patched areas to demonstrate integrity of work.
 2. Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.
 3. Where removal of walls or partitions extends from one finished area into another finished area, patch and repair floor and wall surfaces in the new space to provide an even surface or uniform color and appearance. If necessary to achieve uniform color and appearance, remove existing floor and wall coverings and replace with new materials.
 - a. Where patch occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing patch after patched area has received prime and base coat.
- D. Plaster installation: Comply with manufacturer's instructions and install thickness and coats as indicated.
1. Unless otherwise indicated, provide 3-coat work.
 2. Finish gypsum plaster with smooth-troweled finish.
 3. Cut, patch, point and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections.

3.4 CLEANING

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

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CUTTING AND PATCHING

END OF SECTION

SECTION 01 74 11 – PROJECT SAFETY

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to work of this Section.

1.02 PURPOSE

- A. The purpose of this Section is to define and emphasize the responsibilities of each Contractor to keep the project safe and healthful for everyone.

1.03 PREQUALIFICATION

- A. Each Contractor is required to be on the approved Contractor's list and must submit the Contract Firm Safety Pre-Qualification Information Request Form found in the Appendix section.
- B. To qualify to perform on-site work for this Project, a Contractor must provide the following information and documentation.
 - 1. Provide their written Company Safety Program that meets all minimum legislated requirements applicable to work.
 - 2. Provide a letter from insurance carrier stating the company's previous three years' Experience Modification Rating report. If you do not have an EMR, submit a letter from your insurance carrier stating the reason an E.M.R. is not available. Expectation for EMR rating is 1.0 or less.
 - 3. Provide copies of your corporate OSHA 300 logs from the previous three years. If OSHA does not require you to keep an injury/illness log you must submit a Loss Run History report from your insurance carrier.
 - 4. Agree that any Subcontractors utilized will meet the requirements listed above.
 - 5. Provide Certificate of Insurance listing Rose-Hulman Institute of Technology as additional insured.

1.04 SAFETY REQUIREMENTS

- A. Each Contractor is responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of their work including:
 - 1. Protection of their employees and those around them that may be affect by their work.
 - 2. Providing and maintaining an up-to-date HAZCOM and Safety Plan on file with the Safety Director. No Contractor may mobilize or work on the site without said plan on file. MSDS must be kept current for materials utilized on the job site.
 - 3. Contractors are responsible for their own emergency plans.

4. Identifying and notifying the Site Superintendent of hazards whether a result of their operations or operations affecting or may affect their employees on project.
5. Each Contractor will employ and identify a “competent person” as defined by OSHA for each of its operations in accordance with IOSHA regulations.
 - a. Competent person shall make frequent and regular inspections of site, materials, and equipment.
 - b. Identify existing and foreseeable hazards and take corrective action.
 - c. Conduct Daily Safety Huddles and Weekly Toolbox Talks.
6. All Contractors shall be responsible for meeting all IOSHA requirements in the performance of their Work.
7. All Contractors employees shall adhere to substance abuse testing requirements.
8. All onsite personnel (managers, tradesmen, delivery drivers, inspectors, visitors, etc.) will be required to wear full personal protective equipment (PPE) while onsite. This shall include a hardhat, steel toe safety shoes, high visibility upper garment and eye protection. This will be the minimum Project standard for personnel safety protection. Violators will be removed from the jobsite.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 SAFETY DOCUMENTATION

- A. The following safety related documents shall be stored and maintained at the project site until the end of the project and upon completion of the project turned over to Construction Manager
 1. Contractors Safety Plan
 2. Contractors Site Safety Plan
 3. Pre-Task Plans
 4. Completed Site Inspections
 5. Completed Accident/Incident and Near Miss Reports
 6. Safety Warning Violations
 7. All safety related worksheets, logs, and permits
 8. Property Damage Reports

3.02 PROJECT SAFETY ENFORCEMENT

- A. Reckless endangerment of oneself or others/willful destruction of property is cause for immediate termination.
- B. Disciplinary procedures for other violations or hazards:
 - 1. First Violation: Verbal and Written warning.
 - 2. Second Violation: Written warning and 1-3-day suspension without pay, pending severity of infraction.
 - 3. Third Violation: Immediate termination with written documentation to be kept on file.

END OF SECTION

SECTION 01 74 13 – HOUSEKEEPING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to work of this Section.

1.2 PURPOSE

- A. The purpose of this Section is to define and emphasize the responsibilities of the Construction Manager and each Subcontractor to keep the work site orderly, clean and safe for everyone.

1.3 HOUSEKEEPING REQUIREMENTS

- A. Each Subcontractor shall execute housekeeping to keep their Work, the site, and adjacent properties free from accumulations of construction operations and as follows:
 - 1. Clean up all waste materials, rubbish and debris resulting from their own operations at such frequencies as required by the Construction Manager, but as a minimum daily.
 - 2. Place waste materials, rubbish and debris in trash carts and deliver trash carts outside the building to rubbish containers, as provided under Section 015260.
 - 3. Organize and secure materials, equipment, offices in assigned areas. Maintain administrative areas in an orderly fashion and relocate as necessary to facilitate the sequence of construction.
 - 4. Repair, patch, and touch up marred surfaces to match adjacent finishes damaged by their own operations.
 - 5. Leave all work areas in a "broom clean" condition at the completion of their work for the day. Each subcontractor is responsible for providing broom(s), dump carts, and necessary cleaning equipment (including sweeping compound).
 - 6. Participate in joint clean up as directed by the Construction Manager, the duration of which shall be at the sole discretion of the Construction Manager.
 - a. Each Subcontractor working on this project will provide 4-man hours for each 200 manhours expended per week or fraction thereof. This labor is to be dedicated to indefinable cleanup under the supervision of the Construction Manager.
 - 7. Utilized established break areas and ensure employees and Subcontractors do not bring food or drink into the work area.
 - 8. Enforce no smoking, no vaping and no tobacco use policies.
- B. Construction Manager shall be responsible for the following items:
 - 1. Assign locations of and responsibility for site operations and logistics to include parking, storage, project offices, break areas, rubbish containment facilities and other administrative project requirements.
 - 2. Oversee cleaning and ensure the building and grounds are maintained free from accumulations of waste materials, rubbish, and debris.

- C. Each Subcontractor is financially responsible for their own housekeeping operations. Clean-up must be timely as well as thorough to meet safety regulations and permit other Subcontractors to perform without hindrance from dirt and debris. Failure to perform daily cleaning to the Construction Manager's satisfaction or a tardy response to the request will result in a \$500/day fine.
- D. The cost of this work shall be included in the Subcontractor's Bid and must appear as a line item on the "Schedule of Values".

PART 2 – PRODUCTS

2.1 HOUSEKEEPING MATERIALS

- A. Use cleaning materials only on surfaces recommended by product manufacturer.
- B. Use only those cleaning materials which will not create hazards to health or property, and which will not damage surfaces.
- C. Each Subcontractor shall provide their own cleaning materials and equipment.
- D. Ensure that current Material Safety Data Sheets are on file in the HAZCOM and Safety Plan in the Construction Manager's Office.

PART 3 – EXECUTION

3.1 HOUSEKEEPING REQUIREMENTS DURING CONSTRUCTION

- A. Execute cleaning to ensure that building, grounds, public and adjacent properties are maintained free from accumulations of waste materials and rubbish.
- B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- C. Daily during progress of Work, clean site and public properties and deliver waste materials, debris, and rubbish to dumpster.
- D. Leave no trash or debris in the building or uncontained on the site overnight.
- E. Remove debris from concealed spaces before enclosing the space.
- F. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- G. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces or affect the HVAC systems.
- H. Place no new work on dirty surfaces.
- I. Store volatile wastes in covered metal containers and remove from premises daily.
- J. Prevent accumulation of wastes which create hazardous conditions.

- K. Provide adequate ventilation during use of volatile or noxious substances.
- L. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on Project site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.
- M. Clean exposed surfaces and protect as necessary to maintain them free from damage and deterioration through Substantial Completion.

END OF SECTION

SECTION 01 74 23 – FINAL CLEANING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to work of this Section.

1.2 SAFETY REQUIREMENTS

- A. Hazards Control.
 - 1. Store volatile wastes in covered metal containers and remove from premises daily.
 - 2. Prevent accumulation of wastes, which create hazardous conditions.
 - 3. Provide adequate ventilation during use of volatile or noxious substances.
- B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on Project site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.
- C. Use only those cleaning materials which will not create hazards to health or property, and which will not damage surfaces.
- D. Ensure that current Material Safety Data Sheets are on file in the HAZCOM and Safety Plan in the Construction Manager's Office.

PART 3 – EXECUTION

3.1 DURING CONSTRUCTION FINAL CLEANING

- A. Employ professional cleaners for final cleaning.

- B. In preparation for substantial completion or occupancy, conduct final inspection of interior and exterior surfaces and of concealed spaces.
- C. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from interior and exterior finished surfaces, both new and existing construction. Clean all surfaces exposed to the accumulation of dirt, dust or debris whether or not easily with-in sight.
- D. Power wash concrete and asphalt paving.
- E. Clean all areas of glass.
- F. Broom clean paved surfaces; rake clean other surfaces of grounds.
- G. Maintain cleaning until Project, or portion thereof, is accepted by the Construction Manager.
- H. Immediately bring to the attention of the Construction Manager any items requiring repair that are discovered during the process of final cleaning.
- I. When final cleaning involves use of volatile or noxious products and there exists a possibility of fumes entering adjacent occupied areas, coordinate with Owner, through the Construction Manager, for additional ventilation requirements or a more acceptable time, including off hours, to perform the work.

END OF SECTION

SECTION 01 77 00 – CONTRACT CLOSEOUT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and 01 Specification Sections, apply to work of this Section.
- B. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.
- C. Refer to the amended General Conditions of the Contract for Substantial Completion and final payment.
- D. Specification *Section 013300 – Submittal Procedures*.

1.2 SUMMARY

- A. Closeout is one of the most important aspects of the project. Preparation for Closeout starts from the beginning of the project and includes all the activities for final acceptance, final payment, normal termination of contract, occupancy by Owner, and similar actions evidencing completion of the Work. Specific requirements for individual units of Work are specified in the contract documents. Time of closeout is directly related to “Substantial Completion.”
- B. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
 - 1. Prerequisites to substantial completion
 - 2. Prerequisites to final payment
 - 3. Punch list
 - 4. Correction of Work period
 - 5. Project record documents
 - 6. Certification of code compliance
 - 7. Operation and maintenance manuals
 - 8. Instructions for the Owner’s personnel
- C. All closeout documentation shall be submitted electronically. Each electronic submittal transmittal shall include the following information:
 - 1. Date submitted.
 - 2. Project title and number.
 - 3. Contractor’s name and address.
 - 4. Identification by Specification Section and quantity submitted for each submittal including name of Contractors, manufacturer, or supplier.
 - 5. Notification of deviations from the Contract Documents for each submittal.

1.3 PREREQUISITES TO SUBSTANTIAL COMPLETION

- A. General: Prior to requesting Construction Manager inspection for certification of Substantial Completion (for either entire Work or portions thereof), complete the following and list known exceptions in request:
1. In the Application for Payment that coincides with, or first follows the date Substantial Completion is claimed, show 100 percent completion for the Work claimed as substantially complete.
 - a. Include supporting documentation for completion as indicated in those Contract Documents and a statement showing an accounting for changes to the Contract sum.
 - b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 2. Advise Owner of pending insurance changeover requirements.
 3. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, agreements, final certifications, and similar documents.
 4. Obtain and submit releases enabling Owner's full and unrestricted use of the Work and access to services and utilities, including occupancy permits, operating certificates, and similar releases.
 5. Submit record drawings, maintenance, operating instructions, and similar final record information.
 6. Deliver tools, spare parts, extra stocks of materials, and similar physical items to Owner. Complete receipt for extra stock form, at the end of this Section.
 7. Make final changeover of locks and transmit keys to Construction Manager and advise Owner's personnel of changeover in security provisions.
 8. Complete start-up testing of systems and instructions of Owner's operating/maintenance personnel. Discontinue and remove from project site temporary facilities and services, along with construction tools, mock-ups, and similar elements.
 9. Complete final cleaning-up requirements.
 10. Touch up and otherwise repair and restore marred, exposed finishes.
 11. Perform demonstration and training as required by specific specification. Documentation indicating Owner's participants shall serve as verification of training.
- B. Inspection Procedures: On receipt of a request for inspection, the Construction Manager will either proceed with inspection or advise the Contractor of unfulfilled requirements. The Construction Manager will prepare the Certificate of Substantial Completion following

inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Construction Manager will repeat inspection when requested and assure that the work is substantially complete.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 PREREQUISITES TO FINAL PAYMENT

A. General: Prior to requesting Construction Manager final inspection for certification of final payment, complete the following:

1. Submit final payment request, with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and complete operations where required.
2. Submit copy of Construction Manager final punch list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance.
3. Submit record drawings, maintenance manuals, and similar final record information.
4. Certification of code compliance for Mechanical, Plumbing and Electrical work.
5. Submit certification stating that no materials containing asbestos were incorporated into the work.
6. Plumbing Contractor shall submit certification stating that no flux or solder used for drinking water piping contained more than 0.2 percent lead, and that no pipe or fittings used for drinking water piping contained more than 8.0 percent lead.
7. Firestopping Contractor's letter of certification stating that all Firestopping systems have been installed in accordance with the Contract Documents.
8. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion of when the Owner took possession of and assumed responsibility for corresponding elements of the work.
9. Submit consent of surety to final payment.
10. Submit evidence of final, continuing coverage complying with insurance requirements.
11. Submit a final liquidated damages settlement statement, if applicable. Final unconditional waiver of liens, prepared on AIA Documents G706, G706A, and Consent of Surety G707.

- B. Re-inspection Procedure: The Construction Manager will re-inspect the work upon receipt of notice that the work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Construction Manager.
 - 1. Upon completion of re-inspection, the Construction Manager will prepare a certificate of final acceptance. If the work is incomplete, the Construction Manager will advise the Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PUNCH LIST

- A. Prior to the Construction Manager's preparation of a Project Punch List, Construction Manager shall prepare a Work Completion List for use by Contractors and Contractors to facilitate completion of the Work.
- B. The Construction Manager's inspection shall be as thorough as possible, in accordance with their desire to provide first-class workmanship.
- C. After receipt of the Construction Manager's Work Completion List, the Contractors shall bring their work to 100% completion or list those items they cannot complete to 100% with the reasons why and inform the Construction Manager they are ready for final inspection.
- D. Construction Manager shall observe the Work and prepare the Project Punch List for use by the Construction Manager, Contractors, and their Contractors to expedite proper completion of the Work.
- E. Contractors will designate one or more individuals as required to complete the listed items within the specified time limits herein. This individual will be specifically assigned to the completion and correction of punch list items and have no other assignments. This individual will report to the Construction Managers designated Punch List Supervisor daily to report progress and removal of punch list items.
- F. The time fixed by the Architect and Construction Manager for the completion of all items referenced on the Certificate of Substantial Completion shall not be greater than 21 days. The Contractor shall complete items on the list within such 21-day period. The Contractor shall begin completion and correction activities within 7 days of receipt of the lists and complete all activities within the 21-day period specified. If the Contractor fails to do so, the Owner in its discretion may perform the Work by itself or others and the cost thereof shall be charged against the Contractor. If more than one inspection by the Construction Manager for the purpose of evaluating corrected work for a Contractor is required by the subject list of items to be completed or corrected, it will be performed at the Contractor's expense.
- G. At the time the Construction Manager commences the Substantial Completion Inspection, if the Construction Manager discovers excessive additional items requiring completion or

correction, the Construction Manager may decline to continue the inspection, instructing the Contractor as to the general classification of deficiencies which must be corrected before the Construction Manager will resume the Substantial Completion Inspection. If the Contractor fails to pursue the Work to make it ready for Substantial Completion Inspection in a timely fashion, the Construction Manager shall, after notifying the Contractor, conduct inspections and develop a list of items to be completed or corrected. This list of items shall be furnished to the Contractor who shall proceed to correct such items within 21 days. The Architect will conduct additional inspections as required to determine that the Work is ready for Substantial Completion Inspection.

- H. The Contractor shall reimburse the Construction Manager from the amounts due the Contractor under the Contract Documents for (1) the cost of inspections between the termination of the initial Substantial Completion Inspection and the commencement of the satisfactory Substantial Completion Inspection, (2) The cost of inspection or review after the 21 day period established for the completion of the list by the Contractor.
- I. Contractors will continue to attend progress meetings with the Owner, Architect and Construction Manager until they are 100% complete with their contract.
- J. Contractors failing to actively participate in the correction of the punch list delaying the close out of the project beyond the 21-day period will also reimburse the Construction Manager for additional time of the Construction Manager required to facilitate the closeout of the Project.

3.2 CORRECTION OF WORK PERIOD (WARRANTY)

- A. Prior to the expiration of the one-year correction of work period (warranty), the Architect and Construction Manager will check to see if additional Work by the Contractor(s) is needed to make good on the warranties. An itemized list will be furnished to the Contractor for corrective or replacement work.
- B. This Work shall be completed immediately by the Contractor(s) after receiving notification.

3.3 PROJECT RECORD DOCUMENTS

- A. Project Record Documents include drawings, project manual, product data, and samples.
- B. Each Contractor shall update "Project Record Drawings" on separate blue or black line prints set-aside especially for this purpose on the job. Drawings shall incorporate changes made in the Work of the respective trades during the construction period. Such changes shall be indicated at the time they occur.
 - 1. Accurately record information in an understandable drawing technique.
 - 2. Record data as soon as possible after obtaining it. Record and check markup prior to enclosing concealed installations.
- C. The Construction Manager shall maintain at the jobsite one copy of Drawings, Project Manual, addenda, final shop drawings, change orders, field orders, other contract

modifications, and other documents submitted by the Contractor, in compliance with various Sections of the Project Manual.

- D. Project Record Drawings shall be clearly marked "Project Record Document", maintained in good condition; available for observation by the Architect; and shall not be used for construction purposes. Mark these drawings to show the actual installation where the installation varies from the installation shown originally. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Items required to be marked include, but are not limited to, the following:
1. Dimensional changes to the Drawings.
 2. Significant detail not shown in the original Contract Documents including Change Orders or Construction Change Directives.
 3. The location of underground utilities and appurtenances dimensionally referenced to permanent surface improvements.
 4. The location of internal utilities and appurtenances concealed in building structures, referenced to visible and accessible features of the structures.
 5. When elements are placed exactly as shown on Drawings, so indicate; otherwise show changed location.
 6. Revisions to details shown on the Drawings.
 7. Depths of foundations below the first floor.
 8. Revisions to routing of piping and conduits.
 9. Revisions to electrical circuiting.
 10. Actual equipment locations.
 11. Duct size and routing.
 12. Changes made following the Architect's written orders.
 13. Details not on original Contract Drawings.
 14. Charts and locations of concealed work.
 - a. The plumbing and HVAC Contractors shall prepare a suitable chart identifying and locating each concealed control or other concealed item requiring repair, adjustment, and maintenance. Charts shall be mounted in suitable frames with glass covers secured to wall where directed.
 - b. Charts shall list each item, together with its function, item number, and location.

- c. Locations throughout the building shall be identified on the wall or ceiling by permanent non-obstructive plates, labels, or other approved means secured in a permanent manner.
 - d. Chart details, identification methods, locations, and methods of attachment shall be as approved by the Architect's representative at the jobsite upon full submission of proposed procedures and proper execution of same.
- E. Keep project record documents current. Do not permanently conceal work until the required information has been recorded. Mark record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where shop drawings are marked, show cross reference on Contract Drawings location.
 - 1. Mark record sets with red, or color that may be photo copied, erasable colored pencil. Use other colors (no blue) to distinguish between changes for different categories of the work at the same location.
 - 2. Note Construction Change Directive numbers, alternate numbers, change order numbers, and similar identification.
- F. During the construction period, maintain one copy of the Project Manual, including addenda and modifications issued, for Project Record Documents purposes.
 - 1. Mark the Specifications to indicate the actual installation where the Installation varies from that indicated in Specifications and modifications issued. Note related project record drawings information, where applicable. Give particular attention to substitutions, selection of product options, and information on concealed installations that would be difficult to identify or measure and record later.
- G. Record Sample Submittal: Immediately prior to date of Substantial Completion, meet with the Architect and Owner's personnel at the site to determine which of the samples maintained during the construction period shall be transmitted to the Owner for record purposes. Comply with the Architect's instructions for packaging, identification marking, and delivery to the Owner's samples storage space. Dispose of other samples in a manner specified for disposing samples and waste materials.
- H. Monthly record on the Construction Manager's "Project Record Documents" changes made to the Contract Documents.
 - 1. Title sheets shall be labeled "Project Record," dated, and signed by the Contractor(s).
 - 2. The Construction Manager's record drawings will be submitted to the Owner.
- I. Prior to final completion the Contractors for Mechanical, Plumbing, Fire Protection and Electrical Work shall update their working drawings with changes made in his Work. Contractors will submit record drawings as agreed upon with the Owner, Architect, and Construction Manager, and/or as required elsewhere in the Contract Documents.

1. Each drawing shall be labeled "Project-Record," dated and signed by the Contractor.

3.4 CERTIFICATION OF CODE COMPLIANCE

- A. Prior to final payment the Contractors indicated below shall submit through the Construction Manager to the Architect (in duplicate) letters of certification of code compliance as follows:
 1. The Contractor(s) for Mechanical and Plumbing Work shall submit letter certifying mechanical installations comply with UMC current applicable editions.
 2. The Contractor(s) for Electrical Work shall submit letters certifying that electrical wiring complies with NEC current applicable editions.
 3. The Contractor(s) for Electrical Work shall submit letters certifying that alarm systems, smoke and heat detection systems comply with Chapter 31 (Regulations No. 7) of UBC, current applicable edition, as supplemented by NFPA Standards 72A, B, C, D, and E.

3.5 MAINTENANCE AND OPERATING INFORMATION

- A. The Contractors shall submit Maintenance and Operating Information presenting complete directions and recommendations for the proper care and maintenance of visible surfaces as well as maintenance and operating instructions for equipment items which he has provided.
 1. If the project is being constructed in Phases, Maintenance and Operating Information shall be submitted for each Phase of Work.
 2. Operations and Maintenance information will be submitted as part of the submittal process in accordance with requirements of the submittal process.
- B. Operating instructions shall include necessary printed directions for correct operations, adjustment, servicing, and maintenance of movable parts. Also included shall be suitable parts lists, diagrams showing parts location and assembly, information specified in individual Specification Sections and the following:
 1. Emergency Instructions.
 2. Wiring diagrams.
 3. Recommended maintenance procedures and turnaround times. Mechanical contractors will submit a comprehensive periodic maintenance, filters, belts and consumables matrix for all major Mechanical components. Matrix should depict equipment, recommended service intervals, filters, belts or other consumable products required in the periodic maintenance. Matrix should include quantity and part numbers of filters, belts and other consumables required for each piece of equipment and for each periodic maintenance time period.
 4. Inspection and system test procedures.

5. Precautions against improper maintenance and exposure.
- C. For each titled item or work portion the contractor submits, the O&M information shall include:
1. The names, addresses, and phone number of the following parties:
 - a. Contractor/Installer
 - b. Manufacturer
 - c. Nearest dealer/supplier
 - d. Nearest agency capable of supplying parts and service
 2. Label each item with the following information:
 - a. Project name and address
 - b. Specification Section and Title
 - c. Name of specific component or item
 - d. Owner's name
 - e. Name and address of Architect
 - f. Name and address of Construction Manager
 - g. Name and address of Contractor
 - h. Date of submission

3.6 WARRANTY, GUARANTEES, CERTIFICATIONS, RECIEPTS AND VERIFICATIONS

- A. Prior to Substantial Completion the contractors shall submit the following:
1. All warranties for the contractor's scope of work, including 1-year comprehensive parts and labor, special and long-term manufacturers warranties or guarantees as provided for in the project specifications.
 2. Certificates of Code Compliance for Plumbing, Mechanical, Electrical and Fire Protection Systems
 3. Firestopping Sealant Certifications
 4. Receipts for Extra Stock
 5. Verification of Owner Training
 6. Certificate of Occupancy (if applicable)
 7. Other information as required by the Owner, Architect or Construction Manager

3.7 INSTRUCTIONS FOR THE OWNER'S PERSONNEL

- A. Arrange for each Installer of equipment that requires regular maintenance and noted in technical sections, to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if

Installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:

1. Maintenance manuals
2. Record documents
3. Spare parts and materials
4. Tools
5. Lubricants
6. Fuels
7. Identification systems
8. Control sequences
9. Hazards
10. Cleaning
11. Warranties and bonds
12. Maintenance agreements and similar continuing commitments

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

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

C. Each contractor shall provide video record of all in-service training and maintenance demonstrations provided to the Owner. Submit to the Construction Manager electronic files for all such training.

END OF SECTION

DIVISION 3 - CONCRETE

SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents.
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

- D. Preinstallation Conference: Conduct conference at Project site, at least two weeks prior to concrete placement.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 - e. Finish flooring subcontractor(s).
 - 2. Review testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 1064 plain, fabricated from as-drawn steel wire into flat sheets.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I, gray. Supplement with the following:
 - a. Liquid Fly Ash (E5): ASTM C 494, Type S
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- B. Water: ASTM C 94 and potable.

2.4 ADMIXTURES

- A Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494, Type A.
 - 2. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 - 3. Plasticizing and Retarding Admixture: ASTM C 1017 Type II.
 - 4. E5 Internal Cure: ASTM C 494. Type S

2.5 VAPOR BARRIERS

- A. Sheet Vapor Barrier: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape. Minimum 15-mil thickness. Maximum 0.01 perms.

2.6 FIBER REINFORCEMENT

- A. Synthetic Micro-Fiber: fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III. Do not use fiber reinforcing in slabs scheduled to receive polished concrete finish.

2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.

- E. Curing:
 - 1. Internal Curing Compound: E5 Internal Cure, 4 fl. oz. per 100 lbs. of cementitious material.

2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips.

2.9 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Admixtures at Other Concrete: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 - 4. E5 Internal Cure, 4 fl. Oz. per 100 lbs. of cementitious material.
- C. Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength at 28 Days: As indicated on Drawings.
 - 2. Maximum Water-Cementitious Materials Ratio: As indicated on Drawings.
 - 3. Slump Limit: As indicated on Drawings.
 - 4. Air Content: As indicated on Drawings.
 - 5. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.5 lb/cu. yd.

2.10 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116 and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

2.13 LIQUID FLOOR TREATMENT

- A. Liquid Floor Treatment: Biodegradable micro grout that makes troweling smooth by reducing drag, and creates a denser, less permeable surface for resistance to liquid penetration and staining.
 - 1. Products:
 - a. Basis of design: E5 Catalyst, by Specification Products.
 - 2. Coverage: 800 – 1,000 sf/gal.

2.14 SEALERS

- A. Densifier: Environmentally friendly densifier that deeply penetrates and chemically reacts with concrete to evacuate existing contaminants and slows future penetration of chlorides, greases, oils and acids.
 - 1. Products:
 - a. Basis of design: E5 Protect, by Specification Products.
 - 2. Coverage: 2,000 sf/gal

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete where exposed.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.
- D. Avoid placing concrete if rain, snow, or frost is forecast within 24 hours. Protect fresh concrete from moisture and freezing.
- E. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendations.
- F. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- G. Cold-Weather Placement: Comply with ACI 306.1.
- H. Hot-Weather Placement: Comply with ACI 301.

3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 - 1. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.7 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces to receive trowel finish and non-slip broom finishes.
- C. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.
 2. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155 for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness F(L) 17; for slabs-on-grade.
 - b. Specified overall values of flatness, F(F) 30; and levelness, F(L) N.A.; with minimum local values of flatness, F(F) 24; and levelness, F(L) N.A.; for suspended slabs.
- E. Broom Finish: Apply a broom finish to exterior concrete stage floor, platforms, steps, ramps, and elsewhere as indicated. Coordinate finish of exterior walks, stoops, pavements, etc. with the Civil Drawings and Specifications.

3.8 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Curing Compounds: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION

SECTION 03 35 00 - CONCRETE SURFACE TREATMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes the following:
 - 1. Penetrating Liquid Floor Treatment (Concrete Sealer).

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Floor and slab treatments.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete Work 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. Manufacturer Qualifications: A firm experienced in manufacturing concrete surface treatment products and complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- C. Source Limitations: Obtain each type of material of the same brand from the same manufacturer.
- D. Mockups: Cast concrete slab-on-grade panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
 - 1. Build panel approximately 200 sq. ft. (18.6 sq. m) for slab-on-grade in the location indicated or, if not indicated, as directed by Architect.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.01 LIQUID FLOOR TREATMENTS

- A. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ChemMasters; Chemisil Plus.
 - b. ChemTec Int'l; ChemTec One.
 - c. Conspec by Dayton Superior; Intraseal.
 - d. Curecrete Distribution Inc.; Ashford Formula.
 - e. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
 - f. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
 - g. L&M Construction Chemicals, Inc.; Seal Hard.
 - h. Meadows, W. R., Inc.; LIQUI-HARD.
 - i. Nox-Crete Products Group; Duro-Nox.
 - j. Vexcon Chemicals, Inc.; Vexcon StarSeal PS Clear.
 - k. ProSoCo, Consolideck.

PART 3 - EXECUTION

3.01 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

3.02 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - 2. Do not apply to concrete that is less than 28 days' old.
 - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

3.03 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

DIVISION 4 - MASONRY

SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

1. Structural brick.
2. Stone trim units.
3. Mortar and grout.
4. Steel reinforcing bars.
5. Masonry joint reinforcement.
6. Ties and anchors.
7. Embedded flashing.
8. Miscellaneous masonry accessories.

B. Coordination:

1. Installation of all types masonry and accessories on the Project to be as specified in this section.

1.03 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.04 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

1. Clay Masonry Unit Test: For each type of unit required, according to ASTM C 67 for compressive strength.
2. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.
3. Mortar Test (Property Specification): For each mix required, according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
4. Mortar Test (Property Specification): For each mix required, according to ASTM C 780 for compressive strength.
5. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
 - 3. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
 - 4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Verification: For each type and color of the following:
 - 1. Decorative CMUs.
 - 2. Face brick, in the form of straps of five or more bricks.
 - a. Provide specified size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
 - 3. All special brick shapes.
 - 4. Stone Trim: Stone trim samples not less than 12 inches in length, showing the full range of colors and textures expected in the finished construction.
 - 5. Weep holes and vents in color to match mortar color.
 - 6. Accessories embedded in masonry.
- D. UL Assemblies: Provide assembly numbers designations from UL's "Fire Resistance Directory" and associated information for each wall type where masonry is used in a rated assembly.
- E. Fire-resistance requirements, including determination by testing or equivalent thickness

1.06 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing 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 identify materials used. Include mix proportions for mortar and grout and source of aggregates.
 - 1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Qualification Data: For testing agency.
- C. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
 - 1. Masonry units.

- a. Include data on material properties or material test reports substantiating compliance with requirements.
 - b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - c. For exposed brick, include test report for efflorescence according to ASTM C 67.
2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Joint reinforcement.
6. Anchors, ties, and metal accessories.
- D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.07 QUALITY ASSURANCE

- A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
 1. Comply with National Concrete Masonry Association (NCMA) TEK recommendations, as applicable, for installation of concrete unit masonry.
 2. Comply With Brick Industry of America (BIA) Technical Notes of Brick Construction recommendations, as applicable, for installation of brick unit masonry.
 3. Meet more stringent requirements of standards above where conditions common to both occur.
- B. Efflorescence Test: Prior to commencement, supplier is to take 5 test bricks from actual materials on site and perform an ASTM C216 efflorescence test.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source, single manufacturer, and preferred single run for each product required.

- E. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Locate mockups in the location as directed by Architect and Construction Manager.
 - 2. Build mockups for typical exterior wall, unless noted otherwise on Drawings, in sizes approximately 48 inches (1200 mm) long by 48 inches (1200 mm) high by full thickness, including face and backup wythes and all accessories.
 - 3. If not to match existing, have mockup face south.
 - 4. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
 - 5. Protect accepted mockups from the elements with weather-resistant membrane.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 7. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
 - b. 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.
 - c. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.09 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls and hold cover securely in place.
 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three 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-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
1. Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
 2. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.01 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 or in compliance with UL 618, Concrete Masonry Units. by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

1. Equivalent thickness shall be determined in accordance with ACI 216 and NCMA Tek 7-1A.

2.02 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 2. Provide bullnose units for outside corners unless otherwise indicated.
 3. Provide bullnose units at cased openings and at hollow metal framed openings not scheduled to receive wrap-around frames.
- B. Concrete Masonry Units: ASTM C 90.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi (14.8 MPa) unless otherwise indicated.
 2. Density Classification: Normal weight.
 3. Size: Indicated nominal width by nominal 16 inches long by nominal 8 inches high.
 - a. Actual dimensions 3/8 inch less than nominal, +/- 1/8 inch.
 4. Where units are to be left exposed, provide color and texture matching the range represented by Architect's sample.
 5. Provide manufactured bullnose corners, no field machined bullnose corners will be accepted.
- C. Decorative CMUs: ASTM C 90.
1. Basis of Design Product: The Maso Company Masolite
 2. Acceptable Manufacturers: Subject to compliance with requirements, provide one of the following:
 - a. The Maso Companies, Masolite.
 - b. Northfield, an Oldcastle Company. Echelon Mesastone
 - c. Architect approved equivalent
 3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi (14.8 MPa).
 4. Density Classification: Normal weight.
 5. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
 6. Pattern and Texture: Ground-face finish.
 7. Colors: Architect to select from manufacturer's full range.

2.03 CONCRETE AND MASONRY LINTELS

- A. General: Unless noted otherwise on Drawings provide one of the following:
1. Precast Concrete Lintels: ASTM C 1623, matching concrete masonry units in color, texture, and net area compressive strength; and with reinforcing bars, No. 5, 1000 lbs/lineal ft or required to support loads indicated.

- a. Cure precast lintels by the same method used for concrete masonry units.
 - b. Score lintels to match joint pattern of adjacent concrete unit masonry.
 - c. Lintel Size: Nominal 4 inches by 8 inches by length required, unless otherwise indicated.
 - d. Verify overlapped 4 inch precast units to match thickness of wall construction.
2. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.04 BRICK

- A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B. Through Wall (Structural) Brick:
 1. Brick Type 01: Structural brick complying with ASTM C 652.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Basis of Design: Belden
 - a) Color: Match Existing
 - b) Texture: Match Existing
 - b. Grade: SW.
 - c. Type: HBX.
 - d. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3350 psi (23.10 MPa).
 - e. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67.
 - f. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 - g. Brick Size (Nominal Dimensions): 8 inches wide by 4 inches high by 16 inches long.
 2. Brick Type 02: Same as Brick Type 01 but second color

- a. New brick color to match adjacent buildings.
- b. Reference elevations for quantity and locations.

2.05 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Davis Colors; True Tone Mortar Colors.
 - b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
 - c. Solomon Colors, Inc.; SGS Mortar Colors.
- E. Pigmented Cement Product: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 1. Pigmented Portland Cement-Lime Mix:
 - a. Products: Subject to compliance with requirements, provide one of the following :
 - 1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
 - 2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
 - 3) Lafarge North America Inc.; Eaglebond Portland & Lime.
 - 4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
 - 5) Eaglebond; Blue Circle Cement.
 - 6) Color Mortar Blend; Glen-Gery Corporation.
 2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
 3. Pigments shall not exceed 10 percent of portland cement by weight.
- F. Aggregate for Mortar: ASTM C 144.
 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.

- G. Aggregate for Grout: ASTM C 404.
- H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company (The); Accelguard 80.
 - b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morseled.
 - c. Sonneborn Products, BASF Construction Chemicals; Trimix-NCA.
- I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs, containing integral water repellent by same manufacturer.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ACM Chemistries, Inc.; RainBloc for Mortar.
 - b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
 - c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
 - 2. Application: For concrete masonry units exposed to the weather, in particular around the mechanical equipment yard.
- J. Water: Potable.

2.06 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Use Portland cement-lime mixes for exterior applications.
 - 2. Do not use calcium chloride in mortar or grout.
 - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
 - 1. For masonry below grade or in contact with earth, use Type M.
 - 2. For reinforced masonry, use Type S.
 - 3. For mortar parge coats, use Type N.
 - 4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
- C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products. Do not exceed pigment-to-cement ratio of 1-to-10, by weight.

1. Color: Mix to match Architect's Pigments shall not exceed 10 percent of portland cement by weight.
 2. If pigments containing carbon black are used, carbon black must be limited to 2 percent of portland cement by weight.
 3. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Decorative CMUs.
 - b. Face brick.
 - c. Stone trim units.
 - d. Cast stone trim units.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
 3. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured according to ASTM C 143/C 143M.

2.07 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
1. Interior Walls: Mill- galvanized, carbon steel.
 2. Exterior Walls, Inside Wythe: Hot-dip galvanized, carbon steel.
 3. Wire Size for Side Rods: W1.7 or 0.148-inch (3.77-mm) diameter (9 gage).
 4. Wire Size for Cross Rods: W1.7 or 0.148-inch (3.77-mm) diameter (9 gage).
 5. Wire Size for Veneer Ties: 0.148-inch (3.77-mm) diameter (9 gage).
 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
 7. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Truss type with single pair of side rods.
- D. Masonry Joint Reinforcement for Multiwythe Masonry: As indicated on Drawings or, if not shown, Contractor's option with one of the following:
1. Tab type, either ladder or truss design, with 1 side rod at each face shell of backing wythe and with rectangular tabs sized to extend at least halfway through facing wythe but with at least 5/8-inch (16-mm) cover on outside face.
 2. Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches (32 mm). Size ties to extend at least halfway through facing wythe but with at least 5/8-inch (16-mm) cover on outside face. Ties have hooks or clips to engage a continuous horizontal wire in the facing wythe.

- E. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- (4.76-mm-) diameter (7 gage), hot-dip galvanized, carbon -steel continuous wire.

2.08 TIES AND ANCHORS - MATERIALS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 2. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
 3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 4. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.09 MISCELLANEOUS ANCHORS

- A. Dovetail Slots in Concrete: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from 0.034-inch (0.86-mm), galvanized steel sheet.
- B. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.
- C. Steel Connectors: "L" shaped hot-dipped steel anchor for restraining lateral movement between ends of masonry walls and perpendicular construction:
1. Size: 1/4 inch thick by 1-1/2 inch width by 24 inches long, with ends bent up at least 2 inches.
 2. Products: Provide one of the following:
 - a. Heckman Building Products, Inc.; "#272 Z-Type Rigid Steel Anchor".
 - b. Hohmann and Barnard, Inc.; "Slip-Set Stabilizer"
 - c. Wire-Bond; "Rigid Steel Tie #3000z"

2.10 EMBEDDED FLASHING MATERIALS

- A. Stainless Steel Fabric Flashing: Laminated flashing material consisting single sheet of 0.003 inch, 304 stainless steel bonded to two layers of woven polymeric fabric (one layer each side).
1. Basis-of Design Product: Subject to compliance with requirements, provide Hohmann & Barnard, Inc.; Mighty-Flash Flashing or approved equivalent by listed manufacturers.
 - a. York Manufacturing Inc.: Multi-Flash SS
 - b. STS Coatings: Gorilla Flash Stainless Steel Flashing
 - c. TK Products: TWF-18 Stainless Steel Thru-Wall Flashing
 - d. Hohmann & Barnard, Inc.: Mighty-Flash Flashing

2. Provide 3-inch stainless steel drip edge with adhesive strip on top side of drip plate.
 3. Provide continuous stainless steel termination bar.
 4. Performance Characteristics:
 - a. ASTM D3273, mold resistant.
 - b. Puncture Resistance: ASTM E154, 2500 psi.
 - c. Tensile Strength: ASTM D412, 100,000 psf
 - d. Fire Resistance: ASTM E84, Pass.
 - e. Mold Resistance: ASTM D3273, Pass.
 - f. UV resistant to 180 days.
 5. Flashing System Accessory Products:
 - a. Self-Adhesive Primer: Subject to compliance with requirements, provide Hohmann & Barnard, Inc; Primer-SA or equal.
 - b. Flashing Sealant/Mastic: Subject to compliance with requirements, provide Hohmann & Barnard, Inc.; HB Sealant or equal.
- B. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from high-density polyethylene incorporating chemical stabilizers that prevent UV degradation. Cell flashing pans have integral weep spouts that are designed to be built into mortar bed joints and weep collected moisture to the exterior of CMU walls and that extend into the cell to prevent clogging with mortar.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Mortar Net USA, Ltd.; Blok-Flash.
- C. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and Division 07 Section "Sheet Metal Flashing and Trim" and as follows:
1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch (0.40 mm) thick.
 2. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
 3. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at 3-inch (76-mm) intervals along length of flashing to provide an integral mortar bond.
 - a. Products: Subject to compliance with requirements, provide one of the following :
 - 1) Cheney Flashing Company; Cheney 3-Way Flashing (Sawtooth).
 - 2) Keystone Flashing Company, Inc.; Keystone 3-Way Interlocking Thruwall Flashing.
 - 3) Sandell Manufacturing Co., Inc.; Mechanically Keyed Flashing.
 4. Fabricate metal drip edges for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least 3 inches (76 mm) into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam will shed water.

- D. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Sheet Metal Flashing and Trim."
1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
 2. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
 3. Elastomeric Sealant: ASTM C 920, chemically curing silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.11 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Preformed Control-Joint Gaskets: Made from PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- E. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
1. Products: Subject to compliance with requirements, provide one of the following:
 - 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.

2.12 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
 - a. Diedrich Technologies, Inc.

- b. EaCo Chem, Inc.
- c. ProSoCo, Inc.

- 2. Clean both sides of single wythe masonry walls.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation of face brick, examine windows, air and vapor barrier and peel and stick window flashings to verify that such work has been installed prior to installation of face brick.
- C. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 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. Where possible, use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.
- F. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

1. Do not wet concrete masonry units.

3.03 TOLERANCES

- A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following.

- B. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

- C. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.

- D. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).

3.04 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in pattern indicated below; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
 - 1. Exposed Brick Masonry Assemblies: bond pattern indicated on Drawings
 - 2. Exposed Concrete Masonry Unit Assemblies: bond pattern indicated on Drawings
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches (100-mm). Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- D. 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.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. 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.
- H. Fill cores in hollow CMUs with grout 24 inches (600 mm) 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. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors 48 inches (1200 mm) o.c. unless otherwise indicated.
 - 3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
 - 4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems."

3.05 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick and CMUs as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.

2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
 5. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.06 SETTING DIMENSION STONE TRIM

- A. Execute dimension stone cladding installation by skilled mechanics and employ skilled stone fitters at Project site to do necessary field cutting as stone is set.
- B. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure dimension stone trim in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.
1. Place weep holes and vents in joints where moisture may accumulate, including base of cavity walls, above shelf angles, and flashing. Locate weep holes and vents at intervals not exceeding 24 inches and for those serving as vents only, at intervals not exceeding 60 inches horizontally and 20 feet vertically.
- C. Attach anchors securely to stone and to backup surfaces. Comply with recommendations in ASTM C 1242.
- D. Set stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of stone a distance at least equal to width of joint.
- E. Set stone in full bed of mortar with head joints slushed full, unless otherwise indicated.
1. Use setting buttons of adequate size, in sufficient quantity, and of thickness required to maintain uniform joint width and to prevent mortar from extruding. Hold buttons back from face of stone a distance at least equal to width of joint.
 2. Do not set heavy units or projecting courses until mortar in courses below has hardened enough to resist being squeezed out of joint.
 3. Support and brace projecting stones until wall above is in place and mortar has set.
 4. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes with mortar.
- F. Rake out joints for pointing with mortar to depths of not less than 1/2 inch. Rake joints to uniform depths with square bottoms and clean sides.
- G. Point stone joints by placing and compacting pointing mortar in layers not more than 3/8 inch.

- H. Tool joints with a round jointer having a diameter 1/8 inch larger than width of joint, when pointing mortar is thumbprint hard.
- I. Rake out mortar from sealant-pointed joints to depths of not less than 1/2 inch nor less than that required to provide enough depth for sealant and sealant backing. Rake joints to uniform depths with square bottoms and clean sides.
 - 1. Set the following dimension stone cladding with unfilled head joints for installing joint sealants:
 - a. Copings and Panel Tops.
 - 2. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Division 7 Section "Joint Sealants."

3.07 CAVITY WALLS

- A. Prior to installation of facing veneer, inspect air and vapor barrier installed on veneer backup under Division 07 Section "Air and Vapor Barrier Membranes." Notify General Contractor of damaged or incomplete membrane. Do not proceed with work until damaged or deficient membrane has been repaired. Prevent damage to membrane during installation of face veneer or repair damage occurring during installation work.
- B. Bond wythes of cavity walls together using one of the following methods:
 - 1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. (0.25 sq. m) of wall area spaced not to exceed 24 inches (610 mm) o.c. horizontally and 16 inches (406 mm) o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches (305 mm) of openings and space not more than 36 inches (915 mm) apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches (610 mm) o.c. vertically.
 - a. Where bed joints of wythes do not align, use adjustable (two-piece) type ties.
 - b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type ties to allow for differential movement regardless of whether bed joints align.
 - 2. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of both wythes align, use tab-type reinforcement.
 - b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.
 - c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.
 - 3. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.

4. Header Bonding: Provide masonry unit headers extending not less than 3 inches (76 mm) into each wythe. Space headers not over 8 inches (203 mm) clear horizontally and 16 inches (406 mm) clear vertically.
 5. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.
- C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
1. Provide individual metal ties not more than 16 inches o.c.
 2. Provide continuity with masonry joint reinforcement by using prefabricated "T" units.
 3. Provide rigid metal anchors not more than 24 inches o.c. If used with hollow masonry units, embed ends in mortar-filled cores.
- D. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
1. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.

3.08 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

Revise three subparagraphs below if different spacing is required; delete if shown on Drawings. Spacing below is typical for non-reinforced walls. Revise if necessary.

1. Space reinforcement not more than 16 inches (406 mm) o.c.
 2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
 3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.09 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:

1. Provide an open space not less than 1 inch (25 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.10 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing and concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:
1. Fasten screw-attached anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 2. Embed tie sections in masonry joints. Provide not less than 2 inches (50 mm) of air space between back of masonry veneer and face of sheathing.
 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 4. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. (0.2 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around perimeter.

3.11 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
1. Provide movement joints in masonry wall construction as indicated. Where not shown, provide maximum spacing between joints of 40 feet and maximum distance between outside corners and joints of 10 feet. Provide joints between all interior load-bearing and non-load bearing walls at all abrupt changes in heights and at all changes in wall thickness. Verify final movement joint locations whether or not indicated on the Drawings with Architect prior to starting work.
- B. Form control joints in concrete masonry as follows :
1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
 2. Install preformed control-joint gaskets designed to fit standard sash block.
 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
- C. Form expansion joints in brick as follows:
1. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch (10 mm) for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

- D. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch (10 mm).
- 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.12 LINTELS

- A. Refer to Division 05 Section "Metal Fabrications" for steel lintel requirements.
- B. Install steel lintels where indicated.
- C. Provide masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are shown without structural steel or other supporting lintels.
- D. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.13 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches (200 mm), and through inner wythe to within 1/2 inch (13 mm) of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches (50 mm) on interior face.
 - 3. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches (200 mm); with upper edge tucked under building paper or building wrap, lapping at least 4 inches (100 mm).
 - 4. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
 - 5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 - 6. Install flashing and weeps above any blocking indicated on Drawings.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned

with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

- D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- E. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
 - 1. Use specified weep/vent products or to form weep holes.
 - 2. Space weep holes 24 inches (600 mm) o.c. at continuous runs of exterior walls with a minimum of two per column wrap between window openings unless otherwise indicated.
 - 3. Trim wicking material flush with outside face of wall after mortar has set.
- F. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.
- G. Install vents in head joints in exterior wythes at 48 inches on center at continuous runs of exterior walls with a minimum of two per column wrap between window openings unless otherwise indicated.. Use specified vinyl weep/vent products to form vents.
 - 1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Level 1 special inspections according to the "International Building Code."
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- E. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.
- F. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

- H. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- I. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.15 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 - 6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
 - 7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
 - 8. Clean stone trim to comply with stone supplier's written instructions.
 - 9. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.16 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste, and legally dispose of off Owner's property.

END OF SECTION

DIVISION 5 - METALS

SECTION 05 12 00 – STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Extent of structural steel work is indicated on the Drawings, including framing plans, schedules, notes, and details to show the size and location of members, typical connections, and type of steel required.

1.3 ACTION SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings to include all information necessary for fabrication and erection as follows:
 - 1. Details of proposed connections for each member size, steel grade, and connection type indicated on the drawings. Use standard details where appropriate. Refer to Part 2 – Products “Design” for criteria.
 - 2. Structural calculations prepared and sealed by a qualified engineer licensed in the State of Indiana for each connection condition indicated above. Submit sample calculations for typical connections for review before preparation of Detail Drawings.
 - 3. Base plate and anchor rod plans showing the location, size and identification marks of all base plate, bolts, grades of steel and setting elevations.
 - 4. Erection Plans (minimum 1/8"=1'-0" scale) showing type, size, weight and identification marks of all structural steel members. Include temporary members required for erection, dimensions locating all members relative to column grid lines, elevations of all members, and clear cross references with all other related drawings. Also, include the necessary information and instructions regarding field welds and field bolts including type, size and extent of field welds, types of electrodes, joint welding procedures, welding sequence and size and type of field bolts.
 - 5. Detail Drawings showing complete details for the fabrication of all structural steel members and components including, but not limited to: identification marks, dimensions, size, type, weight and grade of steel; requirements for installation of other materials or parts of construction, such as punched or drilled holes, openings, etc.; type, size and extent of shop and field welds; type of electrodes, joint welding procedures, welding sequences, size and type of shop and field bolts; cleaning requirements prior to painting; type and dry thickness of paint. Use welding symbols used by the American Welding Society.
 - 6. Drawings of all shop and field modifications and/or remedial work.
 - 7. Drawing index sheets, including updated sheets, at the same time that details are submitted.
 - 8. Contract Document plan drawings may be reproduced by the Contractor with the following provisions:

- a. Plan drawings may be reproduced only to locate piece marks. The responsibility for producing complete and accurate shop drawings remains with the Contractor.
 - b. The Contractor must remove all title blocks, notes, references, revision marks, and section marks referring to the Contract Document plan drawings.
 - c. Only the plans, modified as described above, may be reproduced. Contract Document detail drawings may not be reproduced, in whole or in part, for any reason.
- B. Substitutions: Substitutions for the members sizes, type(s) of steel, connection details, or any other modifications proposed by the Contractor will be considered by the Architect/Engineer under the following conditions:
1. The revisions in no case result in additional cost to the Owner. In considering cost savings to the Owner, adequate compensation for the Engineer's review of these substitutions should be considered.
 2. The request is made in writing and accepted prior to the submission of shop drawings.
 3. It is suitably demonstrated that there is a substantial cost or time advantage to the Owner.
 4. Sufficient sketches, and other data submitted to facilitate the review by the Architect/Engineer.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Fabricator and Erector.
- B. Welding certificates.
- C. Product Data: Submit copies of manufacturer's specifications and installation instructions for each proprietary product, including laboratory test reports and such other data as may be required to show compliance with the specifications. Indicate by transmittal form that copies of such data have been distributed to the Fabricator/Installer and the Owner's Testing Laboratory.
1. Welding electrodes, each type.
 2. Shop coat primer paint(s).
 3. Grout.
- D. Record Surveys: Submit three (3) copies of certified survey(s) by the Contractor's licensed professional surveyor as specified in Part 3-Execution for both the base conditions prior to erection and the final erected steel frame.
- E. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
1. Power source (constant current or constant voltage).
 2. Electrode manufacturer and trade name, for demand critical welds.

1.5 QUALITY ASSURANCE

- A. The Fabricator shall have 10 years of comparable experience in installations of this type and shall employ labor and supervisory personnel familiar with the type of installation, experienced in fabrication and erection of structural steel for projects of similar size and complexity. The Fabricator's qualifications shall be subject to review by the Architect/Engineer.
- B. The Erector shall have 10 years of successful experience erecting structural steel for structures of this type and complexity in the region of this project. The Erector's qualifications shall be subject to review by the Architect/Engineer.
- C. The Detailer shall have 10 years experience preparing detailed shop drawings for structures of this type and complexity. The Detailer's qualifications shall be subject to review by the Architect/Engineer.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."
- E. Pre-Construction Conference:
 - 1. Conduct a meeting prior to the preparation of Shop Drawings to review the detailed requirements for preparing shop drawings, sequence of submittals, erection tolerances, welding qualifications, inspection procedures, surveys, and other similar matters.
 - 2. Responsible representatives from all concerned parties are required to attend the meeting including, but not limited to, the following:
 - a. Contractor's Superintendent.
 - b. Architect/Engineer.
 - c. Structural Steel Fabricator.
 - d. Structural Steel Erector.
 - e. Surveyor.
 - 3. Record and distribute legible meeting minutes within 10 business days to all parties in attendance at the meeting and an additional copy to the Owner's representative.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from 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.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.7 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.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992.
- B. Channels, and Angles: ASTM A 36, unless noted.
- C. Plate and Bar: ASTM A 36.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500 Grade B, or A 1085, structural tubing.
- E. Welding Electrodes: Comply with AWS requirements.

2.2 CONNECTORS, AND ANCHOR RODS

- A. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
- C. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
 1. Configuration: Straight.
 2. Nuts: ASTM A 563 heavy-hex carbon steel.
 3. Plate Washers: ASTM A 36 carbon steel.
 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
 5. Finish: Plain.
- D. Threaded Rods: ASTM A 36.

1. Nuts: ASTM A 563 hex carbon steel.
2. Washers: ASTM F 436, Type 1, hardened carbon steel.
3. Finish: Plain.

2.3 PRIMER

- A. Shop Primer for Interior Structural Steel: Fast-curing, lead-and chromate-free, universal modified-alkyd primer with good resistance to normal atmospheric corrosion, complying with performance requirements of FS TT-P-664.
- B. Shop Primer for Structural Steel Exposed in the Exterior Environment: Zinc-Rich Urethane Primer. Tnemec 90-97 or approved equal.
- C. Galvanizing Repair Paint: SSPC-Paint 20 with dry film containing a minimum of 94 percent zinc dust by weight.
 1. Galvilite by ZRC Worldwide.
 2. Approved equal.

2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 1. Fabricate beams with rolling camber up.
 2. Mark and match-mark materials for field assembly.
 3. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning, SSPC-SP 2, "Hand Tool Cleaning or SSPC-SP 3, "Power Tool Cleaning." Remove all materials that might impair proper adhesion of spray fireproofing.

- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
- G. Holes: Provide holes required for securing other work to structural steel and for 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.

2.6 SHOP CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded, including the top surface of beams to receive steel deck and/or shear connectors fastened by welding.
- 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:
 - 1. Structural Steel Exposed in the Exterior Environment: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning".
 - 2. Interior Structural Steel: SSPC-SP 3 "Power Tool Cleaning".
- C. Priming of Interior Structural Steel: Immediately after surface preparation, apply Universal Modified-Alkyd Primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 to 2.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces. Steel will receive a finish top coat(s) per Division 9.
- D. Priming of Structural Steel Exposed in the Exterior Environment: Immediately after surface preparation, apply Zinc-Rich Urethane Primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 2.5 to 3.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces. Steel will receive a finish top coat(s) per Division 9.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete-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. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Plates: Clean concrete surfaces of bond-reducing materials and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on setting nuts with plate washers.
 - 2. Weld plate washers to top of baseplate.
 - 3. Pretension anchor rods after supported members have been positioned and plumbed.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.

- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
- B. 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 unless indicated as Pretensioned or Slip Critical.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
 - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- C. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint 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.

END OF SECTION 05 12 00

DIVISION 6 – WOOD, PLASTICS & COMPOSITES

SECTION 06 10 00 - ROUGH CARPENTRY

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. Framing with dimension lumber.
- 2. Framing with engineered wood products.
- 3. Rooftop equipment bases and support curbs.
- 4. Wood blocking, cants, and nailers.
- 5. Wood furring and grounds.
- 6. Wood sleepers.
- 7. Plywood backing panels.

B. Related Requirements:

- 1. Section 06 16 00 "Sheathing."
- 2. Section 06 17 53 "Metal Plate Connected Wood Trusses" for wood trusses made from dimension lumber.
- 3. Section 31 31 16 "Termite Control" for site application of borate treatment to wood framing.

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. SPIB: The Southern Pine Inspection Bureau.
 - 4. WWPAA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
 1. Wood-preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Engineered wood products.
 4. Shear panels.
 5. Power-driven fasteners.
 6. Powder-actuated fasteners.
 7. Expansion anchors.
 8. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal thickness or less, and for more than 2-inch nominal thickness unless otherwise indicated.
- C. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 3. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
1. Use treatment that does not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by testing agency.
- E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings, and the following:

1. Exterior walls, where indicated.
2. Framing for raised platforms.
3. Concealed blocking.
4. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: No. 1/No. 2 grade.

1. Application: Interior partitions not indicated as load-bearing.
2. Species:
 - a. Spruce-Pine-Fir; NLGA.

B. Load-Bearing Partitions: No 1/No. 2 grade.

1. Application: Exterior walls and interior load-bearing partitions.
2. Species:
 - a. Spruce-Pine-Fir; NLGA.

C. Ceiling Joists: No. 2 grade.

1. Species:
 - a. Hem-fir (north); NLGA.
 - b. Southern pine; SPIB.
 - c. Douglas fir-larch (north); NLGA.

D. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade.

1. Species:
 - a. Hem-fir (north); NLGA.
 - b. Southern pine; SPIB.
 - c. Douglas fir-larch; WCLIB or WWPA.

2.5 ENGINEERED WOOD PRODUCTS

A. Engineered Wood Products, General: Products shall contain no urea formaldehyde.

B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

C. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Boise Cascade Corporation.
 - b. Georgia-Pacific.
 - c. Louisiana-Pacific Corporation.
 - d. Pacific Woodtech Corporation.
 - e. Weyerhaeuser Company.
 2. Extreme Fiber Stress in Bending, Edgewise: 2900 psi, 2600 psi for 12-inch nominal- depth members.
 3. Modulus of Elasticity, Edgewise: 2,000,000 psi.
- D. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Weyerhaeuser Company.
 2. Extreme Fiber Stress in Bending, Edgewise: 2900 psi for 12-inch nominal- depth members.
 3. Modulus of Elasticity, Edgewise: 2,000,000 psi.
- E. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research/evaluation report for I-joists.
1. Manufacturer: Provide products by same manufacturer as I-joists.
 2. Material: Glued-laminated wood.
 3. Thickness: 1-1/8 inches or 1-1/4 inches.
 4. Provide performance-rated product complying with APA PRR-401, rim board plus grade, factory marked with APA trademark indicating thickness, grade, and compliance with APA standard.

2.6 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and any of the following species:
1. Hem-fir (north); NLGA.
 2. Southern pine; SPIB.
 3. Spruce-pine-fir; NLGA.

- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.7 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, Exterior, C-C Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.8 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153 or of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: ESR-1539.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.9 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or when approved comparable product by one of the following:
 - 1. Cleveland Steel Specialty Co.
 - 2. KC Metals Products, Inc.
 - 3. Phoenix Metal Products, Inc.
 - 4. Simpson Strong-Tie Co., Inc.
 - 5. USP Structural Connectors.
- C. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- D. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- E. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653; structural steel (SS), high-strength low-alloy steel Type A, or high-strength low-alloy steel Type B; G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.
- F. Stainless-Steel Sheet: ASTM A 666, Type 304.
 - 1. Use for exterior locations and where indicated.

2.10 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
- C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- G. Do not splice structural members between supports unless otherwise indicated.
- H. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- I. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
 - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- J. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- K. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- L. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. ESR - 1539 for power-driven fasteners.
 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- M. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- N. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
1. Comply with approved fastener patterns where applicable.
 2. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Where wood-preserved-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring vertically at 24 inches o.c.
- C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs. Fasten plates to supporting construction unless otherwise indicated.
1. For exterior walls, provide 2-by-6-inch nominal- size wood studs spaced as indicated on the Drawings.

2. For interior partitions and walls, provide 2-by-4-inch nominal- size wood studs spaced as indicated on the drawings. Provide 2 x 6 studs where indicated on the Drawings.
 3. Provide continuous horizontal blocking of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs. Reference Drawings for header sizes and number of jamb studs.

3.5 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 06 10 53 – MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Rooftop equipment bases and support curbs.
 - 2. Wood blocking, cants, and nailers.
 - 3. Wood sleepers.
 - 4. Plywood backing panels.

1.03 DEFINITIONS

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NHLA: National Hardwood Lumber Association.
 - 3. NLGA: National Lumber Grades Authority.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPA: Western Wood Products Association.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - a. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 - 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
5. Include written authorization from pressure treatment manufacturer for compatibility of fasteners in pressure treated blocking.

1.05 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.

1.06 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPAC U1; Use Category UC2.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.

2.03 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841.
 - a. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- E. Application:
 - 1. Treat all concealed miscellaneous carpentry except the following:
 - a. Blocking installed as part of a Class "A" roof system.
 - b. Blocking indicated as non-treated on Drawings.

2. Treat allplywood backing panels.

2.04 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases.
 4. Cants.
 5. Furring.
- B. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species:
 1. Mixed southern pine.
 2. Hem-fir or hem-fir (north).
 3. Spruce-pine-fir (south) or spruce-pine-fir.
- C. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work; grade suitable for use intended
- D. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.05 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1,, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.06 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 1. Provide fasteners that will not deteriorate with direct contact with pressure treatment pressure provided.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Metal Framing: ASTM C 954, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

- G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
 - 1. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Provide blocking as required to support facing materials, fixtures, specialty items, and trim.
- E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- F. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table identifying, "Fastening Schedule," in ICC's International Building Code as amended by State and Local jurisdictions.
- G. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.02 WOOD SLEEPER, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.03 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size (19-by-63-mm actual-size) furring as indicated on drawings.
- C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size (19-by-38-mm actual-size) furring as indicated on drawings or vertically if not indicated on drawings.

3.04 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Roof sheathing.
- B. Related Requirements:
 - 1. Section 06 10 00 "Rough Carpentry" for plywood backing panels.
 - 2. Division 07 Section "Fluid Applied Air/Vapor Barriers" for air/vapor barrier applied over wall sheathing.

1.03 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For following products, from ICC-ES:
 - 1. Preservative-treated plywood.
 - 2. Fire-retardant-treated plywood.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.02 WOOD PANEL PRODUCTS

- A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
- B. Oriented Strand Board: DOC PS 2.
- C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

- D. Factory mark panels to indicate compliance with applicable standard.

2.03 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPAC U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

2.04 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior sheathing.
 - 1. Roof slopes greater than or equal to 3 in 12:
 - a. Span Rating: Not less than 24/16.
 - b. Nominal Thickness: Not less than 7/16 inch.
 - 2. Roof slopes less than 3:12:
 - a. Span Rating: 48/24.
 - b. Nominal Thickness: Not less than 23/32 inch.
- B. Oriented-Strand-Board Roof Sheathing: Exposure 1 sheathing.
 - 1. Roof slopes greater than or equal to 3 in 12.
 - a. Span Rating: Not less than 24/16.
 - b. Nominal Thickness: Not less than 7/16 inch.
 - 2. Roof slopes less than 3:12:
 - a. Span Rating: 48/24.
 - b. Nominal Thickness: Not less than 23/32 inch.

2.05 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: ESR-1539.

- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
 - 1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 1. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

2.06 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
 - 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

2.07 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and roof sheathing installation with flashing, joint sealant and air/vapor barrier installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.02 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Roof Sheathing:
 - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
 - b. Screw to cold-formed metal framing.
 - c. Space panels 1/8 inch apart at edges and ends.

SECTION 06 17 53 – METAL PLATE CONNECTED WOOD TRUSSES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Wood roof trusses.
 - 2. Wood girder trusses.
 - 3. Wood truss bracing.
 - 4. Metal truss accessories.
- B. Related Requirements:
 - 1. Section 06 16 00 "Sheathing" for roof sheathing and subflooring.

1.03 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.04 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for trusses.
 - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - 2. Indicate sizes, stress grades, and species of lumber.
 - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 - 6. Show splice details and bearing details.
- B. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.05 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in ANSI/TPI 1 for manufacture of connector plates.
 - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in ANSI/TIP 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
 - 1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
 - 2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
 - 3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in ANSI/TPI 1 unless more stringent requirements are specified below.
 - 1. Design Loads: As indicated.
 - 2. Maximum Deflection Under Design Live/Snow Loads:
 - a. Roof Trusses: Vertical deflection of 1/360 of span.
 - b. Floor Trusses: Vertical deflection of 1/480 of span.
- C. Comply with applicable requirements and recommendations of the following publications:

1. ANSI/TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 3. BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.02 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Provide dressed lumber, S4S.
 4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 06 10 00 "Rough Carpentry."

2.03 METAL CONNECTOR PLATES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Alpine Engineered Products, Inc.; an ITW company.
 2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
 3. Eagle Metal Products.
 4. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
 5. Truswal Systems Corporation; an ITW company.
- B. Source Limitations: Obtain metal connector plates from single manufacturer.
- C. General: Fabricate connector plates to comply with ANSI/TPI 1.
- D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591, 80Z coating designation; ASTM A 570, Structural-Steel Sheet, Grade 33; and not less than 0.047 inch thick.
1. Use for interior locations unless otherwise indicated.
- E. Stainless-Steel Sheet: ASTM A 666, Type 304, and not less than 0.035 inch thick.
1. Use for exterior locations and where indicated.

2.04 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
 - 2. Where trusses are exposed to weather, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153.
- B. Nails, Brads, and Staples: ASTM F 1667.

2.05 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Cleveland Steel Specialty Co.
 - 2. KC Metals Products, Inc.
 - 3. Phoenix Metal Products, Inc.
 - 4. Simpson Strong-Tie Co., Inc.
 - 5. USP Structural Connectors.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 coating designation.

2.06 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94 percent zinc dust by weight.

2.07 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in ANSI/TPI 1. Position members to produce design camber indicated.
 - 1. Fabricate wood trusses within manufacturing tolerances in ANSI/TPI 1.

- D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI & BCSI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
 - 1. Anchor trusses to girder trusses as indicated, and only after all girder plies are in place and fastened together as required.
- I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Section 061000 "Rough Carpentry" and BCSI.
 - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- J. Install wood trusses within installation tolerances in BCSI.
- K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- L. Replace wood trusses that are damaged or do not meet requirements.
 - 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Engineer of Record.

3.02 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

END OF SECTION

DIVISION 7 - THERMAL & MOISTURE PROTECTION

SECTION 07 31 13 - ASPHALT SHINGLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Asphalt shingles.
 - 2. Underlayment.
 - 3. Ridge vents.

1.03 DEFINITION

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of asphalt shingle indicated.
- C. Samples for Verification: For the following products, of sizes indicated, to verify color selected:
 - 1. Asphalt Shingle: Full size.
 - 2. Ridge and Hip Cap Shingles: Full size.
 - 3. Ridge Vent: 12-inch- (300-mm-) long Sample.
 - 4. Exposed Valley Lining: 12 inches (300 mm) square.
 - 5. Self-Adhering Underlayment: 12 inches (300 mm) square.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Warranties: Sample of special warranties.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of asphalt shingle to include in maintenance manuals.

1.07 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Asphalt Shingles: 3 unopened containers of each type.

1.08 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain ridge and hip cap shingles ridge vents felt underlayment and self-adhering sheet underlayment from single source from single manufacturer.
- C. Preinstallation Conference: Conduct conference at Project site, coordinate time with owner, construction manager and architect.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
 - 1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
- B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install asphalt shingles until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.11 WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Manufacturing defects.
 - b. Structural failures including failure of asphalt shingles to self-seal after a reasonable time.
 - 2. Material Warranty Period: 30 years from date of Substantial Completion, prorated, with first three years non-prorated.
 - 3. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor 10 years from date of Substantial Completion.
 - 4. Workmanship Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Laminated-Strip Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. [CertainTeed Corporation.](#)
 - b. [Owens Corning.](#)
 - c. [Atlas Roofing Corporation.](#)
 - d. [GAF Materials Corporation.](#)
 - e. [IKO.](#)
 - f. [Malarkey Roofing Products.](#)
 - g. [PABCO Roofing Products.](#)
 - h. [TAMKO Roofing Products, Inc.](#)
 - 2. Color and Blends: As selected by Architect from manufacturer's full range.
- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles. Trim each side of lapped portion of unit to taper approximately 1 inch (25 mm)].

2.02 UNDERLAYMENT MATERIALS

- A. General: Utilize either felt or synthetic felt for roofing underlayment. Utilize high temperature self-adhering underlayment at locations noted in Part 3 and as indicated on Drawings.
- B. Felt: ASTM D 226 or Type I, asphalt-saturated organic felts, non-perforated.
- C. Synthetic roofing felts, complying with Acceptance Criteria of ICC-ES AC48 or ASTM D 6757, and acceptable to manufacturer of roofing shingles for warranty period specified.
 - 1. Provide one of the following products, or products by another manufacturer that, in the sole judgment of the Architect, is equal in composition and performance with products specified:
 - a. Tarco; "EasyLay".
 - b. Fiberweb, Inc. Americas Industrial Division; "Surround SR, a Tytar Brand".
 - c. E.I. du Pont de Nemours and Company; "Roofliner".
 - d. Grace Construction Products; "TriFlex 30".
 - e. CertainTeed Corporation; "DiamondDeck".
 - f. Atlas Roofing Corporation; "Summit".
 - g. GAF Corporation; "Shinglemate".
- D. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, minimum of 55-mil- (1.4-mm-) thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle Coatings & Waterproofing, Div. of Carlisle Companies Inc.; Dri-Start "G."
 - b. Celotex Corporation; Celo-Guard.
 - c. CertainTeed Corporation; WinterGuard.
 - d. GAF Materials Corporation; Weather Watch.
 - e. Johns Manville International, Inc.; Roof Defender.
 - f. Owens Corning; WeatherLock G.
- E. Granular-Surfaced Valley Lining: ASTM D 3909, mineral-granular-surfaced, glass-felt-based, asphalt roll roofing; 36 inches (914 mm) wide.

2.03 HIP/RIDGE VENTS

- A. Roll Ridge Vent: Manufacturer's standard, high-impact polypropylene or other UV-stabilized plastic net structure ridge vent with weather filter; for use under ridge shingles.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed by Saint-Gobain; Rolled Ridge Vent.
 - b. Cor-A-Vent, Inc.; Revolution Rolled Ridge Vent
 - c. GAF Materials Corporation; COBRA Ridgrunner
 - d. Lomanco, Inc.; OmniRoll
 - e. Owens Corning; VentSure RidgeCat.
 2. Minimum Net Free Area: In compliance with the local building code.
 3. Width: See drawings.

2.04 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- (3-mm-) diameter, barbed shank, sharp-pointed, with a minimum 3/8-inch- (9.5-mm-) diameter flat head and of sufficient length to penetrate 3/4 inch (19 mm) into solid wood decking or extend at least 1/8 inch (3 mm) through OSB or plywood sheathing.
 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch (25-mm) minimum diameter.

2.05 METAL FLASHING AND TRIM

- A. General: Comply with requirements in Section 07 62 00 "Sheet Metal Flashing and Trim."
 1. Sheet Metal: Coil-coated aluminum Anodized aluminum.

- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item.
 - 1. Drip Edges: Fabricate in lengths not exceeding 10 feet (3 m) with 2-inch (50-mm) roof-deck flange and 1-1/2-inch (38-mm) fascia flange with 3/8-inch (9.6-mm) drip at lower edge.
- C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch (1.6 mm) thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches (100 mm) from pipe onto roof.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of 2 inches (50 mm) over underlying course. Lap ends a minimum of 4 inches (100 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). Fasten with felt underlayment nails.
 - 1. Install fasteners at no more than 36-inch (900 mm) o.c.
 - 2. Install felt underlayment on roof sheathing not covered by self-adhering sheet underlayment. Lap edges over self-adhering sheet underlayment not less than 3 inches (75 mm) in direction to shed water.
- C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below, lapped in direction to shed water. Lap sides not less than 3-1/2 inches (89 mm). Lap ends not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Roll laps with roller. Cover underlayment within seven days.

3.03 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Section 07 62 00 "Sheet Metal Flashing and Trim."
 - 1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
 - 2. Secure hemmed flange edges into metal cleats spaced 12 inches (300 mm) apart and fastened to roof deck.
 - 3. Adhere 9-inch- (225-mm-) wide strip of self-adhering sheet to metal flanges and to self-adhering sheet underlayment.
- B. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.
- C. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.
- D. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.04 ASPHALT SHINGLE INSTALLATION

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed at least 7 inches (175 mm) wide with self-sealing strip face up at roof edge.
 - 1. Extend asphalt shingles 1/2 inch (13 mm) when drip edge is used or 3/4 inch (19 mm) when no drip edge is used over fasciae at eaves and rakes.
 - 2. Install starter strip along rake edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Fasten asphalt shingle strips with roofing nails, number and location according to manufacturer's written instructions.
 - 1. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
 - 2. When ambient temperature during installation is below 50 deg F (10 deg C) , seal asphalt shingles with asphalt roofing cement spots.
- E. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.
- F. Ridge Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.

1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

END OF SECTION

SECTION 07 42 53 - METAL SOFFIT PANELS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes metal soffit panels.

1.03 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
- C. Samples for Initial Selection: For each type of metal panel 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. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranties: For special warranties.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.
- E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.09 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems 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 and other materials beyond normal weathering.
 - 2. Warranty Period: 5 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 panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel 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.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
 1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings
 3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 283 at the following test-pressure difference:
 1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa).
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
 1. Test-Pressure Difference: 2.86 lbf/sq. ft. (137 Pa).
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.02 METAL SOFFIT PANELS

- A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weather tight installation.
- B. Flush-Profile Metal Soffit Panels Solid and Perforated panels formed with vertical panel edges and a flat pan between panel edges; with flush joint between panels.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. MBCI; a division of NCI Building Systems, L.P.
 - b. CENTRIA Architectural Systems.

- c. [AEP Span; a BlueScope Steel company.](#)
 - d. [Architectural Building Components.](#)
 - e. [ATAS International, Inc.](#)
 - f. [Berridge Manufacturing Company.](#)
 - g. [Dimensional Metals, Inc.](#)
 - h. [Englert, Inc.](#)
 - i. [Fabral.](#)
 - j. [Firestone Metal Products, LLC.](#)
 - k. [Innovative Metals Company, Inc.](#)
 - l. [McElroy Metal, Inc.](#)
 - m. [Merchant & Evans Inc.](#)
 - n. [Metal-Fab Manufacturing, LLC.](#)
 - o. [Metal Sales Manufacturing Corporation.](#)
 - p. [Petersen Aluminum Corporation.](#)
 - q. [Ultra Seam, Inc.](#)
2. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
- a. Thickness: .40 inch (1.02 mm).
 - b. Surface: Smooth, flat finish.
 - c. Exterior Finish: Two-coat fluoropolymerat fluoropolymer]
 - d. Color: As selected by Architect from manufacturer's full range
3. Panel Coverage: 12 inches (305 mm)
4. Panel Height: 1.0 inch (25 mm)

2.03 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
- 1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

- E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 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 (13 mm) wide and 1/8 inch (3 mm) thick.
 - 2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.04 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, 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.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to 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. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.05 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. 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 same piece are not acceptable. Variations in appearance of other compo

nents are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

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.
2. 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 (0.013 mm).

D. Aluminum Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 620. 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.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
1. Examine substrate construction to verify installed within alignment tolerances required by metal panel manufacturer.
 - a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.
1. Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.03 METAL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless oth

erwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
3. Copper Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
4. Stainless-Steel Panels: Use stainless-steel fasteners.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Accessory Installation: 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 panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

F. 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 are permanently watertight.

1. Install exposed flashing and trim that is without 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 achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.04 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

- 1. Formed fascia.
- 2. Formed wall sheet metal fabrications.
- 3. Formed equipment support flashing.

B. Related Sections:

- 1. Division 07 Section "Roof Specialties" for manufactured copings, roof-edge flashings, reglets and counter flashings.

1.03 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.

- 1. Include plans, elevations, sections, and attachment details.
- 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
- 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
- 4. Include details for forming, including profiles, shapes, seams, and dimensions.
- 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
- 6. Include details of termination points and assemblies.
- 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
- 8. Include details of roof-penetration flashing.
- 9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.

10. Include details of special conditions.
 11. Include details of connections to adjoining work.
 12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches (1:10).
- C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
- D. Samples for Verification: For each type of exposed finish.
1. Sheet Metal Flashing 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
 3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
- 1.05 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For fabricator.
- B. Warranty: For special warranty.
- 1.06 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.
- 1.07 QUALITY ASSURANCE
- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- 1.08 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.
- D. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- E. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.09 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel 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 more than 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.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

2.02 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. Alclad Finish: Metallurgically bonded surfacing alloy on both sides, forming aluminum sheet with reflective luster.

2. Factory Prime Coating: Where painting after installation is required, pretreat metal with white or light-colored, factory-applied, baked-on epoxy primer coat; minimum dry film thickness of 0.2 mil (0.005 mm).
 3. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 620. 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. Color: Architect to select from manufacturer's full range.
 5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).
- C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 316, dead soft, fully annealed; with smooth, flat surface.
1. Finish: 4 (polished directional satin).
- D. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
1. Surface: Smooth, flat.
 2. Exposed Coil-Coated Finish:
 - a. 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.
 3. Color: Architect to select from manufacturer's full range.
 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

2.03 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Self-Adhering, High-Temperature Sheet: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Residential, a division of Carlisle Construction Materials; WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.-Conn.; Grace Ice and Water Shield HT.

- c. Henry Company; Blueskin PE200 HT.
 - d. Kirsch Building Products, LLC; Sharkskin Ultra SA.
 - e. Metal-Fab Manufacturing, LLC; MetShield.
 - f. Owens Corning; WeatherLock Specialty Tile & Metal Underlayment.
 - g. Polyguard Products, Inc.; Deck Guard HT.
 - h. Protecto Wrap Company; Protecto Jiffy Seal Ice & Water Guard HT.
- 2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
 - 3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.
- C. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.04 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
- 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - 4. Fasteners for Zinc-Tin Alloy-Coated Stainless-Steel Sheet: Series 300 stainless steel.
 - 5. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Solder:
- 1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
 - 2. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

- E. Elastomeric Sealant: ASTM C 920, elastomeric silicone 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 emulsion according to ASTM D 1187.

2.05 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 1. 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.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Where lapped expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

- H. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- I. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- J. Do not use graphite pencils to mark metal surfaces.

2.06 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings; and form with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
 - 1. Stainless Steel: 0.016 inch (0.40 mm) thick.
- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
 - 1. Stainless Steel: 0.016 inch (0.40 mm) thick.

2.07 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch (0.71 mm) thick.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

- B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.

3.03 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, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. 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.
 3. Roof edge cleats and hold-down clips shall be continuous. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 5. Torch cutting of sheet metal flashing and trim is not permitted.
 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturers to achieve maximum pull-out resistance not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
1. Galvanized or Prepainted, Metallic-Coated Steel: Use stainless-steel fasteners.
 2. Aluminum: Use aluminum or stainless-steel fasteners.
 3. Stainless Steel: Use stainless-steel fasteners.

- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
 - 1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 - 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.
 - 1. Do not solder metallic-coated steel and aluminum sheet.
 - 2. Do not use torches for soldering.
 - 3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 - 4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
- H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.04 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.
- C. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints mini

imum of 4 inches (100 mm). Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant or anchor and washer at 36-inch (910-mm) centers unless otherwise indicated.

- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.05 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 04 20 00 "Unit Masonry."
- C. Reglets: Installation of reglets is specified in Section 04 20 00 "Unit Masonry."
- D. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.06 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.07 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.08 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.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

- E. 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 - ROOF SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Copings.
 - 2. Roof-edge flashings.
 - 3. Roof-edge drainage systems.
 - 4. Reglets and counterflashings.
 - 5. Pre-cast splash blocks.

1.03 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. FM Approvals' Listing: Manufacture and install copings and roof-edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90 . Identify materials with FM Approvals' markings.
 - 1. Wind Zone 3: Wind pressures of 46 to 104 lbf/sq. ft.
- C. SPRI Wind Design Standard: Manufacture and install copings and roof-edge flashings tested according to SPRI ES-1 and capable of resisting design pressures.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent 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 calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C) , material surfaces.

1.04 ACTION 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: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work. Include the following:

- C. Product cut sheets for initial color selection: For each type of roof specialty indicated with factory-applied color finishes.
- D. Samples for Verification: For copings, roof-edge flashings, roof-edge drainage systems, reglets and counterflashings made from 12-inch (300-mm) lengths of full-size components including fasteners, cover joints, accessories, and attachments.

1.05 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.07 QUALITY ASSURANCE

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects roof specialties including installers of roofing materials and accessories.
 - 2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.
- B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof specialties installation.

1.09 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace 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.

PART 2 - PRODUCTS

2.01 EXPOSED METALS

- A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
 - 1. Surface: Smooth, flat finish.
 - 2. Exposed Coil-Coated Finishes: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 620. The system consists of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 - b. Concealed Surface: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:
 - 1. Exposed High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 2605. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

2.02 CONCEALED METALS

- A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

2.03 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).
 - 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
 - c. Henry Company; Blueskin PE200 HT.
 - d. Metal-Fab Manufacturing, LLC; MetShield.

e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

B. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kb/sq. m) minimum, rosin sized.

2.04 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.

C. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.05 ROOF-EDGE FLASHINGS

A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet (3.6 m) and a continuous formed or extruded-aluminum anchor bar with integral drip-edge cleat to engage fascia cover. Provide matching cover corner units.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Architectural Products Company.
- b. Hickman Company, W. P.
- c. Johns Manville.
- d. Metal-Era, Inc.
- e. Metal-Fab Manufacturing, LLC.
- f. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.

2. Fascia Cover: Fabricated from the following exposed metal:

- a. Formed Aluminum: 0.050 inch (1.27 mm) thick or thickness as required to meet performance requirements.

3. Corners: Factory mitered and continuously welded

4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.

B. Aluminum Finish: Two-coat fluoropolymer.

1. Colors: As selected by Architect from manufacturer's full range.

2.06 REGLETS AND COUNTERFLASHINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Architectural Products Company.
2. Cheney Flashing Company.
3. Fry Reglet Corporation.
4. Heckmann Building Products Inc.
5. Hickman Company, W. P.
6. Metal-Era, Inc.
7. Metal-Fab Manufacturing, LLC.
8. MM Systems Corporation.

- B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

1. Formed Aluminum: 0.050 inch (1.27 mm) thick.
2. Corners: Factory mitered and continuously welded.
3. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
4. Concrete Type, Embedded: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
5. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
6. Multiuse Type, Embedded: For multiuse embedment in cast-in-place concrete.

- C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches (100 mm) and in lengths not exceeding 12 feet (3.6 m) designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:

1. Formed Aluminum: 0.032 inch (0.81 mm) thick.

- D. Accessories:

1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

- E. Aluminum Finish: Two-coat fluoropolymer.

1. Color: As selected by Architect from manufacturer's full range.

2.07 ROOF-EDGE DRAINAGE SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ATAS International, Inc.
 2. Cheney Flashing Company.
 3. CopperCraft by FABRAL; a Euramax company.
 4. Hickman Company, W. P.
 5. Merchant & Evans, Inc.
 6. Metal-Era, Inc.
 7. Metal-Fab Manufacturing, LLC.
 8. MM Systems Corporation.
 9. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.
- B. Gutters: Manufactured in uniform section lengths not exceeding 12 feet (3.6 m), with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch (25 mm) above front edge.
1. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
 2. Fabricate from the following exposed metal:
 - a. Formed Aluminum: 0.040 inch (1.02 mm) thick.
 3. Gutter Profile: As selected from manufacturer's full range.
 4. Corners: Factory mitered and mechanically clinched and sealed watertight.
 5. Gutter Supports: Flat stock Gutter brackets, Straps, and Spacers with finish matching the gutters.
- C. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Formed Aluminum: 0.040 inch (1.02 mm) thick.
- D. Parapet Scuppers: Manufactured with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof.
1. Fabricate from the following exposed metal:
 - a. Formed Aluminum: 0.040 inch (0.81 mm) thick.
- E. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout, exterior flange trim, and built-in overflow.
1. Fabricate from the following exposed metal:
 - a. Formed Aluminum: 0.040 inch (0.81 mm) thick.
- F. Splash Blocks: Provide precast concrete splash blocks at roof at downspouts. Refer to 2.09.

- G. Aluminum Finish: Two-coat fluoropolymer Two-coat fluoropolymer.
 - 1. Color: As selected by Architect from manufacturer's full range.

2.08 GENERAL FINISH REQUIREMENTS

- 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: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.
- C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Install wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water. Overlap edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.
- B. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

3.03 INSTALLATION, GENERAL

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.
 - 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
 - 3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.

4. Torch cutting of roof specialties is not permitted.
 5. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of self-adhering, high-temperature sheet underlayment
 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
1. Space movement joints at a maximum of 12 feet (3.6 m) with no joints within 18 inches (450 mm) of corners or intersections unless otherwise shown on Drawings.
 2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
- E. Seal joints with elastomeric sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

3.04 ROOF-EDGE FLASHING INSTALLATION

- A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.05 ROOF-EDGE DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
 1. Fasten gutter spacers to front and back of gutter.

2. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches (600 mm) apart.
 3. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet (15.24 m) apart. Install expansion-joint caps.
- C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints.
1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.
 2. Provide elbows at base of downspout to direct water away from building.
- D. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch (25 mm) below scupper or gutter discharge.
- E. Parapet Scuppers: Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
1. Anchor scupper closure trim flange to exterior wall and solder to scupper.
 2. Loosely lock front edge of the scupper with conductor head.
 3. Solder exterior wall scupper flanges into back of conductor head.

3.06 REGLET AND COUNTERFLASHING INSTALLATION

- A. General: Coordinate installation of reglets and counterflashings with installation of base flashings.
- B. Embedded Reglets: See Division 03 Section "Cast-in-Place Concrete" and Division 04 Section "Unit Masonry" for installation of reglets.
- C. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches (100 mm) over top edge of base flashings.
- D. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches (100 mm) over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with elastomeric sealant. Fit counterflashings tightly to base flashings.

3.07 SPLASH BLOCK INSTALLATION

- A. Place precast concrete splashblock at rooftop downspout locations as indicated on Drawings.

3.08 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 sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused

fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

- D. Replace 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 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Mildew-resistant joint sealants.
 - 4. Butyl joint sealants.
 - 5. Acoustical joint sealants.
- B. Related Sections: Preformed joint sealants specified under Division 07 "Expansion Control".

1.03 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Submit not fewer than eight pieces of each kind 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 use of specially formulated primers.
 - 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.04 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- 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 kind 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. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.05 INFORMATIONAL SUBMITTALS

- A. Product data and informational cut sheets.
- B. Comprehensive schedule indicating location and type of sealant proposed for review prior to installation.
- C. Warranties: Sample of special warranties.

1.06 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents and deliver to Owner.
 1. Quantity: Furnish Owner with an additional 3 percent, but not less than 1/2 gal. or equivalent number of tubes, as appropriate, of each material and color applied.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.08 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 2. When joint substrates are wet.
 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.09 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: 10 years from date of Substantial Completion.
- C. Special Manufacturer's Warranty for Silicone and Silyl-Terminated Polyether Sealants: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this section within specified warranty period.
1. Warranty Period: 20 years from date of Substantial Completion.
 - a. Structural Adhesion - Prior Testing Required (for silicone only)
 - b. Weatherseal
 - c. Non-Staining - Prior Testing Required
- D. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.01 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 joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.02 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Dow Corning Corporation; 790.
- b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
- c. Pecora Corporation; 301 NS.
- d. Sika Corporation, Construction Products Division; SikaSil-C990.
- e. Tremco Incorporated; Spectrem 1.

B. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. BASF Building Systems; Omniseal 50.
- b. Dow Corning Corporation; 795.
- c. GE Advanced Materials - Silicones; UltraPruf II SCS2900.
- d. Pecora Corporation; 895.
- e. Sika Corporation, Construction Products Division; SikaSil-C995.
- f. Tremco Incorporated; Spectrem 2.

C. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Dow Corning Corporation; 799.
- b. GE Advanced Materials - Silicones; UltraGlaze SSG4000.
- c. Tremco Incorporated; Tremsil 600.

D. Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Dow Corning Corporation; 790.
- b. Pecora Corporation; 301 NS.
- c. Tremco Incorporated; Spectrem 800.

- E. Multicomponent, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Tremco Incorporated; Spectrem 4TS.

2.03 URETHANE JOINT SEALANTS

- A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Sika Corporation, Construction Products Division; Sikaflex - 15LM.
b. Tremco Incorporated; Vulkem 921.

- B. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. BASF Building Systems; Sonolastic NP1.
b. Pecora Corporation; Dynatrol I-XL.
c. Sika Corporation, Construction Products Division; Sikaflex - 1a.
d. Tremco Incorporated; Dymonic.

- C. Single-Component, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type S, Grade NS, Class 25, for Use T.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. BASF Building Systems; Sonolastic NP1.
b. Sika Corporation, Construction Products Division; Sikaflex - 1a.
c. Tremco Incorporated; Vulkem 116.

- D. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Pecora Corporation; Dynatrol II.
b. Tremco Incorporated; Dymeric 240.

- E. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. BASF Building Systems; Sonolastic NP 2.
 - b. Pecora Corporation; Dynatred.
 - c. Sika Corporation, Construction Products Division; Sikaflex - 2c NS.
 - d. Tremco Incorporated; Vulkem 227.
- F. Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use T.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Tremco Incorporated; Dymeric 240 FC.
- G. Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonolastic NP 2.
 - b. LymTal International, Inc.; Iso-Flex 885 SG.
 - c. Pecora Corporation; Dynatred.
 - d. Sika Corporation, Construction Products Division; Sikaflex - 2c NS.
 - e. Tremco Incorporated; Vulkem 227.

2.04 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Pecora Corporation; 898.
- C. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Omniplus.
 - b. Dow Corning Corporation; 786 Mildew Resistant.
 - c. GE Advanced Materials - Silicones; Sanitary SCS1700.
 - d. Tremco Incorporated; Tremsil 200 Sanitary.

2.05 POLYSULFIDE JOINT SEALANTS

- A. Multicomponent, Nonsag, Polysulfide Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonolastic Polysulfide Sealant.
 - b. Pecora Corporation; Synthacalk GC-2+.
 - c. W. R. Meadows, Inc.; Deck-O-Seal Gun Grade.
- B. Multicomponent, Nonsag, Traffic-Grade, Polysulfide Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonolastic Polysulfide Sealant.
 - b. Pecora Corporation; Synthacalk GC-2+.

2.06 SOLVENT-RELEASE-CURING JOINT SEALANTS

- A. Acrylic-Based Joint Sealant: ASTM C 1311.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Schnee-Morehead, Inc.; Acryl-R Acrylic Sealant.
 - b. Tremco Incorporated; Mono 555.
- B. Butyl-Rubber-Based Joint Sealant: ASTM C 1311.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bostik, Inc.; Chem-Calk 300.
 - b. Pecora Corporation; BC-158.
 - c. Tremco Incorporated; Tremco Butyl Sealant.

2.07 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Pecora Corporation; AC-20 FTR.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.

2.08 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) , and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.09 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 1. Remove excess sealant from surfaces adjacent to joints.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch (10 mm). Hold edge of sealant bead 1/4 inch (6 mm) inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do no pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For application at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.

I. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.04 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.05 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.06 JOINT-SEALANT SCHEDULE

- A. Joints in all exterior similar and dissimilar materials in movement joints, in non-traffic areas, except as noted otherwise:
 - 1. Use Single-Component, Nonsag, Neutral-Curing Silicone Sealant, Class 100/50.
 - 2. Use Single-Component, Nonsag, Urethane Sealant, Class 100/50.
- B. Joints in all interior similar and dissimilar materials in movement joints, in non-traffic areas, except as noted otherwise:
 - 1. Use Single Component, Nonsag, Silicone Sealant, Class 25, NT.
 - 2. Use Single Component, Nonsag, Urethane Sealant, Class 25, NT.
 - 3. Use Multicomponent Nonsag Urethane Sealant, Class 25, NT.
- C. Joints between aluminum storefront and curtain wall systems and dissimilar materials, in non-traffic areas:
 - 1. Use Single Component Nonsag Neutral-Curing Silicone Sealant, Class 50, NT .
- D. Joints at all plumbing fixtures, counter tops, vanities, etc.:
 - 1. Use Mildew-Resistant Silicone Sealant.
- E. Joints in exterior and interior sloped and vertical surfaces in traffic areas:
 - 1. Use Multi-Part Nonsag Urethane Sealant-T.
- F. Joints at copings and counterflashing between coping and counterflashing and vertical surface:
 - 1. Use Multi-Part N
 - 2. Single-Part Silyl-Terminated Polyether.
- G. Joints in all interior similar and dissimilar materials, in non-traffic areas, non-moveable joints:
 - 1. Use Polysulfide Sealant.
 - 2. Use Acrylic-Emulsion Sealant.
- H. Joints in all exterior horizontal surfaces in traffic areas:
 - 1. Use Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant, Class 100/50.
 - 2. Use Multicomponent Nonsag Urethane Joint Sealant, Traffic Grade, Class 50.
- I. Joints in all interior horizontal surfaces in traffic areas:
 - 1. Use Single Component Nonsag Urethane Sealant, Traffic Grade, Class 25.
 - 2. Use Multicomponent Nonsag Urethane Sealant, Class 25, Traffic Grade.

END OF SECTION

DIVISION 8 – DOORS & WINDOWS

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes hollow-metal work as follows:
 - 1. Exterior and interior steel doors.
 - 2. Exterior and interior steel door frames.
 - 3. Fire-rated door and frame assemblies.
- B. Related Requirements:
 - 1. Division 08 Section "Door Hardware" for door hardware for hollow-metal doors.
 - 2. Division 09 Section "Painting" for field painting factory-primed doors and frames.

1.03 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.04 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of conduit and preparations for power, signal, and control systems.

- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.06 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.
- D. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ceco Door Products; an Assa Abloy Group company.
 - 2. Curries Company; an Assa Abloy Group company.
 - 3. Steelcraft; an Allegion Brand.
 - 4. Karpen Steel Custom Doors & Frames.
 - 5. MPI Group, LLC (The).
 - 6. Republic Doors and Frames; an Allegion Brand.
 - 7. Stiles Custom Metal.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.02 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

2.03 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- C. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- H. Glazing: Comply with requirements in Division 08 Section "Glazing".
- I. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.04 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

- A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.
 - 1. Physical Performance: Level A according to SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches (44.5 mm.)
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm) (16 gage), with minimum A40 (ZF120) coating.
 - d. Edge Construction: Model 2, Seamless.
 - e. Core: Polystyrene Vertical steel stiffener.

- 1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (U-value) of not less than 0.700 when tested according to ASTM C 1363.
3. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
4. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets flush as an integral part of door construction or by addition of 0.053-inch- thick, (16 gage) metallic-coated steel channels with channel webs placed even with top and bottom edges.
5. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053-inch (1.3 mm), with minimum A40 (ZF120) coating. 14 gage, minimum thickness of 0.067
 - b. Construction: Full profile welded.
6. Exposed Finish: Prime.

2.05 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.
3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.06 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more

- than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
2. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
 3. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
 4. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets flush as an integral part of door construction or by addition of 0.053-inch- thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.
 5. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 6. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
 7. Fire Door Cores: As required to provide fire-protection and temperature-rise ratings indicated.
- C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 4. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - c. Compression Type: Not less than two anchors in each frame.

- d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
- 5. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
- 6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
- D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- E. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between pairs of doors. Not more than 3/4 inch at bottom.
- F. Clearances for Fire-Rated Doors: As required by NFPA 80.
- G. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- H. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 - 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- I. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
 - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 4. Provide tamper resistant screws at all borrowed lites.
 - 5. Provide loose stops and moldings on inside of hollow-metal work.
 - 6. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.07 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2. Comply with Division 09 Sections for painting requirements and compatibility.
- B. Frames installed in concrete or masonry walls: Coat interior of frame with asphaltic paint, except fire-rated frames.
- C. Paint color to match dark bronzed anodized.

2.08 ACCESSORIES

- A. Coordinator: For doors that have been tested with surface mounted astragal, provide GJ-COR door coordinator.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint contin

- uously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
- a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Metal or Wood-Stud Partitions: Install per the following:
- a. Solidly pack mineral-fiber insulation inside frames.
 - b. Place welded frames during partition construction.
4. Concrete and Masonry Walls: Install per the following:
- a. Place welded frames during concrete and masonry walls construction.
 - b. Coordinate installation of welded frames to allow for solidly filling space between frames and masonry with grout.
5. For openings 90 inches or more in height, install an additional anchor at hinge and strike jambs.
6. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
- a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
- a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
 - c. At Bottom of Door: 3/4 inch plus or minus 1/32 inch.
 - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Glazing: Comply with installation requirements in Division 08 Section " Glazing" and with hollow-metal manufacturer's written instructions.
 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

3.04 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

SECTION 08 36 13 - SECTIONAL DOORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes electrically operated sectional doors.

1.03 PERFORMANCE REQUIREMENTS

- A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
- B. Delegated Design: Design sectional doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components. Deflection of door in horizontal position (open) shall not exceed 1/120 of the door width.
- D. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283.
 - 1. Air Infiltration: Maximum rate of 0.08 cfm/sq. ft. (0.406 L/s per sq. m) at 15 and 25 mph (24.1 and 40.2 km/h).
- E. Operation Cycles: Provide sectional door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type and size of sectional door and accessory. Include the following:
 - 1. Construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
 - 2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
 - 1. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Flat Door Sections: 6 inches (150 mm) square.
- E. Delegated-Design Submittal: For sectional doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Warranties: Sample of special warranties.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sectional doors to include in maintenance manuals.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Manufacturer Qualifications: Engage a firm experienced in manufacturing sectional overhead doors similar to those indicated for this Project and with a record of successful in-service performance.
- C. Source Limitations: Obtain sectional doors from single source from single manufacturer.
 - 1. Obtain operators and controls from sectional door manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Standard for Sectional Doors: Fabricate sectional doors to comply with DASMA 102 unless otherwise indicated.

- F. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1.

1.08 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Faulty operation of hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
 - d. Delamination of exterior or interior facing materials.
 2. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 STEEL DOOR SECTIONS

- A. Exterior Section Faces and Frames: Fabricate from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated zinc coating and thickness.
1. Fabricate section faces from single sheets to provide sections not more than 24 inches (610 mm) high and of indicated thickness. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weathertight seal, with a reinforcing flange return.
 2. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.
- B. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.064-inch- (1.63-mm-) nominal coated thickness and welded to door section. Provide intermediate stiles formed from not less than 0.064-inch- (1.63-mm-) thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches (1219 mm) apart.
- C. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile.
- D. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place.

- E. Board Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard polystyrene or polyurethane board insulation, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84; or with glass-fiber-board insulation. Secure insulation to exterior face sheet. Enclose insulation completely within steel sections that incorporate the following interior facing material, with no exposed insulation:
 - 1. Interior Facing Material: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated thickness.
- F. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

2.02 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances shown on Drawings, and complying with ASTM A 653/A 653M for minimum G60 (Z180) zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced 2 inches (51 mm) apart for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.
- B. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.
 - 1. Vertical Track Assembly: Track with wall jamb brackets attached to track and attached to wall.
 - 2. Horizontal Track Assembly: Track with continuous reinforcing angle attached to track and supported at points from curve in track to end of track by laterally braced attachments to overhead structural members.
- C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.

2.03 HARDWARE

- A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
- B. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch- (2.01-mm-) nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors over 16 feet (4.88 m) wide unless otherwise recommended by door manufacturer.
- C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- (76-mm-) diameter roller tires for 3-

inch- (76-mm-) wide track and 2-inch- (51-mm-) diameter roller tires for 2-inch- (51-mm-) wide track.

- D. Push/Pull Handles: For push-up or emergency-operated doors, provide galvanized-steel lifting handles on each side of door.

2.04 LOCKING DEVICES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.
- B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.05 COUNTERBALANCE MECHANISM

- A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from steel-spring wire complying with ASTM A 229/A 229M, mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.
- B. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft. Provide one additional midpoint bracket for shafts up to 16 feet (4.88 m) long and two additional brackets at one-third points to support shafts more than 16 feet (4.88 m) long unless closer spacing is recommended by door manufacturer.
- C. Cables: Galvanized-steel lifting cables with cable safety factor of at least [5] [7] to 1.
- D. Cable Safety Device: Include a spring-loaded steel or spring-loaded bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if lifting cable breaks.
- E. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.
- F. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.06 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - 1. Comply with NFPA 70.
 - 2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

- C. Door-Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.
 - 1. Trolley: Trolley operator mounted to ceiling above and to rear of door in raised position and directly connected to door with drawbar.
- D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 11 05 13 "Common Motor Requirements for Equipment" unless otherwise indicated.
 - 1. Electrical Characteristics:
 - a. Phase: Single phase.
 - b. Volts: 208 V.
 - c. Hertz: 60.
 - 2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
 - 3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
 - 4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
 - 5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
 - 6. Use adjustable motor-mounting bases for belt-driven operators.
- E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- F. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
 - 1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
 - a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensor device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.
- G. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
 - 1. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
- H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed **25 lbf (111 N)**.

- I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.07 DOOR ASSEMBLY

- A. Steel Sectional Door: Sectional door formed with hinged sections.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
 - a. Amarr Garage Doors.
 - b. Arm-R-Lite.
 - c. C.H.I. Overhead Doors.
 - d. Clopay Building Products; a Griffon company.
 - e. Fimbel Architectural Door Specialties.
 - f. Haas Door; a Nofziger company.
 - g. Martin Door Manufacturing.
 - h. Overhead Door Corporation.
 - i. Raynor Garage Doors.
 - j. Wayne-Dalton Corp.
 - k. Windsor Republic Doors.
- B. Operation Cycles: Not less than 20,000.
- C. Steel Sections: Zinc-coated (galvanized) steel sheet with G60 (Z180) zinc coating.
 - 1. Section Thickness: 1-3/4 inches (44 mm).
 - 2. Exterior-Face, Steel Sheet Thickness: 0.064-inch- (1.63-mm-) nominal coated thickness.
 - a. Surface: Flat.
 - 3. Insulation: Board.
 - 4. Interior Facing Material: Zinc-coated (galvanized) steel sheet of manufacturer's recommended thickness to meet performance requirements.
- D. Track Configuration: Standard-lift
- E. Weatherseals: Fitted to bottom and top and around entire perimeter of door.
- F. Roller-Tire Material: Manufacturer's standard.
- G. Locking Devices: locking device assembly.
- H. Counterbalance Type: Torsion spring.

1. Baked-Enamel or Powder-Coated Finish: Color and gloss as selected by Architect from manufacturer's full range.
2. Finish of Interior Facing Material: Finish as selected by Architect from manufacturer's full range.

2.08 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.09 STEEL AND GALVANIZED-STEEL FINISHES

- A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Tracks:
 1. Fasten vertical track assembly to opening jambs and framing, spaced not more than 24 inches (610 mm) apart.
 2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
 3. Repair galvanized coating on tracks according to ASTM A 780.
- C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.03 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.04 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust doors and seals to provide weathertight fit around entire perimeter.
- D. Align and adjust motors, pulleys, belts, sprockets, chains, and controls according to manufacturer's written instructions.
- E. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

3.05 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION

DIVISION 9 - FINISHES

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:

- 1. Interior gypsum board.
- 2. Mold and moisture resistant gypsum board.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations and fabrication of control and expansion joints.
- C. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim and reveal accessory indicated.
 - 2. Textured Finishes: Provide 24 by 24 inch for each textured finish indicated and on same backing indicated for Work.
- D. Submit schedule of gypsum board panels and joint compounds including location using Drawing designations.
- E. UL Assemblies: Provide assembly numbers designations from UL's "Fire Resistance Directory." or GA-600, "Fire Resistance Design Manual" and associated information for each rated assembly utilizing gypsum board, including ICC-ES Evaluation Reports.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.05 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged or have been in direct contact with concrete.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency acceptable to authorities having jurisdiction.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

2.02 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.03 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
 - 1. American Gypsum.
 - 2. CertainTeed Corp.
 - 3. Georgia-Pacific Gypsum LLC.
 - 4. Continental Building Products.
 - 5. National Gypsum Company.
 - 6. US Gypsum Company.
- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.
 - 1. Thickness: Minimum 5/8 inch (15.9 mm), or as indicated on Drawings.
 - 2. Long Edges: Tapered .
- C. Sag-Resistant Gypsum Wallboard: ASTM C 36, manufactured to have more sag resistance than regular-type gypsum board.
 - 1. Thickness: 1/2 inch.
 - 2. Long Edges: Tapered.

2.04 ABUSE RESISTANT GYPSUM BOARD

- A. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 2.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Tough-Rock"; Georgia Pacific.
 - b. "Gold Bond Hi-Abuse XP"; National Gypsum Company;
 - c. "SHEETROCK Brand Abuse-Resistant Gypsum Panels"; United States Gypsum Co.
 - d. Air Renew Extreme Abuse/Impact, Certaainteed.
2. Core: 5/8 inch (15.9 mm), Type X where required to achieve fire resistance ratings.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.05 MOISTURE AND MOLD RESISTANT GYPSUM BOARD

- A. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and coated fiberglass mat on front and back surfaces.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "ToughRock Mold Guard"; Georgia Pacific.
 - b. "Gold Bond XP"; National Gypsum Company.
 - c. "Sheetrock Brand Mold Tough", United States Gypsum
2. Core: 5/8 inch (15.9 mm), Type X
3. Long Edges: Tapered.
4. Conforming to physical properties of ASTM C 36 and ASTM C 1177 on Glass mat back.
5. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.06 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc, Plastic, or Paper-faced galvanized steel sheet.
2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound .
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
 - g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.07 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M "Standard Specifications for Joint Treatment Materials for Gypsum Wallboard Construction" and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper reinforcing tape, unless otherwise indicated.
 - a. Provide alkali-resistant, polymer-coated glass-fiber mesh joint tape at veneer plaster, water-resistant panels, and tile backer board, unless otherwise indicated
 - 2. Exterior Gypsum Soffit Board: Paper.
 - 3. Tile Backing Panels: 10-by-10 glass mesh, self-adhering.
- C. Fire-rated drywall finishing tape: Self-adhesive tape tested in accordance with ASTM E 119 as a component in a gypsum board wall assembly having an hourly rating up to 2 hours.
 - 1. E-Z Taping System, Inc.; Fire Tape
- D. Setting-Type Joint Compounds for Abuse Resistant Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.
 - 1. Where setting-type joint compounds are indicated as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
 - 2. Use setting type at abuse resistant gypsum board and where required by gypsum board manufacturer.
 - 3. For topping compound, use sandable formulation.
- E. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.
 - 1. Ready-Mixed Formulation: Factory-mixed product.
 - a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
- F. Joint Compound for Exterior Applications:
 - 1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
- G. Joint Compound for Tile Backing Panels:
 - 1. As recommended by tile backing panel manufacturer.

2.08 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws for Interior Use: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
- C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- D. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates, including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Sprayed Fire-Resistive Materials: Coordinate with gypsum board assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of assemblies to comply with requirements specified in Division 07 Section "Applied Fireproofing."
- C. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- D. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Rated Assemblies: Do not deviate from approved UL Assemblies. Comply with rated assembly requirements.
- C. Install gypsum board panels raised a minimum of ¼ inch above finish floor unless raised installation is not allowed per fire resistive rating requirements.
- D. Permanently label rated walls above ceiling with hourly rating of assembly in 4 inch tall letters of contrasting color.

- E. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- F. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- G. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- H. Form control and expansion joints with space between edges of adjoining gypsum panels.
- I. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- J. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
 - 1. Accommodate deflection. Greater than ¼ inch coordinate with interior framing and deflection tracks.
- K. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- L. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.03 APPLYING INTERIOR GYPSUM BOARD

- A. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) **[or horizontally (perpendicular to framing)]** unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

- a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls where end joints are unavoidable, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 3. On Z-furring members, apply gypsum panels perpendicular to framing to minimize end joints. Locate edge joints over furring members.
 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
 5. Install panels with gap above finished floor.
- B. Multilayer Application:
1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.04 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect
1. Distance between control joints in walls or wall furring shall not be more than 30 feet.
 2. Extend control joints the full height of the wall or length of soffit/ceiling membrane.
 3. Control joints shall be installed where a partition or wall runs in an uninterrupted straight plane exceeding 30 linear feet.
 4. Control joints shall be installed in interior ceilings exceeding 2500 sq ft. The distance shall not be more than 50 feet between ceiling control joints in either direction.
 5. A control joint shall be installed where ceiling framing or furring changes direction

6. Where a control joint occurs in an acoustical or fire rated system, blocking shall be provided behind the control joint by using a backing material such as 5/8 in. type X gypsum panel product, mineral fiber, or other tested equivalent.
7. Wall or partition height door frames shall be considered a control joint.
8. Install control joints in furred assemblies where control joints occur in base exterior wall.

C. Interior Trim: Install in the following locations:

1. Cornerbead – Use at outside corners.
2. Bullnose bead – Use at outside corners, where indicated.
3. LC-Bead: J-shaped; exposed long flange receives joint compound – Use at exposed panel edges..
4. L-Bead: L-shaped; exposed long flange receives joint compound – Use where indicated.
5. U-Bead: J-shaped; exposed short flange does not receive joint compound.
6. Expansion (control) joint – Use where indicated or if not indicated at maximum spacing of 30 feet on center.
7. Curved-Edge Cornerbead: With notched or flexible flanges – Use at curved openings.

D. Exterior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges .

E. Aluminum Trim: Aluminum Trim: Install aluminum trim using standard gypsum wallboard finishing techniques according to manufacturer's literature.

1. End Caps: Where gypsum wallboard partition terminates and gypsum wallboard column wrap meets exterior glass curtain wall, etc., provide end caps, finish to match exterior glass framing system.

F. All trim, accessories and corner beads shall be installed using screws. "Crimping" tool and staple attachment is not allowed.

3.05 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

1. Use joint compounds recommended by manufacturer for gypsum board and for in-use conditions.
 - a. Setting Type: Use setting type where required for high- humidity and unconditioned areas, repairs, exterior gypsum soffit, and as required for rapid set.
 - b. Drying Type: Use product most suited for conditions and project requirements.
 - c. Finishing/Topping: Use products to best achieve level required.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
 - 2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for tile, not exposed to view and where indicated.
 - 3. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.
 - a. At panel surfaces that will be exposed to view unless otherwise indicated .
 - b. Apply Level 4 finish when final lighting is installed and utilized during finish and final evaluations.
- E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- F. Sand joint compound, including all drips, smears, and other deposits, so that final installation is completely smooth along tapered edges and in the same plane as the gypsum drywall itself; so that evidence of the joints is minimal with no ridges, humps, or other irregularities.
- G. Final installation to be acceptable in accordance with finish manufacturer's written instructions for finishes applied by others.

3.06 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes surface preparation and application of high-performance coating systems on the following substrates:
 - 1. Aliphatic Polyurethane Coatings for Exterior Substrates:
 - a. Steel/Galvanized Steel
 - 1) Exposed structural steel including steel lintels.
 - b. Exterior hollow metal doors and frames.
 - 2. Epoxy Coating for Interior Substrates:
 - a. Concrete masonry units (CMU).
 - b. Interior steel/hollow metal in wet or high humidity areas.
 - c. Gypsum board in toilet rooms and where indicated.
- B. Related Requirements:
 - 1. Division 05 Sections "Structural Steel Framing" and "Metal Fabrications" for shop priming of metal substrates with primers compatible with coating systems specified in this Section.
 - 2. Division 09 Section "Interior Painting" for general field painting.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of coating system and in each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 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.

1.04 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.05 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each coating system specified in Part 3.
 - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 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.

1.07 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 when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Carboline Company.
 - 2. Kelly-Moore Paints.
 - 3. Glidden Professional.
 - 4. M.A.B. Paints.
 - 5. PPG Paints, Inc.
 - 6. Sherwin-Williams Company (The).
 - 7. Tnemec Company, Inc.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

2.02 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and are listed in "MPI Approved Products List."
- B. 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. For each coat in a coating system, provide products recommended in writing by manufacturers of topcoat for use in coating system and on substrate indicated.
 - 3. Provide products of same manufacturer for each coat in a coating system.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior coatings applied at project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Primers, Sealers, and Undercoaters: 200 g/L.
 - 4. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: 250 g/L.
 - 5. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 - 6. Pre-Treatment Wash Primers: 420 g/L.
 - 7. Floor Coatings: 100 g/L.
 - 8. Shellacs, Clear: 730 g/L.
 - 9. Shellacs, Pigmented: 550 g/L.
- D. Colors: As selected by Architect from manufacturer's full range.

2.03 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. Masonry (CMU): 12 percent.
 - b. Gypsum Board: 12 percent.
- B. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.02 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and 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. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
- D. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions.
1. Clean surfaces with pressurized water in accordance with SSPC WJ4 Light Cleaning. Use pressure range of 100 to 600 psi (690 to 4140 kPa) at 6 to 12 inches (150 to 300 mm).
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
1. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 2. SSPC-SP 15 Commercial Grade Power Tool Cleaning
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods in accordance with SSPC-SP 16 with abrasives able to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
- H. Galvanized-Metal Structural Substrates: Remove grease and oil residue from galvanized structural members by mechanical methods in accordance with SSPC-SP 16 with abrasives able to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

3.03 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
1. Use applicators and techniques suited for coating and substrate indicated.
 2. 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.
 3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

- D. 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.

3.04 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner will engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
 - 1. Contractor shall touch up and restore coated surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.05 CLEANING AND PROTECTION

- 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.

3.06 EXTERIOR HIGH-PERFORMANCE COATING SYSTEMS SCHEDULE

- A. General: Provide the following aliphatic polyurethane coating systems based on Tnemec to establish quality standard for the various substrates, as indicated.
- B. Ferrous Metal: Provide the following finish systems over exterior ferrous-metal surfaces:
 - 1. Semi-Gloss Finish: One finish coat over an intermediate coat and a primer. Coating applicator shall verify that sand or shot blast preparation has been executed at shop on same day as primer.
 - a. Primer: Zinc-rich primer applied at spreading rate recommended by manufacturer.
 - 1) Tnemec: Series 394 PerimaPrime Zinc.
 - 2) S-W: Corothan I Mastic or Galvapak, B65 Series.
 - 3) PPG Paints: Durethane MCZ 97-699 Moisture Cure Organic Zinc
 - b. Intermediate Coat: Epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 3.0 to 8.0 mils.
 - 1) Tnemec: Series 66 Hi-Build Epoxoline II Polyamide Epoxy.
 - 2) S-W: Macropoxy 646 FC, B58 Series.

- 3) PPG Paints: 95-245 Rapid Coat DTR Epoxy
- c. Topcoat (Semi-Gloss): Aliphatic polyurethane enamel applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 4.0 mils.
 - 1) Tnemec: Series 1075 Endura-Shield.
 - 2) S-W: HiSolids Polyurethane, B65 Series.
 - 3) PPG Paints; 95-8800 Pitthane HB Semi-Gloss Urethane
- C. Galvanized Steel: Provide the following finish systems over exterior ferrous-metal surfaces:
 1. Finish: One finish coat over an intermediate coat and a primer. Coating applicator shall verify that sand or shot blast preparation has been executed at shop on same day as primer.
 - a. Intermediate Coat: Epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 3.0 to 8.0 mils.
 - 1) Tnemec: Series N69 Hi-Build Epoxoline II Polyamide Epoxy.
 - 2) S-W: Macropoxy 646 FC, B58 Series.
 - 3) PPG Paints: 95-245 Rapid Coat DTR Epoxy
 - b. Topcoat: Aliphatic polyurethane enamel applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 4.0 mils.
 - 1) Tnemec: Series 1075 Endura-Shield II.
 - 2) S-W: HiSolids Polyurethane, B65 Series.
 - 3) PPG Paints: 95-8800 Pitthane Semi-Gloss Urethane
 - D. Exterior Steel Doors and Frames: Provide the following finish systems over exterior ferrous-metal surfaces:
 1. Semi-Gloss Finish: One finish coat over an intermediate coat and a primer. Coating applicator shall verify that sand or shot blast preparation has been executed at shop on same day as primer.
 - a. Primer: Alkyd primer applied at spreading rate recommended by manufacturer.
 - 1) S-W: Primer: Kem Bond HS Primer
 - 2) PPG Paints 94-258 Multiprime Fast Dry 2.8 VOC Universal Primer
 - b. Intermediate Coat: Urethane Alkyd applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 4.0 mils.
 - 1) S-W Coat: Industrial Urethane Alkyd B54W00151.
 - 2) PPG Paints: 7-282 series Industrial Int/Ext Alkyd

- c. Topcoat: Aliphatic polyurethane enamel applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 4.0 mils.
 - 1) S-W Coat: Industrial Urethane Alkyd B54W00151.
 - 2) PPG Paints: 7-282 series Industrial Int/Ext Alkyd

3.07 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. General: Provide the following water based epoxy coating systems based on Sherwin Williams to establish quality standard for the various substrates, as indicated:
- B. CMU Substrates: Waterbased Pre-Catalyzed Epoxy system:
 - 1. Epoxy System: Polyamide Water Based Catalyzed Epoxy Coating with block filler applied at spreading rate recommended by manufacturer as sufficient to fill pores:
 - a. Block Filler: Block filler applied at spreading rate recommended by manufacturer to produce a pinhole free surface in accordance with PDCA P12, Level 3.
 - 1) SW: 1 coat S-W Heavy Duty Block Filler, B42 Series.
 - 2) PPG: 1 coat Pitt-Glaze WB Interior/Exterior Block Filler, 16-90.
 - b. Intermediate and Finish Coat: Epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 3.0 to 8.0 mils.
 - 1) SW: 2 coats S-W Water Based Pro Industrial Pre-Catalyzed Epoxy, K46 Series.
 - 2) PPG: 2 coats Pitt-Glaze WB1 Interior Semi-Gloss Pre-Catalyzed Water-Borne Acrylic Epoxy, 16-510 Series.
- C. Steel Substrates, Shop Fabricated and primed: Waterbased Pre-Catalyzed Epoxy system:
 - 1. Basis of Design: One finish coat over an intermediate coat and a primer. Coating applicator shall verify that sand or shot blast preparation has been executed at shop on same day as primer.
 - a. Primer: Applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 3.0 - 4.0 mils.
 - 1) S-W: Corothane I Galvapak, B65 Series.
 - 2) PPG: 97-699 Durethane MCZ Moisture Cure Organic Zinc.
 - b. Intermediate Coat and Finish Coat: Epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 4.0 mils per coat.
 - 1) S-W: 2 coats Pro Industrial Pre-Catalyzed WB Epoxy, K46 Series.

PPG: 2 coats Pitt-Glaze WB1 Interior Semi-Gloss Pre-Catalyzed
Water-Borne Acrylic Epoxy, 16-510 Series.

D. Gypsum Board Substrates: Waterbased Pre-Catalyzed Epoxy system

1. Basis of Design: Semi-Gloss Water Based Pre-Catalyzed Epoxy Coating:

a. Primer: 1 coat

- 1) SW ProMar 200 0 VOC Primer, B28W2600 Series.
- 2) PPG Speedhide Zero Interior Zeo VOC Latex Sealer, 6-4900 Series.

b. Finish: 2 coats

- 1) SW Pro-Industrial Pre-Catalyzed WB Epoxy, K46 Series.
- 2) PPG: 2 coats Pitt-Glaze WB1 Interior Semi-Gloss Pre-Catalyzed
Water-Borne Acrylic Epoxy, 16-510 Series.

END OF SECTION

DIVISION 26 - ELECTRICAL

SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Scope of Work
2. Codes and Standards
3. Coordination Between Contractors
4. Work and Workmanship
5. Drawings
6. Submittals
7. Permits
8. Minor Deviations
9. Record Drawings
10. Project Closeout
11. Guarantee
12. Inspection
13. Assignment of Miscellaneous Work
14. Materials and Equipment
15. Product and Material Approval
16. Caulking and Fire Stopping
17. Attaching to Building Construction
18. Equipment Installation
19. Occupational Safety & Health Administration

B. Related Requirements:

1. Contractor shall thoroughly review entire bid documents, including all drawings and specifications prior to bidding and include all required electrical work in his bid, even if not shown on electrical plans and specification.

1.2 SCOPE OF WORK

- A. This section of Specifications contains instructions and information applicable to the electrical contractor and his subcontractors.
- B. In event of conflict between the requirements in Drawings, the General Provisions, or the Specifications, the bidder shall inform Engineer of such conflict in writing not later than five days before bids are due. If such notification is not provided, Contractor shall accept Engineer's resolution of conflicts without any further compensation.
- C. This Section contains a general scope of work to be performed under this contract; however, this section does not include all work to be performed, only a general description of the project.
 1. All electrical equipment indicated herein and as indicated on Drawings to make this structure electrically complete.

2. Provide electrical service entrance, capacity as shown on the plans.
3. Provide overcurrent protection.
4. Provide grounding and bonding.

1.3 CODES AND STANDARDS

- A. Materials and workmanship shall comply with Code.
- B. Codes and standards shall include state laws, local ordinances, utility company regulations and requirements of nationally accepted codes and standards.
- C. In case of difference between building codes, specifications, state laws, local ordinances, industry standards and utility company regulations and contract documents, the most stringent shall govern. Contractor shall promptly notify Engineer in writing of such difference.
- D. Non-compliance: Should Contractor perform any work that does not comply with requirements of applicable building codes, state laws, local ordinances, industry standards and utility company regulations, he shall bear all costs arising in correcting the deficiencies.
- E. Building Codes: Indiana Building Code; Indiana Plumbing Code; Indiana Mechanical Code; Indiana Electrical Code and American Disabilities Act Title III, Appendix ADAAG.
- F. These requirements are to be considered minimum and are to be exceeded when so indicated on Drawings or herein specified.
- G. Industry Standards, Code and Specifications
 1. ADA Americans with Disabilities Act
 2. ANSI American National Standards Institute
 3. ASTM American Society for Testing and Materials
 4. ETL Electrical Testing Laboratories
 5. IEEE Institute of Electrical and Electronics Engineers
 6. ICEA Insulated Cable Engineers Association
 7. NECA National Electrical Contractors Association
 8. NEMA National Electrical Manufacturers Association
 9. NESC National Electrical Safety Code
 10. NFPA The National Fire Protection Association
 11. NIST National Institute of Standards and Technology
 12. OSHA Occupational Safety & Health Administration
 13. UL Underwriters Laboratory Inc.

1.4 COORDINATION BETWEEN CONTRACTORS

- A. Each contractor and subcontractor shall study all Drawings applicable to Work, so complete coordination between trades will be effected. It is responsibility of each Contractor and Subcontractor to leave necessary room for other trades. No extra compensation will be allowed to cover cost of removing piping, conduit, ducts or equipment found encroaching on space required by others.
- B. All power outages shall be scheduled in advance with the Owner. At least two weeks advance notice is required for power transfers to allow for building user notification and scheduling.

1.5 WORK AND WORKMANSHIP

- A. Provide all required labor, materials, equipment and contractor's services necessary for complete installation of systems required in full conformity with requirements of authorities having jurisdiction, all as indicated on Drawings and herein specified.
- B. Finished job shall be functional and complete in every detail including any and all such items required for complete system, whether or not these items be specified or shown on Drawings.
- C. Each contractor shall acquaint himself with details of all work to be performed by other trades and take necessary steps to integrate and coordinate his work with other trades.
- D. It is assumed that electrical contractor is familiar with standard first class installation procedures. Therefore, the Specifications do not attempt to include every detail or operation necessary for complete installation.
- E. Electrical contractor shall be responsible for the protection, safekeeping and cleanliness of all existing equipment, material, etc. located in spaces to be remodeled in which he is working. As part of his responsibility, he shall provide necessary covers, structures, etc., as required to keep all dirt, water, moisture and dust from equipment. Method the contractor proposes to use in protecting equipment shall be coordinated with Engineer and Owner's Representative for approval before any work is started. Any damage sustained during construction shall be corrected or replaced by electrical contractor.

1.6 DRAWINGS

- A. Conduit runs are shown on Drawings. Care shall be taken to coordinate conduit runs with piping, ductwork and other equipment to be installed by other trades. Routing of large conduits or groups of conduits shall be approved by the Engineer.
- B. Junction boxes are shown on Drawings. Contractor may install small junction boxes, concealed above ceilings, at his discretion as long as they are accessible. Large junction boxes or those exposed in walls or ceilings shall have locations approved by Engineer.
- C. Number of wires for electrical circuits are shown on Drawings. Number of wires required shall be installed to provide indicated functions. Verify all wiring requirements.
- D. Wiring requirements for special systems may vary between acceptable manufacturers; conduit system or riser diagram shown will be that required by indicated manufacturer, but it shall be the contractor's responsibility to obtain wiring requirements from manufacturer of equipment he intends to use and include cost of this wiring in his bid.
- E. Electrical work shall conform to requirements shown on Drawings. Existing structure shall take precedence over electrical drawings. Because of small scale of electrical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. Contractor shall investigate structural and finish conditions and provide such fittings and accessories as may be required to meet such conditions.

1.7 SUBMITTALS

- A. In addition to the requirements in Division 01 Section "Submittal Procedures," comply with the following requirements:
 - 1. Review of product data and shop drawings does not relieve Contractor of responsibility for correct ordering of material and equipment. Submittals shall be reviewed by the Contractor, Engineer and Owner.
 - 2. Include all significant data on submittals shown in specifications and on equipment schedules.
 - 3. Contractor review should insure that equipment will fit into available space.
 - 4. Submit submittals in electronic form and include all related equipment in one file.
 - 5. After award of contract, submit within 30 days.
 - 6. Provide submittals for load centers, all low voltage cabling, lights, receptacles, device plates, and raceway.
 - 7. Contractor to affix his company name (in form of a stamp) and project name to all Shop Drawings and submittals before submitting.

1.8 PERMITS

- A. Contractor shall pay for all permits required to carry out his work.
- B. Permits shall be posted in prominent place at building site, protected properly from weather and physical damage.

1.9 MINOR DEVIATIONS

- A. For purpose of clarity and legibility, Drawings are diagrammatic, although size and location of equipment and piping are drawn to scale wherever possible. Verify contract document information at site.
- B. Drawings may indicate required sizes and points of termination and suggested routes. The Drawings do not indicate all necessary offsets. Install work in manner to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear. Do not scale from Drawings.

1.10 RECORD DRAWINGS (AS-BUILTS)

- A. In addition to the requirements in Division 01 Section "Project Record Documents," comply with the following:
 - 1. During construction, maintain complete and legible set of Drawings, showing changes and deviations between actual construction and Engineer's Drawings. Submit marked-up sets to Engineer for review.
 - 2. As-Built Drawings shall show ALL conduit routings, junction boxes and wiring.

1.11 PROJECT CLOSEOUT

- A. In addition to the requirements in Division 01 Section "Closeout Procedures," comply with the following:
 - 1. Contractor shall perform the following at time the building is determined to be complete and ready to turn over to Owner:
 - a. All equipment and systems shall be checked by respective contractor for correct adjustment and operation and made to function as intended.

1.12 GUARANTEE

- A. Unless noted otherwise, materials and equipment shall be guaranteed for a period of one year after final acceptance of Project by Owner.
- B. Contractor agrees to make good damage to construction of building or site, or equipment which, in the opinion of the Architect/Engineer, is a result of, or incidental to, use of materials, equipment or workmanship which is inferior, defective or not in accordance with the Specifications.
- C. Contractor shall keep Work in good repair during the guarantee period. In case such repairs become necessary, Owner shall give written notice to Contractor to commence such repairs. If after 30 days the Contractor has failed to make such repairs, the Owner may make such repairs either by its own employees or by independent contract and may thereupon recover from Contractor and his Sureties the cost of repairs so made, together with the cost of supervision and inspection thereof. Owner shall have 60 days after expiration of said guarantee period in which to notify Contractor of any such repairs necessary.
- D. Determination of the necessity for repairs shall rest entirely with the Architect/Engineer whose decision upon matter shall be final and obligatory upon the Contractor. Guarantee herein stipulated shall extend to whole body improvement and all its appurtenances.
- E. Include the guarantee in the Operation and Maintenance Manual.

1.13 INSPECTION

- A. At the completion of the electrical installation, the electrical contractor shall notify the local and state authorities to arrange the final inspection of Work. Provide the inspection certificate to Architect.

PART 2 - PRODUCTS

2.1 ASSIGNMENT OF MISCELLANEOUS WORK

- A. Excavating and backfilling for electrical work shall be by electrical contractor.
 - 1. Excavate pipe trenches to proper depth. Where rock is encountered, excavate to 6 inches below pipe and refill to 6 inches above pipe with compacted granular fill. Granular fill shall

- consist of dune sand, gravel or other suitable material containing not more than 10 percent by weight passing #200 sieve and 100 percent passing 1-inch sieve.
2. Excavation for utilities shall not be backfilled until all required tests are performed and approved by Engineer and the utility company.
 3. Whenever underground feeders are run below footings and grade beams, contractor shall backfill the void with poured, steel-reinforced concrete to elevation of bottom of footing or grade beam.
 4. Backfill within building lines shall be made with granular fill or compacted backfill material laid in 6-inch layers and tamped to specified compaction after each layer.
 5. Backfill under paved area shall be made with granular fill compacted backfill material laid in 12-inch layers and tamped to compaction after each layer.
 6. Backfill under open yards or fields shall be made with non-compacted backfill laid in layers not to exceed 24 inches deep. Sand trenches may be allowed to settle naturally and shall be refilled back to grade as required during first year after final acceptance.
 7. Contractor shall refill, regrade and refinish any area that becomes unsatisfactory due to settlement within one year after final acceptance.
 8. Contractor shall verify all existing grades, inverts, utilities, obstacles and topographical conditions prior to any trenching, excavation or underground installation. In event existing conditions are such as to prevent installation in accordance with Drawings, contractor shall immediately notify Engineer.
 9. Provide appropriate plastic marker tape buried directly above underground electric and communication lines continuously along length of lines. Marker tape shall be located 12 inches below finished grade, but no closer than 12 inches above underground lines. Tape shall be a minimum of 6 inches wide.
 10. Refer to Division 31 Section "Earth Moving," for additional requirements. In event of conflict between this section and Division 31 Section "Earth Moving," Division 31 Section "Earth Moving" shall apply, unless otherwise indicated by Engineer.
- B. Cutting and patching for electrical equipment shall be by the electrical contractor.
1. Cut structural materials where required after approval from Architect/Engineer.
 2. Electrical contractor shall provide all his own cutting and patching in finished areas.
- C. Sleeves and small openings (not framed) for electrical equipment shall be furnished and set by electrical contractor.
1. Where electrical conduits pass through walls, roofs, ceilings, or floors, electrical contractor shall have sleeves set for them when floors, walls, ceilings or roofs are constructed. If any holes are cut in finished work where sleeves have been omitted, cutting shall be done with a concrete coring machine or other approved means and only with consent of Engineer. All such holes are to be carefully cut and shall not be larger than necessary. These holes are to be entirely covered by escutcheon plates when work is completed. Sleeves shall be made of pipe or rolled sheet steel no lighter than No. 18 gauge.
 2. Where conduits pass through sleeves in exterior walls above grade, annular space shall be caulked with oakum and filled inside and out with non-hardening, waterproof sealant finished off flush with both faces of wall.
 3. Provide penetration seals for all conduits penetrating the building wall below grade. This shall include service entrance, site power and lighting circuits, etc.
 - a. Description: The pipe to wall penetration closures shall be "Link-Seal" or equal, as manufactured by PSI/Thunderline Corporation – Houston, TX. Seals shall be modular type, consisting of synthetic rubber shaped to continuously fill the annular space between the pipe and wall opening. After the seal assembly is positioned in the sleeve, the rubber sealing elements shall provide an absolutely water-right seal

between the pipe and wall opening. The seal shall be constructed as to provide electrical insulation between the pipe and wall, thus reducing changes of cathodic reaction between these two members.

- b. Wall Opening: Provide "Century-Line" sleeves or equal as manufactured by PSI/Thunderline Corporation – Houston, TX. Contractor shall determine the required inside diameter of each individual wall opening of sleeve before ordering, fabricating or installing. The inside diameter of each wall opening shall be sized as recommended by the manufacturer to fit the pipe and Link-Seal to assure a water-tight joint. Sizing (correct Link-Seal model and number of links per seal) may be obtained through manufacturer's catalog. If pipe O.D is non-standard due to coating, insulation, etc. consult Thunderline's factory for engineering assistance and recommendation before proceeding with wall opening detail.

- D. Color Coding: Responsibility for correct color coding shall be by the electrical contractor.

2.2 MATERIALS AND EQUIPMENT

- A. Electrical equipment shall be new, listed by UL and shall conform to NEMA and ICEA standards.
- B. Materials used for like service shall be by same manufacturer (i.e., all motor starters to be by same manufacturer).
- C. All materials and equipment, including any hangers, supports, fastenings or accessory fittings, shall have corrosion protection suitable for atmosphere in which they are installed, whether located indoors or out. Care shall be taken during installation to assure integrity of corrosion protection.
- D. All screws, bolts, nuts, clamps, fittings or other fastening devices shall be made up tight. All bolts, screws, nuts and other threaded devices shall have standard threads and heads so they may be installed and replaced when necessary without special tools.

2.3 PRODUCT AND MATERIAL APPROVAL

- A. A Specification followed by one or more manufacturers is limited to those manufacturers. Names of other manufacturers may be submitted for approval to Engineer a minimum of ten (10) days prior to receiving bids. Approval will be issued by Addendum if granted.
- B. A Specification followed by one or more manufacturers and "or approved equal" is open to all equal products or materials; however, Contractor shall supply one of listed manufacturers at no additional cost if Engineer finds substituted product unsatisfactory.

2.4 CAULKING AND FIRESTOPPING

- A. In addition to the requirements in Division 07 Section "Penetration Firestopping," comply with this Article.
- B. All raceway and sleeve penetrations of fire barriers shall be sealed to achieve fire resistance equivalent to fire separation.
 - 1. Maintain fire rating per ASTM E-814 and UL 1479.

2. This assembly must also maintain a watertight seal between floor or wall and pipe.
- C. For other penetrations through non-rated walls, partitions, floors and ceilings, caulk the space between raceways and raceway sleeves with non-staining, waterproof gun grade compound. Apply caulking compound by the gun method using nozzles of a proper size to fit the width of joint. Prepare the joint for caulking by packing it tightly with a resilient foam or rope yarn.
- D. Products: Subject to compliance with requirements, provide one of the following:
 1. Penetration sealant:
 - a. 3M Brand "Moldable Putty Pads": and "Moldable Putty Stix"
 - b. 3M Brand "Fire Barrier" Caulk, Putty or Penetrating Sealing Systems
 - c. Dow Corning "Fire Stop Foam: and "Fire Stop Sealant" systems
 - d. Insta-Foam Products, Inc. "Insta-Fire Seal Silicone RTV Foam"
 - e. Standard Oil Engineering Materials Company, "Frye Putty"
 - f. Chase technology "Chase Foam #CTC PR-855"
 2. Intumescent Sealant for use at openings and sleeves involving flexible cable.
 - a. 3M Brand "Fire Barrier" caulk or putty, FS-195 Wrap Strip and CS-195 Composite Sheet.
 - b. Dow Corning "Fire Stop Intumescent Wrap Strip"
 - c. Fox Couplings, Inc. "The Fox Cast-in-Place Coupling"
- E. Performance Characteristic: Firestopping materials shall conform to both Flame (F) and Temperature (T) ratings as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire test.
 1. F Rating shall be a minimum of one hour but not less than the fire resistance rating of the assembly being penetrated.
 2. Conduct the fire test with a minimum positive pressure differential of 0.01 inches of water column.
- F. Quality Assurance: Installer qualifications – a firm specializing in firestopping installation with not less than two years of experience or trained and approved by firestopping manufacturer.

PART 3 - EXECUTION

3.1 ATTACHING TO BUILDING CONSTRUCTION

- A. Equipment raceway supports shall be attached to structural members (beams, joists, etc.) rather than to floor or roof slabs. Do not attach to ceiling support wires.
- B. Where equipment and raceway is suspended from existing concrete or masonry construction, use expansion shields to attach supports to construction. Expansion shield bolt diameter shall be same size as support rod diameter, hereinafter specified. Expansion shields shall be Star Double, Star Gloxin, Star Loxin or approved equal.

- C. Where existing masonry is not suitable to receive and hold expansion shield or where other means of attachment is advantageous, Contractor shall submit alternate method for approval by Engineer.
- D. Equipment to be installed in groups shall not be mounted directly to masonry or concrete walls. Mount 1- by 1-inch structural channel such as Unistrut, to wall and secure equipment to these channels.
- E. Where raceways is suspended from structural steel building framing or supporting members, furnish and install beam clamps for attaching piping device to building member.
- F. Obtain approval from Owner and structural engineer before cutting or welding to structural members, or before hanging heavy equipment.

3.2 EQUIPMENT INSTALLATION

- A. All equipment must be installed such that maintenance and service may be properly accomplished. If necessary, the Owner, at their option, may require the contractor to demonstrate the service on any piece of equipment to determine sufficient service space exists. If the service space is not adequate, the equipment shall be relocated at no additional cost to the Owner such that sufficient service space is achieved.

3.3 OCCUPATIONAL SAFETY & HEALTH STANDARDS

- A. All work shall comply with current requirements of U.S. Department of Labor-Occupational Safety & Health Administration, entitled Occupational Safety and Health Standards; National Consensus Standards and Established Federal Standards.

END OF SECTION

SECTION 26 05 19 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- B. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2 and Type SO.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper.
- B. Branch Circuits: Copper.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.
- B. Exposed Feeders: Type THHN-2-THWN-2, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-2-THWN-2, or single conductors in raceway; or metal-clad cable, Type MC.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.
- E. Feeders Installed below Raised Flooring: Type THHN-2-THWN-2, single conductors in raceway.
- F. Exposed Branch Circuits, Including in Crawlspace: Type THHN-2-THWN-2, single conductors in raceway.
- G. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-2-THWN-2, single conductors in raceway.
- H. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conduit Fill: Unless otherwise indicated, install no more than the following in a single conduit or EMT:
 - 1. Single-Phase Circuits: Three circuits, phases A, B, and C, and associated grounded (neutral) conductors, and equipment grounding conductor.
 - 2. Three-Phase Circuits: One circuit, phases A, B, and C, and grounded conductor where applicable, and equipment grounding conductor.
- B. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- C. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

- D. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- E. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- F. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- G. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
- B. Make splices, terminations, and taps that are compatible with conductor material.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- B. Test and Inspection Reports: Prepare a written report to record the following:
1. Procedures used.
 2. Results that comply with requirements.
 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION

SECTION 26 05 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes grounding and bonding systems and equipment.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Burndy; Part of Hubbell Electrical Systems.
 - 2. ERICO International Corporation.
 - 3. Harger Lightning and Grounding.
 - 4. ILSCO.
 - 5. O-Z/Gedney; A Brand of the EGS Electrical Group.

2.2 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.
 1. Bury at least 24 inches below grade.
- C. Conductor Terminations and Connections:
 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 2. Underground Connections: Welded connectors except as otherwise indicated.
 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.4 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- D. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

END OF SECTION

SECTION 26 05 29 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.2 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.3 ACTION SUBMITTALS

- A. Product Data: For steel slotted support systems.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 5. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Not permitted.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc. a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.
 7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

D. Steel Slotted Support Systems: Select material suitable for environmental conditions.

1. Outdoors: Metallic coated.
2. Corrosive Locations (Swimming Pools, Dishwashing): Nonmetallic coated.
3. Indoors: Painted.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
1. To Wood: Fasten with lag screws or through bolts.
 2. To New Concrete: Bolt to concrete inserts.
 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 4. To Existing Concrete: Expansion anchor fasteners.
 5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 6. To Light Steel: Sheet metal screws.
 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

END OF SECTION

SECTION 26 05 33 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Surface raceways.
5. Boxes, enclosures, and cabinets.
6. Handholes and boxes for exterior underground cabling.

1.2 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
1. Structural members in paths of conduit groups with common supports.
 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. GRC: Comply with ANSI C80.1 and UL 6.
- C. IMC: Comply with ANSI C80.6 and UL 1242.
- D. EMT: Comply with ANSI C80.3 and UL 797.
- E. FMC: Comply with UL 1; zinc-coated steel.
- F. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

- G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 - 2. Fittings for EMT:
 - a. Material: Steel. Die-cast is not permitted.
 - b. Type: Setscrew or compression.
- H. Joint Compound for IMC and GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. RNC: Type EPC-40-PVC and Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- C. Continuous HDPE: Comply with UL 651B.
- D. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.
- E. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.4 SURFACE RACEWAYS

- A. Listing and Labeling: Surface raceways shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5.
- C. Surface Nonmetallic Raceways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy or aluminum, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum or galvanized, cast iron with gasketed cover.
- G. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- H. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- I. Gangable boxes are prohibited.
- J. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic or fiberglass.
 - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

2.6 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:
 - 1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
 - 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of polymer concrete.
 - 1. Standard: Comply with SCTE 77.
 - 2. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
 - 3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
 - 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - 5. Cover Legend: Molded lettering, "ELECTRIC."

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: GRC.
 - 2. Concealed Conduit, Aboveground: RNC, Type EPC-40-PVC.
 - 3. Underground Conduit: RNC, Type EPC-80-PVC, direct-buried.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated.
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - 2. Exposed and Subject to Physical Damage: GRC. Raceway locations include the following:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - d. Electrical rooms.
 - e. Utility tunnels.
 - 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 4. Concealed in Exterior Walls: RNC, Type EPC-40-PVC.
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 6. Damp or Wet Locations: GRC or IMC.
 - 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 - 2. EMT: Use steel fittings. Comply with NEMA FB 2.10.
 - 3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum boxes or fittings in contact with concrete or earth.
- F. Install surface raceways only where indicated on Drawings.
- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
- D. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- E. Install no more than the equivalent of three 90-degree bends in any conduit. Support within 12 inches of changes in direction.
- F. Conceal conduit and EMT within finished walls, ceilings, and below floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- G. Support conduit within 12 inches of enclosures to which attached.
- H. Raceways Embedded in Slabs: Not permitted.
- I. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- L. Surface Raceways:
 - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 - 2. Secure surface raceway with self-adhesive tape. Do not use screws to penetrate surface.
- M. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.
- N. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.

2. Where an underground service raceway enters a building or structure.
 3. Where otherwise required by NFPA 70.
- O. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to bottom of box unless otherwise indicated.
- P. Locate boxes so that cover or plate will not span different building finishes.
- Q. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Division 31 Section "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
5. Underground Warning Tape: Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

- D. Install handholes with bottom below frost line, 30 inches below grade.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.7 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 26 05 43 – UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks, and in single duct runs.
 - 2. Handholes and boxes.
 - 3. Manholes.

1.2 ACTION SUBMITTALS

- A. Product Data: For accessories for manholes, handholes, and boxes.
- B. Shop Drawings for Precast or Factory-Fabricated Underground Utility Structures: Include plans, elevations, sections, details, attachments to other work, and accessories, including the following:
 - 1. Duct entry provisions, including locations and duct sizes.
 - 2. Reinforcement details.
 - 3. Frame and cover design and manhole frame support rings.
 - 4. Ladder details.
 - 5. Grounding details.
 - 6. Dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
 - 7. Joint details.
- C. Shop Drawings for Factory-Fabricated Handholes and Boxes: Include dimensioned plans, sections, and elevations, and fabrication and installation details, including the following:
 - 1. Duct entry provisions, including locations and duct sizes.
 - 2. Cover design.
 - 3. Grounding details.
 - 4. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.

1.3 QUALITY ASSURANCE

- A. Comply with ANSI C2.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUIT

- A. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.
- B. RNC: NEMA TC 2, Type EPC-40-PVC and Type EPC-80-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

2.2 NONMETALLIC DUCTS AND DUCT ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ARNCO Corp.
 - 2. Beck Manufacturing.
 - 3. Cantex, Inc.
 - 4. CertainTeed Corp.; Pipe & Plastics Group.
 - 5. Condux International, Inc.
 - 6. ElecSys, Inc.
 - 7. Electri-Flex Company.
 - 8. IPEX Inc.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Manhattan/CDT; a division of Cable Design Technologies.
 - 11. Spiraduct/AFT Cable Systems, Inc.
- B. Underground Plastic Utilities Duct: NEMA TC 6 & 8, Type EB-20-PVC, ASTM F 512, UL 651A, with matching fittings by the same manufacturer as the duct, complying with NEMA TC 9.
- C. Duct Accessories:
 - 1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling.
 - 2. Warning Tape: Underground-line warning tape specified in Section 26 05 53 "Identification for Electrical Systems."
 - 3. Concrete Warning Planks: Nominal 12 by 24 by 3 inches in size, manufactured from 6000-psi concrete.
 - a. Color: Red dye added to concrete during batching.
 - b. Mark each plank with "ELECTRIC" in 2-inch- high, 3/8-inch- deep letters.

2.3 HANDHOLES AND BOXES

- A. Description: Comply with SCTE 77.
 - 1. Color: Green.
 - 2. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.

3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 5. Cover Legend: Molded lettering, "ELECTRIC" or "TELEPHONE" as applicable for each service.
 6. Handholes 12 inches wide by 24 inches long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.
- B. Fiberglass Handholes and Boxes with Polymer Concrete Frame and Cover: Sheet-molded, fiberglass-reinforced, polyester resin enclosure joined to polymer concrete top ring or frame.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC
 - c. Christy Concrete Products.
 - d. Synertech Moulded Products, Inc.; a division of Oldcastle Precast.

2.4 PRECAST MANHOLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Carder Concrete Products.
 2. Christy Concrete Products.
 3. Elmhurst-Chicago Stone Co.
 4. Oldcastle Precast Group.
 5. Riverton Concrete Products; a division of Cretex Companies, Inc.
 6. Utility Vault Co.
 7. Wausau Tile, Inc.
- B. Comply with ASTM C 858 and with interlocking mating sections, complete with accessories, hardware, and features.
1. Windows: Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional 12 inches vertically and horizontally to accommodate alignment variations.
 - a. Windows shall be located no less than 6 inches from interior surfaces of walls, floors, or roofs of manholes, but close enough to corners to facilitate racking of cables on walls.
 - b. Window opening shall have cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.
 - c. Window openings shall be framed with at least two additional No. 4 steel reinforcing bars in concrete around each opening.
- C. Concrete Knockout Panels: 1-1/2 to 2 inches thick, for future conduit entrance and sleeve for ground rod.

- D. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation and Backfill: Comply with Division 31 Section "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.
- B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
- C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Division 32 Section "Turf and Grasses" and Division 32 Section "Plants."
- D. Cut and patch existing pavement in the path of underground ducts and utility structures according to Division 01 Section "Cutting and Patching."

3.2 DUCT INSTALLATION

- A. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.
- B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches, both horizontally and vertically, at other locations, unless otherwise indicated.
- C. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.
- D. Duct Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately 10 inches o.c. for 5-inch ducts, and vary proportionately for other duct sizes.
 - 1. Begin change from regular spacing to end-bell spacing 10 feet from the end bell without reducing duct line slope and without forming a trap in the line.
 - 2. Grout end bells into structure walls from both sides to provide watertight entrances.
- E. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 10 feet outside the building wall without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Install conduit penetrations of building walls as specified in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

- F. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.
- G. Pulling Cord: Install 200-lbf- test nylon cord in ducts, including spares.
- H. Direct-Buried Duct Banks:
 - 1. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
 - 2. Space separators close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches between tiers.
 - 3. Excavate trench bottom to provide firm and uniform support for duct bank. Prepare trench bottoms as specified in Division 31 Section "Earth Moving" for pipes less than 6 inches in nominal diameter.
 - 4. Install backfill as specified in Division 31 Section "Earth Moving."
 - 5. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand-place backfill to 4 inches over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
 - 6. Install ducts with a minimum of 3 inches between ducts for like services and 6 inches between power and signal ducts.
 - 7. Depth: Install top of duct bank at least 36 inches below finished grade, unless otherwise indicated.
 - 8. Set elevation of bottom of duct bank below the frost line.
 - 9. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
 - b. For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
 - 10. Warning Planks: Bury warning planks approximately 12 inches above direct-buried ducts and duct banks, placing them 24 inches o.c. Align planks along the width and along the centerline of duct bank. Provide an additional plank for each 12-inch increment of duct-bank width over a nominal 18 inches. Space additional planks 12 inches apart, horizontally.

3.3 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of ducts, and seal joint between box and extension as recommended by the manufacturer.

- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas and trafficways, set so cover surface will be flush with finished grade. Set covers of other handholes 1 inch above finished grade.
- D. Install handholes and boxes with bottom below the frost line, 30 inches below grade.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
- F. Field-cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.4 GROUNDING

- A. Ground underground ducts and utility structures according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

3.5 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
 - 2. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.
 - 3. Test manhole and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.6 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump. Remove foreign material.

END OF SECTION

SECTION 26 05 44 – SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Division 07 Section "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.

- b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. GPT Industries.
 - d. Metraflex Company (The).
 - e. Pipeline Seal and Insulator, Inc.
 - f. Proco Products, Inc.
 - 2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Reinforced nylon polymer.
 - 4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Presealed Systems.

2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 07 92 00 "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel or cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION

SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for conductors.
2. Underground-line warning tape.
3. Warning labels and signs.
4. Instruction signs.
5. Equipment identification labels.
6. Miscellaneous identification products.

1.2 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.

PART 2 - PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

- A. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- C. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.2 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
 - a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, compounded for direct-burial service.
 - b. Overall Thickness: 5 mils.
 - c. Foil Core Thickness: 0.35 mil.
 - d. Weight: 28 lb/1000 sq. ft.
 - e. 3-Inch Tensile According to ASTM D 882: 70 lbf, and 4600 psi.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE,
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

2.3 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.4 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.5 EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: Screw-attached, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
 - 1. Self-Adhesive equipment identification labels are not permitted.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- D. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
- E. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coded conductor insulation to identify the phase.
 - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
 - a. Color shall be factory applied.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.

- 3) Phase C: Blue.
- 4) Common Neutral: White.
- 5) Neutral, Phase A: White with black stripe.
- 6) Neutral, Phase B: White with red stripe.
- 7) Neutral, Phase C: White with blue stripe.
- 8) Equipment Grounding Conductor: Green.

c. Colors for 480/277-V Circuits:

- 1) Phase A: Brown.
- 2) Phase B: Orange.
- 3) Phase C: Yellow.
- 4) Common Neutral: Gray.
- 5) Neutral, Phase A: Gray with brown stripe.
- 6) Neutral, Phase B: Gray with orange stripe.
- 7) Neutral, Phase C: Gray with yellow stripe.
- 8) Equipment Grounding Conductor: Green.

d. Field-Applied, Color-Coding Conductor Tape: Not permitted.

- B. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- C. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- D. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- E. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
1. Limit use of underground-line warning tape to direct-buried cables.
 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- F. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
1. Comply with 29 CFR 1910.145.
 2. Identify system voltage with black letters on an orange background.
 3. Apply to exterior of door, cover, or other access.

4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- H. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- I. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.
- J. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 1. Labeling Instructions:
 - a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Stenciled legend 4 inches high.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION

SECTION 26 27 26 – WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Receptacles, and associated device plates.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Arrow Hart/Eaton (Arrow Hart).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand (Pass & Seymour).
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

2.3 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, One -piece solid brass mounting strap. 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; 5361 (single), AH5362 (duplex).
 - b. Hubbell; HBL5361 (single), HBL5362 (duplex).
 - c. Leviton; 5891 (single), 5362 (duplex).
 - d. Pass & Seymour; 5361 (single), 5362-A (duplex).
- B. Tamper-Resistant Convenience Receptacles, One-piece solid brass mounting strap. 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart; AHTR5362.
 - b. Hubbell; HBL5362TR.
 - c. Leviton; 5362-SG.
 - d. Pass & Seymour; TR63.

2.4 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: 0.035-inch- thick, satin-finished, Type 302 stainless steel.
 - 3. Material for Unfinished Spaces: Galvanized steel.
 - 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

2.5 FINISHES

- A. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
- B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailling existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
10. Install adjacent devices in multi-gang boxes under common device plates.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Wiring device will be considered defective if it does not pass tests and inspections.

END OF SECTION

SECTION 26 28 13 - FUSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Cartridge fuses rated 600-V ac and less and spare fuse cabinets.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA FU 1 for cartridge fuses.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Bussmann, Inc.
 - 2. Edison Fuse, Inc.
 - 3. Littelfuse, Inc.
 - 4. Mersen.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

2.3 SPARE FUSE CABINETS

- A. Cabinet: Wall-mounted, 0.05-inch-thick steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
 - 1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
 - 2. Finish: Gray, baked enamel.
 - 3. Identification: "SPARE FUSES" in 1-1/2-inch-high letters on exterior of door.
 - 4. Fuse Pullers: For each size of fuse.

PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

- A. Service Entrance: Class L, time delay.
- B. Feeders, 600 A or Less: Class J, time delay.
- C. Feeders, 601 A or Greater: Class L, time delay.
- D. Motor Branch Circuits: Class RK1, time delay.
- E. Other Branch Circuits: Class J, time delay.
- F. Control Circuits: Class CC, fast acting.

3.2 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
- B. Install spare-fuse cabinet.

3.3 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

END OF SECTION

SECTION 26 28 16 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Fusible box cover switches.
 - 4. Enclosures.

1.2 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - 4. Lugs: Suitable for number, size, and conductor material.
 - 5. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120 V(ac).
 - 6. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial – Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Lugs: Suitable for number, size, and conductor material.
 - 4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120 V(ac).

2.3 FUSIBLE BOX COVER SWITCHES

A. Manufacturers:

1. Cooper Bussman, Inc.
2. Ferraz Shawmut, Inc.
3. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

B. Description: Box cover units for standard electrical boxes with fused switch protection, Type S dual-element fuse and holder, rated 1/2 horsepower, and single-pole snap switch.

2.4 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Kitchen and Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install fuses in fusible devices.
- D. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."
 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION

DIVISION 31 – EARTHWORK

SECTION 31 20 10 EARTH MOVING - BUILDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Preparing subgrades for slabs-on-grade.
 - 2. Excavating and backfilling for buildings and structures.
 - 3. Drainage course for concrete slabs-on-grade.
 - 4. Excavating and backfilling for utility trenches within the building footprint.

- B. Related Sections:

- 1. Refer to Site/Civil Earth Moving Specifications for site work, portland cement concrete paving, asphalt paving, preparing subgrade for landscaping and pavers, etc.

1.3 DEFINITIONS

- A. Backfill: Soil material used to fill an excavation.

- 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.

- B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

- C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

- D. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

- E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

- 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized

excavation, as well as remedial work directed by Architect, shall be without additional compensation.

- F. Fill: Soil materials used to raise existing grades.
- G. Structures: Buildings, footings, foundations, retaining walls, slabs, or other man-made stationary features constructed above or below the ground surface.
- H. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- I. Utilities: Underslab pipes, conduits, ducts, cables, and services within buildings.

1.4 QUALITY ASSURANCE

- A. Pre-Excavation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

- A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
 - 1. Groups GC, SC, CL, and ML may be considered satisfactory soils when approved by the testing agency and maintained with 2 percent of optimum moisture content at time of compaction.
 - 2. Soils used as structural fill should have a liquid limit less than 45 and a plasticity index between 10 and 20.
 - 3. All fill materials shall be approved by the Geotechnical Testing Agency.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Engineered Fill: INDOT No. 53 crushed stone or 'B Borrow' as specified by the INDOT 2016 Standard Specifications, Section 211.

- E. Bedding Course: INDOT No. 53 or No. 73 crushed stone.
- F. Drainage Course: INDOT No. 8 or No. 53 crushed stone.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work. If footing subgrade consists of sands and gravels or granular engineered fill, compact subgrade with vibratory plate compactor to 100% of the Standard Proctor prior to placing reinforcing. Protect subgrade from damage by rain or inclement weather until footings are cast.

3.4 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.

- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.

3.5 SUBGRADE INSPECTION

- A. Proof-roll subgrade below the building slabs with a pneumatic-tired dump truck as directed by the Geotechnical Testing Agency to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Geotechnical Testing Agency, without additional compensation.

3.6 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2000 psi, may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.7 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.8 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.

- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in "Cast-in-Place Concrete".
- D. Place and compact initial backfill of granular fill material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Place and compact final backfill of granular backfill material to slab subgrade elevation.

3.9 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under steps and ramps, use engineered fill.
 - 2. Under building slabs, use engineered fill.
 - 3. Under footings and foundations, use engineered fill or lean concrete.

3.10 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.11 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under footings and foundations, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 98 percent.
2. Under interior building slabs scarify and recompact top 12 inches below subgrade and compact each layer of backfill or fill soil material at 98 percent.
3. For utility trenches within the building footprint, compact each layer of initial and final backfill soil material at 98 percent.

3.12 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.13 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
 1. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.14 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

3.15 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

