

**PROJECT MANUAL**

# NEW RESIDENCE HALL

CARROLL DRIVE AT KENTON DRIVE  
HIGHLAND HEIGHTS, KY 41099

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PREPARED FOR:

**NORTHERN KENTUCKY UNIVERSITY**

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**CONSTRUCTION SET**

**08-03-2020**

**VOLUME 1**

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## SECTION 00 11 16 - INVITATION TO BID

### 1.1 PROJECT INFORMATION

- A. Notice to Bidders: **Qualified** bidders are invited to submit bids for Project as described in this Document according to the Instructions to Bidders.
- B. Project Identification: **Northern Kentucky University New Residence Hall** Located in **Highland Heights, Kentucky.**
- C. Owner: **Northern Kentucky University, Highland Heights Kentucky**
- D. Architect: **Moody Nolan, Covington Kentucky**
- E. Contractor: **Messer Construction, Cincinnati Ohio**
- F. Project Description: The project will be located on the university campus, Lot F, at the corner of Kenton and Carrol Drive. The project involves the construction of a new metal framed 5 story, "L" shaped building which will house 297 beds. The approximate total square footage will be 70,220. The entrance level includes the lobby, common area, study rooms, manager's apartment, and several ancillary rooms. The remaining levels 2-5 are primarily residential suites and lounges.
- G. Construction Contract: Bids will be received for the following Work:
  - 1. BC-01 General Trades
  - 2. BC-02 Earthwork, Site Utilities & Asphalt Paving
  - 3. BC-03 Drilled Piers
  - 4. BC-04 Concrete Foundations, Reinforcing Steel, Concrete Materials, Pumping, Placement, and Finish
  - 5. BC-05 Structural & Miscellaneous Steel
  - 6. BC-06 Masonry
  - 7. BC-07 Metal Framing, Gypsum Assemblies, & Acoustical Ceilings
  - 8. BC-08 Elevators
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  - 16. BC-16 Painting & Wall Covering
  - 17. BC-17 Resilient Flooring, Ceramic Tile, and Polished Concrete
  - 18. BC-18 Irrigation & Landscape
  - 19. BC-19 Horizontal Louver Blinds
  - 20. BC-20 Canopies

- H. Contractor will receive sealed bids or electronic copies (emailed) until the bid time and date at the location indicated below. Contractor will consider bids prepared in compliance with the Instructions to Bidders issued by Contractor, and delivered as follows:

1. Bid Date: February 26, 2020
2. Bid Time: 2:00 PM, local time.
3. Location: Email Bids to [bgroneck@messer.com](mailto:bgroneck@messer.com) or hard copies delivered to the Front Desk at Messer Cincinnati Regional Office, 2495 Langdon Farm Rd, Cincinnati, OH 45237

- I. Bids will be thereafter privately opened.

- J. BID SECURITY

1. Bid security is not required.

- K. No bids may be withdrawn for a period of sixty (60) days after opening of bids. Owner and Contractor reserves the right to reject any and all bids and to waive informalities and irregularities.

## 1.2 PREBID CONFERENCE

- A. A pre-bid conference for all bidders will be held at
1. Messer Construction, Langdon Farm Rd, Cincinnati, OH 45237
  2. February 12, 2020
  3. 8:30 AM local time
  4. Prospective bidders are encouraged but not required to attend.

## 1.3 DOCUMENTS

- A. Printed Bid Documents available for purchase: Obtain on or after February 7, 2020 by contacting Phipps Reprographics or sending files to a printer of your choice.
1. Documents can be **purchased at Phipps Reprographic or viewed online at ISQFT.**
  2. Only complete sets of documents will be issued.
  3. Additional mailing and/or shipping charges will apply.
- B. Online Procurement and Bid Documents: Obtain access after February 7, 2020 by contacting ISQFT.
1. Online access will be provided to invited **bidders and suppliers.**

## TIME OF COMPLETION

- C. Bidders shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time as described in section 00 31 13 Preliminary Schedules.

## 1.4 INQUIRIES

- A. **All questions shall be emailed to the Contractor's Representative: [bgroneck@messer.com](mailto:bgroneck@messer.com)**

END OF SECTION 00 11 16



## SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

### PART 1 - GENERAL

- 1.1 The Contractor has entered into, or expects to enter into, an agreement with the Owner to provide Contractor services in connection with the Project (the "Prime Contract"). The Contractor is soliciting bids for a Subcontract to be entered into with the Contractor for a portion of the Project. If the Owner and the Contractor have not entered into the Prime Contract when this Subcontract is executed, then the term "Prime Contract" shall refer to the then-current proposed version of the Prime Contract as identified by the Contractor, which version shall be furnished to the Subcontractor upon request and may be supplemented by change order to reflect the final version (Subcontractor agrees to execute any such change order upon request of without additional compensation if there is no material adverse change in the obligations flowing down to Subcontractor).
- 1.2 The proposed Subcontract Documents consist of the form of Subcontract Agreement between the Contractor and Subcontractor, including all exhibits and addenda thereto, together with all applicable terms of the Prime Contract including but not limited to General, Supplementary and other Conditions, Drawings, Specifications and Addenda. The term Bidder refers to the person or organization submitting a bid to Contractor hereunder, and the term Sub-bidder refers to a person or organization submitting a bid to Bidder for the portion of the Subcontractor's Work.

### PART 2 - DEFINITIONS

- 2.1 "Addenda" means written or graphic instruments issued by the Purchasing Agency prior to the execution of the contract that modify or interpret the bidding documents by addition, deletion, clarification, or correction.
- 2.2 "Alternate" means an optional item stated in the bid the amount of which is to be added to or deducted from the amount of the base bid.
- 2.3 "Architect or engineer" means the architectural firm (CO Architects) and/or their consulting firms that prepared the drawings and specifications.
- 2.4 "Bid" means the sum stated in the Bid Response for which the bidder offers to perform the work described in the specifications and detailed on the plans.
- 2.5 "Bidder" means one who submits a bid directly to the Construction Manager (Messer Construction) for the work described in the bidding documents.
- 2.6 "Bidding documents" means the Solicitation, including Instructions to Bidders, General Conditions, Special and Supplemental Conditions, Forms for Response, plans, specifications, and Addenda issued prior to receipt of bids.
- 2.7 "Bid Response" means a complete and properly signed document, offering to do the work or designated portion thereof, supported by data called for by the bidding documents.
- 2.8 "Owner" means Northern Kentucky University (NKU).
- 2.9 "Purchasing Agency" means Northern Kentucky University.
- 2.10 "Purchasing Officer" or "Contracting Officer" means the Northern Kentucky University, Director of Purchasing, or his authorized representative.
- 2.11 "Sub-bidder" or "subcontractor" means one who submits a bid to a prime bidder for materials or labor for a portion of the work described in the bidding documents.
- 2.12 "Unit price" means an amount stated in the bid as a price per unit of measurement for materials or services as described in the bidding documents.

- 2.13 “Using agency” means the University entity that utilizes the work being contracted.
- 2.14 “Authorized Employees” means Contractor’s employees or work force members (as defined by 45 C.F.R. 160.103) who have a need to know or otherwise access NKU Data to enable Contractor to perform its obligations under this Agreement.
- 2.15 “Authorized Persons” means (i) Authorized Employees; and (ii) Contractor’s contractors, agents, outsourcers, and auditors who have a need to know or otherwise access University Data to enable Contractor to perform its obligations under this Agreement, and who are bound in writing by confidentiality and data protection obligations, including, without limitation, those set forth in a business associate agreement, sufficient to protect University Data in accordance with the terms and conditions of this Agreement.
- 2.16 “Contract” means the entire written agreement between the parties including, but not limited to, the Invitation for Bid or Request for Proposal and its specifications, terms, and conditions, solicitation instructions, solicitation addenda, contractor’s offer, the contract document, and contract amendments if any, including, without limitations, these General Terms and Conditions and the purchase order or price agreement document excluding correspondence of any type unless specifically accepted by both parties in writing.
- 2.17 “Contractor” means a person, company, corporation, organization or other legal entity with whom NKU has executed a Contract.
- 2.18 “NKU” means Northern Kentucky University.
- 2.19 “NKU Data” means any information, in an electronic, written, or oral form, that is made available to the Contractor by NKU. NKU Data includes, but is not limited to, PII, trade secrets, sales and marketing plans, financial data, supplier information, and intellectual property.
- 2.20 “Personally Identifiable Information (PII)” means any information about an individual, including
- 2.21 any information that can be used to distinguish or trace an individual’s identity, such as name, social security number, date and place of birth, mother’s maiden name, or biometric records; and (2) any other information that is linked or linkable to an individual, such as medical, educational, financial, and employment information. PII, includes, but is not limited to, Personal Information as defined by KRS 61.931(6).

### **PART 3 - APPLICABILITY OF TERMS AND CONDITIONS**

- 3.1 These terms are in addition to the terms and conditions set forth in any solicitation document and/or purchase agreement and should be read in conjunction with the same unless the document indicates otherwise. To the extent that Contractor terms and conditions conflict with NKU’s General Terms and Conditions, the latter shall control. A party’s failure to insist upon the performance of any provision of these General Terms and Conditions shall not be construed as a waiver of that party’s present or future right to such performance and each party’s obligation shall continue in full force and effect.

### **PART 4 - BREACH OF UNIVERSITY DATA OR TREATMENT OF PERSONAL INFORMATION**

- 4.1 To the extent Contractor receives Personal Information as defined by and in accordance with Kentucky’s Personal Information Security and Breach Investigation Procedures and Practices Act, KRS 61.931-934 (the “Act”), Contractor shall secure and protect the Personal Information (and ensure the same of its agents or subcontractors having access to the Personal Information) by, without limitation:
  - A. complying with all requirements applicable to non-affiliated third parties as set forth in the Act;



- B. utilizing security and breach investigation procedures that are appropriate to the nature of the Personal Information disclosed, at least as stringent as University's and reasonably designed to protect the Personal Information from unauthorized access, use, modification, disclosure, manipulation, or destruction or that meet industry standard practices for protecting Personal Information from unauthorized access, use, modification, disclosure, manipulation, or destruction;
- C. notifying NKU of a security breach relating to Personal Information in the possession of Contractor or its agents or subcontractors within seventy-two (72) hours of discovery of an actual or suspected breach unless the exception set forth in KRS 61.932(2)(b)2 applies and Company abides by the requirements set forth in that exception;
- D. paying all costs of notification, investigation and mitigation in the event of a security breach of Personal Information caused by the actions or inactions of Contractor ("NIM Costs");
- E. cooperate with NKU in complying with the response, mitigation, correction, investigation and notification requirements of the Act including undertaking a prompt and reasonable investigation of any security breach; and
- F. at NKU's discretion and direction, handling all administrative functions associated with notification, investigation and mitigation, in accordance with the Act's requirements. The Contractor agrees that NKU may withhold payment(s) owed to the Contractor for any violation of these identity theft prevention reporting requirements or failure to pay NIM Costs.

**PART 5 - CONTRACTOR'S INDEPENDENCE AND RESPONSIBILITIES**

- 5.1 Contractor is solely responsible for the fulfillment of the contract with NKU. Contractor agrees that all persons working for or on behalf of the Contractor whose duties bring them on campus shall abide by the rules and regulations that are established by NKU and shall comply with the reasonable directions of NKU's officers. Contractor's employees shall not use existing areas where not required to perform the work.
- 5.2 Contractor shall be responsible for the acts of his employees and agents while on campus. Accordingly, Contractor agrees to take all necessary measures to prevent injury and loss to persons or property located on campus. Contractor shall be responsible for all damages to persons or property caused by Contractor or any of his agents or employees. Contractor shall promptly repair any damage that he, or his employees or agents may cause to the campus or to University equipment.
- 5.3 Contractor and its agents, subcontractors, and representatives shall be independent contractors and not act as agents of NKU. All persons furnished or retained by Contractor in connection with any contract shall be considered employees or agents of the Contractor.
- 5.4 Contractor shall control all employee conduct while on NKU's premises. Any employee under the influence of alcohol or controlled substances, other than prescription medications, shall not be allowed on the premises of NKU and shall be permanently dismissed if found to be so.
- 5.5 Further, offensive language, sexual or other types of harassment of students, employees or visitors to NKU campus could result in immediate and permanent dismissal of the offending person(s) from the NKU site.
- 5.6 Contractor shall comply with the NKU's tobacco-free policy. This policy prohibits the use of all tobacco products in all campus buildings and outside areas on campus.
- 5.7 The possession of, use or storage of any firearm, ammunition, explosive device (including fireworks), or other deadly weapon in any form is prohibited on any NKU property or in any facility or on any property owned, leased, or operated by NKU, except as permitted by law (K.R.S. 527.020). Contractor shall furnish NKU with written documentation that verifies each of their employees working on the property of NKU has cleared a background check, has no felony convictions, is not a sex offender, and has the legal right to work in the United States.

**PART 6 - GOVERNING LAW AND FORUM**

- 6.1 Contractor shall conform to and observe all laws, ordinances, rules and regulations of the United States of America, Commonwealth of Kentucky and all other local governments, public authorities, boards or offices relating to the property or the improvements upon same (or the use thereof) and will not permit the same to be used for any illegal or immoral purposes, business or occupation. The resulting contract shall be governed and construed by Kentucky law and any claim relating to this contract shall only be brought in the Franklin Circuit Court in accordance with KRS 45A.245.

**PART 7 - USE OF NAMES AND LOGOS IN ADVERTISING**

- 7.1 Contractor agrees not to make reference to this Contract, use NKU's name in any advertising or promotion, or use any NKU logos without the expressed written consent of NKU.

**PART 8 - BIDDER CERTIFICATIONS**

- 8.1 The Bidder certifies to Contractor that:
- A. The Bidder has read and understands the proposed Subcontract Documents and other Bidding Documents, to the extent that such documentation relates to the Work for which the Bid is submitted or to any other related portions of the Project.
  - B. Prior to bidding, the Bidder has visited the Project site, become familiar with local conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Subcontract Documents.
  - C. Prior to bidding, the Bidder has carefully reviewed the proposed Subcontract Documents and informed the Contractor, in writing, of any errors, omissions, inconsistencies, code violations, or ambiguities discovered. Bidder acknowledges that it will not be allowed to rely on any of the foregoing after signing a Subcontract that were recognized and not reported before signing.
  - D. If requested following the bid date, the Bidder will return all copies of the Drawings and Specifications received by it (or made by it) to Contractor, unless the Bidder receives the award of the Subcontract.

## **PART 9 - CONFLICTS OF INTEREST**

- 9.1 Contractor affirms that, to the best of Contractor's knowledge, there exist no conflicts of interest between the Contractor and NKU or its employees as defined by all applicable Kentucky Revised Statutes and NKU's ethics and compliance policies and procedures. In the event of change in Contractor's interests, Contractor shall inform NKU regarding any conflicts of interest that are likely to arise as a result of such change. Contractor hereby represents that it has not participated in any illegal or unethical conduct in connection with the Contract. If, at any time, NKU determines the Contractor is in violation of the forgoing representation, NKU may cancel the contract upon written notice to the Contractor and NKU shall have no further obligation to the Contractor.

## **PART 10 - CLARIFICATIONS AND CHANGES**

- 10.1 Bidders and Sub-bidders desiring clarification or interpretation of the Bidding Documents shall make a written request to be received by the Contractor at least seven days (unless otherwise approved by Contractor) prior to the date for receipt of bids. Interpretations, corrections and changes of the Bidding Documents will be made only by written Addendum. Interpretations, corrections and changes of the Bidding Documents given verbally by the Architect or Contractor, or in any other manner except an Addendum, are of no legal effect and Bidder shall not rely upon them.
- 10.2 Addenda will be transmitted to all who are known by the issuing office to have received a complete set of Bidding Documents. Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose. Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall confirm this if so designated in the Bid but shall be bound by all Addenda that were issued even if the Bid does not expressly call for them to be acknowledged in the Bid.
- 10.3 Any Bidder desiring to propose a substitution for any specified materials or equipment must submit the request in writing to Contractor at least 10 days before receipt of bids, unless otherwise approved by Contractor. Approval of any requested substitution is in the sole discretion of the Owner, in consultation with the Architect and Contractor, and if granted will be reflected in an Addendum. Bidder must not assume that any substitution will be approved after the bid date, and must submit its Bid based on the then-current Addenda and other Bidding Documents.

## **PART 11 - BIDDING PROCEDURES**

- 11.1 Bids shall be completed legibly, in ink or typed and submitted on the forms included in Section 00 41 00 – Bid Form.
- 11.2 Any failure to bid a designated portion of the Work or any Alternate may result in the Bid being considered non-responsive, unless otherwise expressly stated. If no change in the Bid amount is required for any Alternate, enter "No Change" or \$0.
- 11.3 If the Bidder makes additional stipulations on the bid form or qualifies the Bid in any other manner, it may be considered non-responsive.
- 11.4 The Bid shall be signed by a person or persons legally authorized to bind the Bidder to a contract. Evidence of authority shall be submitted immediately if requested by Contractor after the bid date, and must be included with any bid signed by any person other than an officer of the Bidder with a title of general partner, general manager, vice president or above.

- 11.5 No bid bond is required; however, the Bidder guarantees to enter into a Subcontract with the Contractor on the terms stated in the Bid and Bidding Documents and will, if required by the Subcontract Documents, promptly after execution of a Subcontract, furnish bonds covering the faithful performance of the Subcontract and payment of all obligations arising thereunder. If an award is made to the Bidder and the Bidder does not execute a Subcontract or does not furnish required performance and payment bonds, then despite the absence of a bid bond, the Bidder is liable to the Contractor for all additional costs incurred in engaging a replacement Subcontractor selected in good faith by Contractor (which is not necessarily the next lowest bidder), including but not limited to any delay costs, together with all attorneys' fees and other costs of collection if Bidder does not pay that amount immediately upon demand. This project will include Subcontractor Default Insurance (SDI). Prior to awarding any subcontracts, the subcontractor shall be required to complete a pre-qualification process. See Section 00 45 13 Bidders Qualifications for additional information.
- 11.6 Bids shall be **sealed hard copies or emailed electronic completed forms** of the Section 00 41 00 Bid Form and deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids may be returned unopened at Contractor's discretion. The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids. Oral or telephonic bids will not be considered unless otherwise determined by the Contractor.
- 11.7 A Bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and each Bidder so agrees in submitting a Bid. Prior to the time and date designated for receipt of bids, a Bid submitted may be modified or withdrawn by written notice from the Bidder to the party receiving bids at the place designated for receipt of bids.

## **PART 12 - SUBMISSION AND CONSIDERATION OF BIDS**

- 12.1 Bids shall be opened privately unless otherwise stipulated in the Bidding Documents. An abstract of the Bids may or may not be made available to Bidders unless required by law.
- 12.2 The Contractor, independently or at the direction of the Owner, shall have the right to reject any or all Bids unless otherwise required by law. A Bid which is in any way incomplete or irregular is subject to rejection as nonresponsive, unless waived by the Owner and Contractor when permitted by law to do so.
- 12.3 It is the intent of the Contractor, subject to any required approval of the Owner, to award a Subcontract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available; however, any Bid may be rejected without necessity of stating any cause unless otherwise required by law, and the Contractor (unless prohibited by law) reserves the right to negotiate with one or more Bidders before making an award decision. The Contractor shall have the right to accept the Bid which, in the Contractor's judgment, is in the Owner's and Contractor's own best interests and in compliance with any legal requirements.
- 12.4 The Owner and Contractor shall have the right to accept or reject Alternates in any order or combination, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

## **PART 13 - TAXES**

- 13.1 Not Tax-Exempt.

- A. Bidders are informed that construction contracts for Northern Kentucky University are not exempt from the provisions of the Kentucky Sales and/or Use Tax. The Bidder shall include in the lump sum bid and the Contractor shall pay sales, consumer, use and similar taxes for materials, equipment and supplies incorporated into the Work unless otherwise specified in the Bid Documents.
- B. Northern Kentucky University, through the Commonwealth of Kentucky, is entitled to exemption from Federal Excise Tax. All Prime Bidders or Sub-bidders shall take this into consideration in their Bid.
- 13.2 Liability for Employee-Related Taxes. The Bidder and Subcontractors will be required to accept liability for payment of all payroll taxes or deductions required by local, state and federal law, including but not limited to old age pension, social security or annuities. Worker's Compensation Insurance shall be carried to the full amount as required by Kentucky Statutes. The Bidder shall be in full compliance with KRS Chapters 341 and 342.
- 13.3 Note: Northern Kentucky University was annexed by the City of Highland Heights in 2008. All contractors performing work for NKU must possess a Campbell County Occupational License and a City of Highland Heights Occupational License (administered by Campbell County) and must also pay applicable payroll taxes. For further information call 859.292.3884 or log onto: [www.campbellcountky.org/occllic.htm](http://www.campbellcountky.org/occllic.htm)

#### **PART 14 - EQUAL EMPLOYMENT**

- 14.1 Equal Employment Opportunity.
  - A. Bidders and subcontractors are required to comply with Federal Executive Order 11246 entitled "Equal Employment Opportunity" as amended.
  - B. The provisions of KRS 45.560 through 45.640, known as the Kentucky Equal Employment Act of 1978, hereinafter referred to as the Act, shall be binding upon the declared successful Bidder and any subsequent contract awarded to the Bidder, except that a Contractor or subcontractor otherwise subject to the provisions of KRS 45.570 is exempt as to any affirmative action or reporting requirements if:
    - 1. The contract or subcontract awarded is in the amount of \$500,000.00 or less, and the amount of the contract is not a subterfuge to avoid compliance with the provisions of this Act.
    - 2. The contractor or subcontractor utilizes the services of fewer than eight (8) employees during the course of the contract.
    - 3. The contractor or subcontractor employs only family members or relatives.
    - 4. The contractor or subcontractor employs only persons having a direct ownership interest in the business, and such interest is not a subterfuge to avoid compliance with the provisions of this Act.
  - C. All compliance reporting shall be directed to the University's representative a.k.a. project manager. It shall be the responsibility of the Contractor or subcontractor to comply with the provisions of KRS 45.560 through 45.640 unless exempted through the compliance officer.

14.2 Affirmative Action.

- A. The Bidder not otherwise exempted from the affirmative action or reporting requirements of the Act, shall within five (5) calendar days after being declared the successful low Bidder, submit to the University Official:
  - 1. Form EEO-1
  - 2. Employee Data Sheet
  - 3. Subcontractor Reporting Form
- B. The above reporting shall be on forms provided in the Project Manual Appendix and submitted in the manner prescribed on the forms.

14.3 Equal Opportunity Compliance.

- A. Within ten (10) days after the receipt of this report, the Office of EEO and Contract Compliance will determine whether the Bidder's work force is reflective of the percentage of available minorities in the areas from which the Bidder's employees are drawn. If a determination is made that the Bidder's work force is reflective of the percentage of available minorities in this drawn area, the Bidder shall be "certified" and be thereby qualified for the contract and to Bid on any contract covered by this Act without filing additional data for a period of six (6) months.
- B. If it is determined by the Official that the Bidder's work force reflects an under utilization of minorities, the Bidder shall be so notified and no certification be granted. The Bidder shall then have the option of filing with the Office of EEO and Contract Compliance an affirmative action plan, indicating goals and timetables for recruiting and hiring minorities throughout the contractor's work force. The Official shall be available, upon request of any contractor, to furnish technical assistance in fulfilling the requirements of the Act.
- C. If the Bidder is subsequently awarded the Contract being sought, failure to comply with the goals and timetables set forth in the affirmative action plan shall be an unlawful practice under the Act and shall constitute a material breach of contract.
- D. If the Official determines that the submitted affirmative action program does not fulfill the provisions of the Act, the Bidder shall be so notified and no certification shall be granted.
- E. If the Bidder's work force is not reflective of the percentage of minorities in the drawing area and he has complied with all other affirmative action requirements in the Act, he may certify by verified affidavit that he has made every reasonable effort to comply with said percentage requirements and he shall thereafter be entitled to all benefits of the Act.
- F. Failure to comply with the requirements of the Act after contract award may result in payments being withheld pending satisfactory fulfillment of contractual obligations.



**PART 15 - WEAPONS-FREE ZONE**

- 15.1 The possession of, use or storage of any firearm, ammunition, explosive device (including fireworks), or other deadly weapon in any form is prohibited on any Northern Kentucky University property or in any facility or on any property owned, leased, or operated by the University, except as permitted by law (K.R.S. 527.020).

“Weapons” include, but are not limited to, martial arts weapons, knives (other than those necessary for cooking or approved university activities, including ROTC), bows and arrows, air guns, shot guns, BB guns, and “deadly weapons” as defined by KRS 500.080(4).

**PART 16 - GENERAL WARRANTIES**

- 16.1 Contractor warrants that all goods shall conform to the specifications of the Contract and shall be merchantable, free from defects (including defects in design and fit) and suitable for the intended purposes. Contractor further warrants that all services shall conform to the specifications of the Contract and shall be performed in a professional and workmanlike manner. These warranties shall remain in effect for at least one year following NKU’s acceptance of the goods or services or for the duration of Contractor’s standard warranty period if such period exceeds one year. The foregoing warranties are in addition to, and shall not limit, any other warranties or buyer protections that exist by operation of law.

**PART 17 - FINAL INSPECTION AND ACCEPTANCE**

- 17.1 NKU reserves the right to perform inspection and/or expediting of the materials and fabrication thereof at the facility of the Contractor or its suppliers at any reasonable times. All materials and services are subject to final inspection and acceptance by NKU at destination, notwithstanding any prior payments or inspection at the source. Such final inspection shall take place within thirty (30) days from the date of delivery or installation or completion of services whichever is latest.
- 17.2 In addition to other remedies which may be available under law or in equity, when services are not delivered on the date agreed on by the Contractor and NKU, or if inferior or incomplete work is found, NKU reserves the right to reject such materials and request replacement as stated above or authorize the contractor to issue a credit based on NKU’s cost for all material found unacceptable NKU, at its option may return to the Contractor any nonconforming or defective item(s), at no cost to NKU, and require correction or replacement of the item(s). If NKU does not require correction or replacement of nonconforming or defective item(s), Contractor shall repay such portion of the contract price or such additional amount as is equitable under the circumstances. The rights of NKU are in addition to and shall not be limited by Contractor’s standard warranties.

**END OF SECTION 00 21 13**



## SECTION 00 24 13 - BID CATEGORY DESCRIPTIONS

### INFORMATION

- 1.1 This section describes the assignment of work as designated by the Contractor.
- 1.2 This summary should in no way be construed as being all-inclusive. It is issued as a guide to aid in the assignment of work. If conflicts regarding assignment of work exist between the drawings, the specifications, notes or these descriptions, the Bid Category Descriptions shall take precedence.
- 1.3 List of Bid Categories associated with this Bid Package:
- A.
- BC-01 General Trades
  - BC-02 Earthwork, Site Utilities & Asphalt Paving
  - BC-03 Drilled Piers
  - BC-04 Concrete Foundations, Reinforcing Steel, Concrete Materials, Pumping, Placement, and Finish
  - BC-05 Structural & Miscellaneous Steel
  - BC-06 Masonry
  - BC-07 Metal Framing, Gypsum Assemblies, & Acoustical Ceilings
  - BC-08 Elevators
  - BC-09 Mechanical, Geothermal, & HVAC
  - BC-10 Electrical
  - BC-11 Plumbing
  - BC-12 Fire Protection
  - BC-13 Roofing, Sheetmetal Flashing & Trim
  - BC-14 Metal Wall Panels
  - BC-15 Aluminum Doors, Frames, Windows, & Storefront
  - BC-16 Painting & Wall Covering
  - BC-17 Resilient Flooring, Ceramic Tile, and Polished Concrete
  - BC-18 Irrigation & Landscape
  - BC-19 Horizontal Louver Blinds
  - BC-20 Canopies
- 1.4 The word "provide" means furnish, deliver, and install complete.

### GENERAL PROVISIONS

- 1.5 These General Provisions form a part of each Bid Category Work Description and apply to each Subcontractor's Scope of Work.



A. Safety.

1. The items listed below are only a brief highlight the safety requirements for this project. See Section 00 73 19 – Health & Safety Requirements for the full description of the safety requirements for this project.
2. Highlighted safety provisions on this project include:
  - a. Assured Fall Protection at heights of 6 feet or greater, pursuant to the OSHA standards and Messer policies, whichever is more stringent. This includes all steel erection.
  - b. Platform ladders are required (no step ladders or aluminum ladders allowed)
  - c. Eye Protection worn by all personnel on the jobsite.
  - d. Gloves worn by all personnel on the jobsite at all times.
  - e. All jobsite personnel shall wear reflective safety shirts or vests (on outside layer of clothing).
  - f. All jobsite personnel shall wear hard hats.
  - g. Attendance by all Subcontractor personnel to Messer's preconstruction safety orientation program prior to beginning work.
  - h. Each Subcontractor shall designate an employee or employees that will serve as the Subcontractor's safety representative and competent person on a daily basis.
  - i. All electrical cords are to be rolled up daily and stored by each Subcontractor. Any cords not rolled up or suspended from the structure at the end of the day will be removed and rolled up by the Contractor at the Subcontractor's expense. Electrical cords in use in walkways or pathways shall be suspended as to not create a tripping hazard and so that these areas can be broom swept daily. Back charge will be billed at the rate of \$250 per man hour plus any associated material, equipment, and supervision costs.
  - j. Any barricade or safety device which is removed by a Subcontractor's employees to perform their work, shall be immediately re-erected or the Contractor shall erect same and the cost thereof paid for by that Subcontractor. Back charge will be billed at the rate of \$250 per man hour plus any associated material, equipment, and supervision costs.
  - k. Roof edge parapets will act as a guardrail. Any subcontractor working from a ladder or other elevated platform shall wear fall protection to prevent exposure to a fall.
  - l. A controlled access zone shall be established by any company removing any portion of the perimeter guardrail system.
  - m. Air monitoring shall be implement prior to entering any manhole. A recovery tripod must be setup and attached to anyone working in a confined space. Each contractor shall submit their plan prior to any confined space entry taken place.

B. Conduct and Coordination.

1. **Northern Kentucky University has a smoke free campus.** Smoking and use of tobacco products inside buildings, on the property of the owner or on the construction site is prohibited. Failure to abide by this policy will result in removal from the project.
2. Each Subcontractor shall cooperate and coordinate with all other Bid Category Subcontractors for expedient completion of the work of this project.
3. Each Subcontractor shall provide 24-hour emergency phone numbers to the Contractor prior to the start of work or the delivery of material to the jobsite.

4. Initial benchmarks, horizontal and vertical, will be provided by the Contractor. Each Subcontractor shall be responsible for all detailed layout, grade and stakes from benchmark and control points required for proper location and coordination of the work.
5. Company signs are prohibited, except as specifically assigned by Contract Documents or approved by the Construction Manager. Safety signage is mandatory.
6. Radios not used for communication purposes, or other electronic sound devices, including headphones are prohibited.

C. Management and Supervision.

1. Every mornings shift begins with a job-site stretch-n-flex meeting in a location designated by the CM and shall be attended all subcontractors.
2. Each Subcontractor and sub-Subcontractor shall have daily huddle meetings at the beginning of each work shift, at a minimum. The huddle meetings shall review all activities on site and provide an open forum for all participants to review safety hazards and procedures to safely conduct the work. All personnel shall attend each huddle meeting and attendance shall be taken daily.
3. Subcontractor must provide a full-time non-working Superintendent on site throughout the duration of their work. This superintendent shall be authorized to make all decisions relative to the on-site work and shall be the primary contact for all correspondence. Part time or token representatives who are not so authorized will not be permitted. Any changes in Superintendents must have the Contractor's approval. In addition, the superintendent of the prime subcontractor must be present during times when work is being done by any of their subcontractors.
4. The on-site superintendent/foreman shall carry a phone. Each subcontractor's site leader shall be available 24/7 in the case of an emergency.
5. Each Subcontractor shall participate and have their Superintendent attend all Weekly Progress Meetings and Plan of the Day Meetings. Failure to attend and participate (unless given permission) will cause rejection of pay request.
6. Each Subcontractor shall submit written reports at the Weekly Progress Meeting indicating manpower, scheduling information, work activities performed the previous work week as well as anticipated work for the upcoming week including weekly gang box meeting minutes.
7. The Contractor will be utilizing a web-based information management system to facilitate communications among project partners including but not limited to Owners, Architects, Engineers, Contractor, and Subcontractors. Use of this system is mandatory for all Subcontractors. All Subcontractors must have an e-mail address and have access to the internet. There will be no costs passed on to the users for access to the system or license fees but users will be responsible for their own cost associated with access to the internet.

D. Permits, Fees and Inspections.

1. Materials Testing & Special Inspections shall be provided by the **Owner**.
2. The **Contractor** will purchase the General Building permit. All other permits and inspection fees must be included in the work scope of the Subcontractor requiring them.
3. Each Subcontractor shall call for, obtain and pay for all inspections as required to facilitate their work and to maintain schedule even if the general building permit was secured by the Contractor. Each Subcontractor shall keep copies of permits, inspections and signatures in the Contractor's office.

4. Permits for work requiring a shutdown of existing streets and/or sidewalks or impeding public access in any way shall be secured and paid for by Subcontractor requiring it and scheduled with the Contractor in advance.
5. Each Subcontractor shall coordinate with the Contractor for scheduling of material testing and inspection services. Any re-testing and/or re-inspection of unacceptable materials or installations shall be paid by the subcontractor requiring the additional test/inspection.

E. Protection of Work or Property.

1. Each Subcontractor will take precautions to prevent damage to any existing finishes, new construction, and the work and equipment of others while performing their work. If any existing finishes, new construction, or work of others is damaged by this Subcontractor or their employees or agents, this Subcontractor will be responsible for the cost of repair or replacement at no additional cost to the Owner or Contractor.
2. If any work is damaged and the damaging party cannot be determined, the cost for repair will be divided among those Subcontractors working on the project at that time.
3. Commencement of finishing work (completion of work started by others) by Subcontractor shall constitute Subcontractor's approval of substrate surfaces for receiving work. Any resulting failure or development of defects in work in these areas shall be repaired at expense of Subcontractor applying finish material. Discrepancies in the work of others shall be brought to the Contractor's attention prior to starting Subcontractor's work.
4. Each Subcontractor shall be responsible for the protection of its own materials, tools, equipment and stored materials. Damage or theft of any materials, tools, or equipment prior to substantial completion will be repaired or replaced at the Subcontractor's expense.
5. Where new work connects with existing, do all necessary cutting and patching required to make a satisfactory connection with the work to be performed under the Contract Documents so as to leave the entire work in a finished and workmanlike condition. This requirement shall include all required work where new items connect, fit, or otherwise interface with existing surfaces. Provide all labor and materials to this end, whether or not shown or specified. Verify and match existing conditions.

F. Access to Jobsite/Work Times.

1. The jobsite will be open during normal working hours, which will be Monday-Friday 7:00 am – 4:00 pm. Depending on the season and stage of the project, jobsite start time may be rescheduled to 6:00am or 6:30am. This does not alleviate the Subcontractor's responsibility to work overtime as required to maintain the schedule. Once the Flow Schedule for interior finishes has been developed, the CM will review the need for interior finishes to work (4) 10hr work days M-Th. The Contractor shall try to accommodate any requests by subcontracts to have the jobsite open at different times/days.
2. **Delays due to normal weather conditions are to be taken into consideration and anticipated when bidding this project. Weekends are considered make-up days for weather days and will be treated as a normal workday to recover weather days.**
3. Certain items of work (shut-downs, tie-ins, etc) may be required to be performed at times/days other than "normal". Subcontractors shall include whatever premium cost this may entail into their bids.
4. If the perimeter of the jobsite is enclosed by construction fencing, any Subcontractor that must relocate the temporary construction fencing shall put it back in place, in the state it was found, at the end of each workday.
5. Subcontractor Parking.

- a. **NKU requires that every subcontractor and their employees parking on NKU property shall purchase an NKU Parking Pass. The cost of a monthly contractor parking pass is \$80. The pass can be purchased at the NKU Parking Office (see NKU campus map for details). Additionally, please find the Section 01 50 00 Site Logistics Plan for the location where contractors are allowed to park. Any contractor not parked in the designated area subjected to tickets or loss of parking privileges.**

G. Storage & Delivery.

1. Tool/Storage/Office trailers/containers/offices shall only be placed with the prior approval of the CM.
2. All materials/equipment must be stored and delivered in accordance with Section 01 35 43.
3. The project site is limited on lay down, storage, preparation areas, etc. All Subcontractors will be required to deliver material to the project on an "as needed" or to be used within 1 week basis.
4. All materials delivered to the site shall be neatly organized (as discussed with the Contractor) and adequately protected from weather at all times and shall be received and stored at the jobsite in an approved manner as established by the manufacturer, specifications, and Contractor.
5. All materials to be delivered shall be sized, bundled, or packaged in such a fashion to fit in the building.
6. Each Subcontractor shall take care to plan their work and storage of materials in a manner that does not overload the structure.
7. Even though the process will be managed, some amount of materials will be stored on the site and/or in the building and each Subcontractor should anticipate working around stored materials and/or moving of materials to facilitate their work.
8. All stored materials shall be placed on rolling storage "platforms or racks" so that materials can be relocated as needed

H. Cleanup

1. Cleanup required in accordance to Section 01 35 43.
2. Each Subcontractor is required to clean up debris, re-grade, and compact and repair all areas that are affected by the installation of their work, and return to grade to design standards. Each Subcontractor shall clean, repair and/or replace all existing site improvements such as landscaping and/or pavement areas affected by installation of their work performed.
3. Public trash receptacles, sanitary sewers, and storm drains shall not be used for the disposal of construction debris, waste material, rubbish, or runoff.
4. If any vehicle working under this Subcontractor carries mud or dirt on any roadways or pavements, this Subcontractor shall clean it immediately. The Contractor will complete work not completed by the subcontractor and a back charge will be billed at the rate of \$250 per man hour plus any associated material, equipment, and supervision costs.

I. Warranties



1. All warranties shall begin on the date of substantial completion as established by the Architect of record.

J. Special Owner Conditions.

1. Shutdowns must be approved by the University and accomplished in the designated timeframe provided.
2. How work permits shall be required and coordinated with the CM.

K. Special Adjacent Property Conditions.

1. No parking in unpaved areas. This includes the electrical substation along Kenton Drive.

**PART 2 - BID CATEGORY DESCRIPTIONS**

- 2.1 The following pages contain the descriptions of each bid category. Each bid category includes all labor, material, equipment, services, supervision, and layout engineering required to provide a complete package.

A.

**Bid Category BC-01: General Trades**

The Scope of Work in this Contract BC-01 includes all labor, material, layout, equipment, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-01, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
	Geotechnical Exploration Report
Division 01	General Requirements
Division 02	Selective Site Demo (as applicable)
Section 03 33 00	Cast-in Place Concrete (As Applicable)
Section 06 10 00	Rough Carpentry
Section 06 16 00	Sheathing (As Applicable)
Section 06 20 00	Finish Carpentry
Section 06 41 00	Custom Cabinet and Woodwork
Section 07 10 00	Waterproofing (As Applicable)
Section 07 11 13	Bituminous Dampproofing (As Applicable)
Section 07 46 46	Mineral-fiber Cement Siding
Section 07 62 00	Sheet Metal Flashing and Trim (As Applicable)
Section 07 81 23	Interior intumescent Fireproofing (As Applicable)
Section 07 84 00	Firestopping (As Applicable)
Section 07 92 00	Joint Sealants (As Applicable)
Section 08 11 00	Steel Doors and Frames
Section 08 14 16	Flush Wood Doors
Section 08 14 33	Stile and Rail Wood Doors
Section 08 31 00	Access Doors and Panels
Section 08 71 00	Door Hardware
Section 08 71 13	Automatic Door Operators (As Applicable)
Section 10 11 01	Visual Display Boards
Section 10 14 00	Signage
Section 10 21 13	Toilet Compartments
Section 10 28 00	Toilet, Bath and Laundry Accessories
Section 10 44 00	Fire Extinguishers, Cabinets and Accessories
Section 10 55 00	Postal Specialties
Section 10 56 17	Shelf Standard and Coat Rod
Section 10 57 23	Wall Mounted Wire Closet Shelving

Section 10 82 13	Rooftop Equipment Screens
Section 12 36 00	Countertops and Window Stools
Section 12 48 13	Entrance Floor Mats and Frames
Section 12 93 00	Site Furnishings

The following items represent specific inclusions in this Contract BC-01: General Trades. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Provide one laborer that is also RTF and Skid Steer Certified from 5/4/20 thru 7/30/2021. Include hand tools and tool belt in order to provide general service moves, cleaning, maintaining site fencing, erosion control, empty trash, and other duties as directed by the Construction Manager. This Laborer shall have a fall protection harness for miscellaneous guardrail repair tasks. This laborer shall work standard working hours Monday through Friday excluding Federal Holidays.
4. Provide an additional laborer (for a total of 2 laborers) 1/4/21 thru 7/30/21. This laborer shall have a fall protection harness and assist with general duties at the direction of the CM in addition to cleaning and removing trash from the building. This laborer shall work standard working hours Monday through Friday excluding Federal Holidays.
5. Provide a four wheel drive telehandler with a rated load capacity of 10,000lbs for (12) months and include the following:
  - a. Telehandler Open Front Trash Hopper, Model HTH459 6.5cu.yd or approved equal.
  - b. Telehandler lifting hook attachment for the forks.
  - c. Complete service, fuel, and maintenance for 12 months
6. Provide a Compact Track Loader equivalent to a Bobcat T750 for a (12) month period and include the following:
  - a. Set of forks
  - b. Smooth bucket
  - c. Street Broom
  - d. Complete service, fuel, and maintenance for 12 months
7. Provide the following items to the Construction Manager at the start of the project:
  - a. (1) 20' Locking Storage Container



- b. (1) large gang box
  - c. (15) 42" tall traffic cones
  - d. (4) 8' folding tables, (1) 6' folding table and (20) folding chairs
  - e. (1) 2.5 gallon gas can, (2) 5 gallon gas cans, (2) Diesel Fuel cans that all have integral metal pour spouts and OSHA approved.
  - f. (12) 30-45 gallon commercial rolling trash cans, (5) trash gondolas, (5) soft brooms, (5) corner brooms, (2) street brooms, (5) scoop shovels, (2) digging spades, (2) square nose shovels, (2) floor squeegees, (1) burke bar, (1) back pack blower, (200') commercial garden hose, (2) commercial mops/rolling buckets, (1) 6hp Wet/Dry Shop Vac, (1) 8-1/4" commercial circular saw & 5 blades, (1) commercial grade reciprocating saw, (1) 7/8" in Hilti small hammer drill, (1) 1-1/2" Hilti hammer drill & bits, (1) 50lb box of 2-1/2" Screws and 16d nails, (4) rolls of reinforced poly, (8) large boxes of dust down, (4) 50' commercial extension cords, (2) 100ft commercial extension cord, (6) GFCI pigtails, (1) Honda EU2200i, (1) Honda gas trimmer Model HHT35SLTAT or approved equal, (1) 6ft platform ladder, (1) 8ft platform ladder, (1) drywall cart, (1) flat cart, (1) 8' cable and lock and assortment of apexes and battery drill tips.
  - g. Provide (1) Dewalt cordless combo kit Model# DCKTS882D2M1 and battery pack kit Model# DCB205-2CK or approved equal.
  - h. Provide (2) 20ft retractables with column chockers while laborers are on site
8. Provide (2) 4,000 watt diesel generator light plants with approximately 30' telescopic extension for a 6 month rental period. Include fuel and maintenance to operate these units. The CM shall be responsible for refueling as needed.
  9. Provide (10) individual 10hr working days rental of a 23 ton boom truck with operator to be utilized for concrete pours and other miscellaneous activities. This includes
  10. Provide, maintain, and remove upon completion 3 fire extinguishers per elevation and 3 on the site (total of 18). Include required signage at each floor of the building for general use at spacing intervals to meet OSHA standards. Fire extinguishers are to be provided on temporary stands which may be moved if necessary.
  11. Provide temporary doors at all exterior door openings on the ground floor. Temporary doors to consist of exterior hollow metal door with closure arm, panic device to exit and lockable lever on the exterior (keyed the same). Provide a minimum of 10 keys to the Construction Manager for their use.
  12. Provide the following temporary equipment/structures:
    - a. Temporary stair tower to each level (5 total including the roof) for a 4 month period. Stair tower shall be erected a minimum of 1 floor above

the structure to prevent delays to floor access. Include any steps or ramps required to meet the floor elevation.

- b. Provide and install a “Jr. Buckhoist” Premier Scaffold Solutions, Transport Platform ECP-1500/150 (or approved similar). Transport Platform shall stop at Floor Levels Ground-Roof. Include Install, 3 months rental, dismantle, slab inserts for connection, and all temporary closures required.
13. Provide 6’ tall site fencing and lockable gates as shown on the attach site logistics plan in Section 01 50 00 Temporary Facilities. All gate posts shall be set in concrete and vehicular gates shall include a rolling caster on the latch side. The fencing along the remaining section of Lot F shall be the water/jersey style barrier with fencing on top. All site fencing shall be post driven.
14. Provide temporary concrete loading dock and sidewalks, Jr buckhoist access ramp, and painted crosswalks as shown in Site Logistic Plan found in 01 50 00 Temporary Facilities and Controls
15. Provide and install all concrete housekeeping/equipment pads shown on the drawings. Include an additional (4) 5’x 5’x4” concrete pads not shown on the drawings.
16. Provide and install the (2) concrete roof top unit pads per note 11 on S106. This includes all edge-forming, concrete materials, foam/caulking of gaps, finishing, and wrecking forming materials.
17. This scope includes cutting slab opening for M.E.P. and other chases per the Isolated Slab Opening at 6-1/2” Slab On Metal Deck (MD1).
18. Include all Spray Applied Fireproofing (Intumescent Paint by others). Coordinate timing of install with the metal framer to allow for any clips or accessories to be installed prior to fireproofing.
19. Grout all column steel baseplates
20. Provide and install all of Section 06 10 00 Rough Carpentry, 06 20 00 Finish Carpentry, and Section 06 41 00 Custom Cabinet and Woodwork as described and/or shown on the drawings.
21. This scope includes the complete installation of complete mineral-fiber cement siding Section 07 46 46 at the locations indicated in the drawings. Include all furring/strapping, weather barrier (where required), all trims, fasteners, flashings, penetration detailing, joint sealants necessary for a complete warranted system, and final cleaning of materials.
22. Provide and install all exterior site concrete paving Section 32 13 13 and associated joint sealants. This includes all fine grading (excavation or thickened or turn-down slabs/curbs included), haul-off, compacted gravel base, edgeform, bulkheads, dowel bars, reinforcing steel/mesh, resteel supports, drilling/epoxy dowel bars, slip dowels, control joints, expansion joints, isolation joints, tooled

joints, saw-cut joints, concrete materials/add mixtures, colored concrete materials, material placement, specified finishes, concrete cure & seal, detectable warning devices, ADA ramps, curbs, curb & gutters and joint sealants. Include all of the following:

- a. Provide and install parking lot signage per detail 6/C001
  - b. All notes and details on C001 are applicable and included in this scope of work.
  - c. Included installation of pipe bollards provided by others. Include (4) at the dumpster location
  - d. Include site concrete stairs per detail 8/C002
  - e. Concrete generator pad, transformer pad, and dumpster pad.
  - f. Concrete Mow Strip per detail 4 on L501. Include coordination at each of the downspout boots as necessary.
  - g. Concrete Landscape Curbs per details: 5, 6, 7, & 9 on L501
23. Include a separate mobilization for the concrete sidewalk along Carroll Drive. This section will need to be reinstalled by the fall of 2020 or immediately following the completion of the underground utilities in this area. Included temporary pedestrian safe tie-in to the existing asphalt apron at the construction entrance at Carroll. This asphalt and entrance will remain in use for construction until all underground utilities have been installed and asphalt paving is ready to be completed. Include gravel base and compaction.
24. Provide a concrete washout containment per detail 2 on C702 for this BC-01 scope of works use.
25. Include all of the following items in (1) separate mobilization to maintain the flow of pedestrian traffic:
- a. Excavate and install the section of sidewalk on the north side of Kenton Drive at the intersection of Campbell Drive from the crosswalk to the existing sidewalk. Include replacing topsoil along the edges once complete.
  - b. Provide painted crosswalk across Kenton Drive as shown.
  - c. Include a temporary sidewalk (radius section at new apron) on the south side of Kenton Drive along with a temporary painted or adhesive backed crosswalk that will span the new construction entrance at Kenton Drive. See Site Logistics Plan in section 01 50 00 for additional details.
26. Include all Division 06 10 00 items including but not limited to:
- a. All wood blocking for: roofing, parapets, perimeter of all shower wall, Division 10 needs, TV mount locations, door stops, display boards,

- janitorial equipment, shelving, curtain rods, casework, countertop supports, etc.
- b. Section 09 21 16 metal framing and gypsum is NOT included in this BC-01 Scope.
27. Include a complete Section 32 31 31 Trash Dumpster Enclosure. Include base, gravel, grade, rebar, concrete, finish, and screen install. Steel provided by others and installed by this contractor.
28. Provide and install the following section from Division 08 Doors & Windows
- a. 08 11 00 Steel Doors and Frames
  - b. 08 14 16 Flush Wood Doors (Bedroom Doors shall be undercut to accommodate HVAC return air requirements)
  - c. 08 14 33 Stile and Rail Wood Doors
    - i. The solid wood doors of the hallway suite should include cross-boring.
    - ii. By-pass closet doors
  - d. 08 31 00 Access Doors and Panels
  - e. 08 71 00 Door Hardware
    - i. Include Schalge L9000 for mechanical mortise locks
    - ii. Conventional push rail exit devices (heavy duty) shall be Von Duprin (VON)-35A/98 XP Series
    - iii. LCN Closers (LCN) - 4040 Series.
    - iv. Provide install temporary construction cores that are individually keyed and with a master key
  - f. 08 71 13 Automatic Door Operators (only for wood doors/HM frames identified in this scope)
  - g. Provide and install all door frames in CMU openings. Include all grout holes and caulking/sealing as necessary to maintain fire ratings.
29. Provide and install a complete system for all of the following Division 10 Specialties:
- a. 10 11 01 Visual Display Units
  - b. 10 14 00 Signage
  - c. 10 21 13 Toilet Compartments
  - d. 10 28 00 Toilet, Bath, and Laundry Accessories
    - i. Dyson Airblade electric hand dryers (1 in each public restroom)
    - ii. Public bathrooms will include the following that are provided and installed by NKU: Stigler hand sop dispenser, sanitary napkin dispenser, toilet paper dispenser, trash receptacle, roll paper towel dispenser

- iii. Provide coat hooks in all toilet partitions
  - iv. Diaper changing stations
  - v. (2) towel bars in each shower room
  - vi. Toilet paper holder
  - vii. Shower curtain rod (curtains by others)
  - viii. (2) robe hooks in each shower rooms
  - e. 10 44 00 Fire Extinguishers, Cabinets, and Accessories
  - f. 10 55 00 Postal Specialties
  - g. 10 73 16 Canopies (by others blocking by this contractor)
  - h. 10 82 13 Rooftop Equipment Screens
30. Provide and install a complete system for all of the following Division 12 Furnishings:
- a. 12 36 00 Countertops and Window Stools
  - b. 12 48 13 Entrance Floor Mats and Frames
  - c. 12 93 00 Site Furnishings
31. Provide and install a complete system for all of the following Division 11 Equipment include:
- a. (3) Dishwashers
  - b. (3) stove hoods
  - c. Washers/Dryers are not included
  - d. Dyson Airblade electric hand dryers (1 in each public restroom)
32. Provide all kitchen equipment shown on A100
33. Provide and install a 10" deep by 24" long book shelf in public restrooms
34. Provide construction clean of floors or areas as they are completed and final cleaning as punchlists have been completed.
35. Provide Termite Treatment as identified in Section 31 31 16
36. Provide caulking and/or sealing of joints at the following locations per Section 07 92 00 Joint Sealants:
- a. All Site Concrete
  - b. All interior polished or exposed concrete floors. Exposed concrete floors may include the following rooms: mechanical, electrical, plumbing, MDF, IDF, janitorial rooms, closets, restrooms, firepump, laundry, vestibules, and stairwells
  - c. Seal all metal stair stringers and landing to the adjoining masonry walls (see details 12 on A620 typical all sides)

- d. Seal the perimeter of wall tile in public restrooms
  - e. Caulk/seal the perimeter of all shower pans, shower walls to drywall, and shower pan to flooring joints.
  - f. Provide all masonry caulking. This includes all expansion, compression joint, and control joints.
  - g. Included all firestop sealant and firesafing at the heads of CMU wall where required. Refer to detail 3/A611 and 5/A611.
  - h. Provide caulking of the exterior side of door frames, light fixture boxes, hose bibs and above grade pipe penetrations. Provide caulking at all sides of doorframes installed in masonry or concrete walls. The BC-18 Painter will caulk door frames to gypsum surfaces only.
  - i. Seal/caulk all countertops to backsplashes or drywall
37. Provide and install all site furnishing as shown on the drawings or identified in the specifications.
38. Provide an interior set of temporary stairs and railing at the elevation change at Stair 105S. Stairs shall be constructed so that other trades can “unscrew” the stairs and temporarily relocate them while constructing the surrounding walls or structure.
39. Provide removable guardrails and full netting protection at each entrance to the elevator shaft.
40. Include all dewatering necessary to complete this scope of work.
41. Install all countertop blocking and supports for restroom vanities provided by others (4/A850).
42. Install steel plate for kitchen countertop provided by others (11/A850)
43. Install steel angle brackets for floating shelves provided by others (7/A850).
44. Alternate No. 2: The General Trades and Electrical Contractors shall include alternate pricing to provide and install card readers and electrified hardware at all residential suite entry doors.
- a. BC-01 General Trades shall include pricing for the following:
    - i. Provide one of the following card readers: HID iCLASS SE® RM40 or Allegion® MTMS15 (aptiQ®) Multi-Technology, Magnetic Stripe Reader (Black). The electrical contractor shall pull all wires and make all connections.
    - ii. Provide and install electronic lockset L9092EU-07B. The electrical contractor shall pull all wires and make connections

- iii. Provide electrified hinge per the hardware specifications.
  - b. BC-10 Electrical Contractor shall provide pricing for the following:
    - i. Pull all wires from MDG/IDF through conduits installed in base bid, connect and install card readers, install electrified hinge provided by BC-01 and connect to wires to electrified hardware on one side of the hinge and the MDF/IDF on the other.
45. Alternate No. 3: Substitute solid wood doors within the suites for hollow core:
- a. The BC-01 General Trades Contractor shall provide alternate pricing to replace the solid core wood doors with hollow core wood doors at the shower rooms, toilet rooms, and bedrooms within the unit suites.
46. Include a \$10,000 for reworking site fencing or other structures as directed by the Construction Manager.

**BC-02 – Earthwork, Site Utilities, and Asphalt Paving**

The Scope of Work in this Contract BC-02 includes all labor, material, equipment, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-02, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
	Geotechnical Exploration Report
Division 01	General Requirements
Section 02 41 13	Selective Site Demolition
Section 03 33 00	Cast-In-Place Concrete (as applicable)
Section 06 10 00	Rough Carpentry (as applicable)
Section 21 01 00	Fire Protection (as applicable)
Section 31 10 00	Site Clearing
Section 31 2000	Earthwork
Section 31 63 20	Drilled Piers (as applicable)
Section 32 12 16	Asphalt Paving
Section 32 13 13	Concrete Paving (as applicable)
Section 32 84 00	Planting Irrigation (as applicable)
Section 32 91 13	Soil Preparation (as applicable)
Section 32 92 00	Turf and Grasses (as applicable)
Section 32 93 00	Plants (as applicable)
Section 33 11 00	Water Distribution
Section 33 31 00	Sanitary Sewer
Section 33 41 00	Storm Drainage
Section 33 46 00	Subdrainage

The following items represent specific inclusions in this Contract BC-02: Earthwork and Site Utilities. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with the BC-02 scope of work shall be included.
4. This scope includes a mock-up.
5. This BC-02 scope shall include:





**Demolition:**

- a. Call 811 and private underground locating company to identify all utilities prior to any excavation/demo.
- b. Install and maintain erosion control. This includes notifying SD1 72 hours prior to construction beginning.
- c. Provide and install construction entrance per detail 1 on C702 as required. See Site Logistics Plan in Section 01 50 00.
- d. Do not disturb the existing Emergency Call Box (C100)
- e. Clear & grub
- f. Landscaping, tree & stump removal
- g. Carefully remove site signage for relocation by others per note 2 on C200
- h. Site saw cutting and removal of existing concrete and asphalt. This includes asphalt along Carroll Drive so that the paving is not damaged during the concrete removal. Coordinate the sidewalk demo with the BC-01.
- i. Include: Note 1, 2, 3, 5, 9, and 10 on C200
- j. Demo concrete aprons between sidewalks along Carroll Drive (not just note 11 on C200)
- k. Remove bollards and light pole per notes 1 and 6 on C200. Remove underground conduit per note 7 and backfill once they have been abandoned by BC-12.
- l. The BC-12 subcontractor shall relocate the light pole, underground conduit, and pull box per note 4 on C200. This BC-02 scope include removal of any concrete bases and conduit that remain after the new lighting has been installed.
- m. Demo underground storm and structures per note 9 on C200.
- n. Cut existing grade down 9 inches to allow for new sidewalk on the south side of the parking lot per detail 5/C001 on C300. Remove material from back of curb to 6 feet back. Excavate and haul off the spoils for the section of sidewalk shown on the north side of Kenton Drive on C300 (see detail 5 on C001).
- o. Catch basin elevation changes per note 5 on C200 shall be coordinated with the replacement of existing asphalt to maintain positive drainage at all times.
- p. Demolition General Notes on C200 apply to this BC-02 scope.
- q. Provide temporary seeding of all disturbed areas

**Excavation & Grading:**

- a. Cut existing elevations to new grades shown on C400. Leave existing asphalt per Site Logistics Plan Section 01 50 00.
- b. Provide 2 foot undercut per the Geotechnical Report provided after Division 00 in the Project Manual.
- c. Cut shaded area of the building footprint on A001 to 97'-0" and 94'-0" for the remainder of the non-shaded slab on grade area. Include backfill per the geotechnical report to 5 inches below finished concrete floor slab after foundation and plumbing work is complete
- d. Import/Export materials as required to establish grades shown on the drawings
- e. 3<sup>rd</sup> Party Testing will be provided for all compacted materials included in this scope
- f. Storm detention pond
- g. Compacted Gravel base for all asphalt areas
- h. Dewatering as needed
- i. Exclude foundation excavation, backfill, under slab drainage & waterproofing
- j. Place & compact utility spoils per 3<sup>rd</sup> party testing and inspections
- k. Compaction testing by others
- l. Include note on C200 along with all plantings within the island. Once the planting have been removed, excavate and replace per detail 8 on C001. This will need to be completed almost immediately to return the parking area over to the owner.

**Storm Drainage:**

- m. Adjust existing catch basin rim elevations as shown (coordinate with final pavement)
- n. All head walls, catch basins, yard drains, cleanouts, and piping as shown on Civil Drawings
- o. Downspout boots shall be provided and install for connection of the downspout by others
- p. Include CDF backfill to subgrade under all paved areas. Match finished grade with adjacent material so that a trip hazard isn't created
- q. Foundation and Landscaping underdrains shall be brought 5 feet outside the foundation wall for connection by this BC-02 subcontractor. Include all site catch-basins and tie-ins stub outs for landscaping subdrainage.
- r. CDF backfill under paved areas
- s. Concrete blocking/encasement as required
- t. Filter fabric or geotextile
- u. Riprap stone
- v. tap and install gas service into the building and run a service back near the generator
- w. Provide a complete storm detention pond. This includes topsoil, grading, and seed mats as required for finished product.

**Sanitary Sewer:**

- a. Tie into existing 8" PVC sanitary piping per C500. The areas of work outside the construction fencing shall be protected with snow fencing at a minimum and restored once the pipe install had been completed. No exposed fall hazards shall remain unprotected when this contractor is not on site.
- b. 6" PVC per C005
- c. Cleanouts
- d. Concrete blocking/encasement as required
- e. Saw cut and demo of Kenton Drive
- f. Traffic control
- g. Granular bedding course and Control density backfill to subgrade
- h. Asphalt restoration of Kenton Drive.
- i. Testing
- j. Bring line to within 5 lf of building footprint and cap for connection by others. Coordinate elevations with plumbing contractor.
- k. Site restoration to match existing surrounding conditions where work takes place outside the limits of the site fencing. This includes all of the sanitary on the north side of Kenton Drive.
- l. Confirm the required elevation or the sanitary 5 feet outside the building with the Plumbing subcontractor.

**Domestic Water and Fire Water Protection Distribution:**

- a. Provide a temporary ¾ inch water service to the Construction Managers project trailer in addition to a frost free yard hydrant by May 15, 2020. Include all permits, taps, fees, inspections required to do so. CM shall pay monthly usage fee. Removal and capping this tie-in once the trailer has been removed is included.
- b. Tie into existing per note 3 on C004
- c. Traffic control

- d. Granular backfill and control density backfill under paved areas
- e. Thrust blocks, concrete encasement, and concrete blocking as required
- f. Services may require additional coverage from what is being shown to coordinate with other intersecting utilities. This BC-02 scope include coordination as needed.
- g. Valves
- h. 4 inch domestic water service turned up inside building, tested, flushed, chlorinated, and inspected as required
- i. 6 inch fire protection water service turned up inside the building, tested, flushed, chlorinated, and inspected as required
- j. Meters if not provided by the water district
- k. Fire hydrant
- l. Free standing FDC (Turn up and cap just below asphalt subgrade. Complete installation just prior to completing asphalt paving)
- m. CDF under paved areas
- n. Testing and documentation

**Natural Gas:**

- a. Schedule with Duke the tie in to the existing gas line located along Kenton Drive
- b. Schedule with Duke and other traffic control during gas tie in work
- c. Schedule inspections with Duke to install the backfill
- d. Provide granular backfill under paved surfaces
- e. Schedule the testing of gas line with Duke
- f. Provide the gas service into the building and out to the generator per MU100
- g. **Coordinate gas trench with electrician so we can have them install electric & telecommunication feeds in the same trench**
- h. Exclude gas meter setting & concrete pad

**Geothermal Underground Sleeves:**

- a. (8) 5 inch pvc sleeves buried a 60 inches deep and 12 inches on center
- b. Include 45 degree bends to turn up inside Mechanical Room 130M
- c. Sleeves shall extend to the edge of the existing asphalt
- d. Cap each end of the pipe to prevent contamination

**Asphalt Paving :**

- a. Light and heavy duty asphalt paving per civil drawings
  - b. All temporary entrances shall include heavy duty asphalt details per detail 1 on C001 less the top coat. Taper all edges to exiting surfaces so that trip hazards can be prevented (where no top coat has been installed).
  - c. Proof rolling subgrade
  - d. Prime coat
  - e. Tack coat
  - f. Joint sealants
  - g. Asphalt surface treatment
  - h. Pavement marking
  - i. Patching and sealing along the new sidewalk along Carroll Drive
6. The critical path of the schedule is to begin the new building foundations as soon as possible. This scope of work includes expediting the earthwork of the building footprint and releasing the BC-03 & BC-04 subcontractors.
- a. While maintaining (1) of the existing entrances at Carroll Drive; demo, cut, and fill the

entire building footprint and surrounding areas out to where the new line of asphalt is shown on C300 (sawcut 6" past new curb/sidewalk location for clean edge). During this time the site electrician will be reworking the site lighting as need for this BC-02 subcontractor to install the new entrances at Carroll and then Kenton Drives.

- b. Install new asphalt entrance at Carroll Drive as soon as the Electrical Contractor has completed the underground in this area.
        - c. Install new underground utilities and demo, install the new entrance shown on Kenton Drive per C300 and also the temporary entrance per the site logistics plan at the end of the BC-02 scope description. Demo and replace existing island on C200 per detail 8 on C001. See the Site Logistics Plan for temporary condition until turnover. Include grinding and resurface this area at the end of the project.
        - d. Provide the temporary construction roads detailed on the Site Logistics Plan in section 01 50 00. Roads shall consist of filter fabric, 8" of #2 stone and 4" of compacted DGA. Include removal of access roads prior to final grade prior to install of site concrete. Include a \$10,000 allowance for the repair of temporary roads and laydown areas as directed by the construction manager.
        - e. Once all site concrete and underground utilities have been installed, the remaining asphalt shall be removed, adjust/replace catch basins as necessary, install gravel base, proof roll and installed new asphalt.
7. Accurate timing of excavation and site demolition work is critical and must be accomplished according to the milestone schedule included in section 01 32 13. All premium time costs to meet the schedule dates are to be included. This includes overtime and Saturdays for any days not worked due to inclement weather.
8. This scope includes erosion control as shown on C700 at a minimum or more if required to prevent contamination of storm water structures, existing paved lots, other owner structures or properties. This scope include maintaining documentation and inspection per authorities having jurisdiction.
  - a) This BC-02 scope include installation and maintenance of the erosion control while mobilized on site.
  - b) This BC-02 scope includes turning over erosion control responsibilities to the CM between phases of this BC-02 subcontractor's scope. Prior to turning over responsibilities, this BC-02 subcontractor shall bring all erosion control and documentation up to date and have the CM sign-off prior to release of responsibility. Provide (6) new catch basin inserts for use by others as needed.
  - c) The Irrigation & Landscaping subcontractor shall remove the erosion control (silt fencing) along Kenton Drive to the north and near Carroll Drive on south side of the new building. This includes any soil restoration and grass seeding and sodding as necessary.
  - d) This BC-02 subcontractor shall install, maintain, and remove the erosion control along Kenton Drive from the new entrance to the end of the new detention pond.
  - e) Once landscaping has been completed, this BC-02 subcontractor shall include removal of all erosion control systems at storm water catch basins and cleaning/camera of the structure by Tele-Vac, Badger or other comparable company. Include camera footage of

clear storm water structures with closeout documents.

9. This scope include installing a complete storm detention pond including but not limited to; erosion control, excavation, import/export or spoils, underground pipe, backfill, filter fabric, stone, headwalls, removal of erosion control, topsoil, restoration, grass seed mats or sod to provide a complete structure during the summer semester of 2020. Include any over-seeding as needed to provide a complete grass covered area. Erosion control is the sole responsibility of this subcontractor. This area of work will be outside the limits of construction fencing so this scope includes not leaving any exposed tripping or fall hazards for the public while work progresses.

10. Include four mobilizations. The mobilizations will be phased as follows:

Phase 1 – (prior to site fencing of building pad)

- a) Install sanitary line from existing sanitary to south side of Kenton Drive for building tie-in.
- b) Tap and install domestic water supply to project Field Office that will have a waste storage tank.
- c) Install all underground utilities shown crossing the new entrance to the parking lot to Kenton Drive

Phase 2 – (Early May)

- a) Install new entrance at Carroll and Kenton
- b) Site demolition, mass cut and fill to bottom of footing installation at 97'-0" for the shaded area shown on A001 and 94'-0" for the remainder of the slab on grade area, underground utility installation, temporary gravel roads
- c) Patch existing island to create new entrance from Kenton.
- d) Install storm detention structure

Phase 3 –

- e) fill building pad to from elevations listed above to 5 inches below concrete slab, complete any site utilities after foundation backfill (by others) has taken place

Phase 5 –

- a) Remove temporary gravel roads and cut site to subgrade (BC-01 will follow with the install of site concrete sidewalks, curbs and gutters), grade sidewalks to subgrade

Phase 6 –

- a) Remove existing asphalt parking, cut to subgrade, install gravel base, install asphalt paving, install pavement markings, and remove temporary entrance from Kenton Drive once the other new asphalt entrances have been installed. Remove and cap all temporary utilities to project Field Office.

11. Topsoil installation will be performed by others. This scope includes fine grading to accept topsoil.



12. Include shoring or trench stabilization as needed for this scope of work.
13. All underground utilities trenches located under paved surfaces shall be backfilled with CDF or lean concrete to subgrade. All trenches shall be backfilled to match adjoining existing surfaces to prevent trip hazards and allow for snow removal/parking lot maintenance.
14. This contractor is responsible for all layout associated with this work. All new pipe installed by this contractor shall be as-built prior to backfilling and a CAD file shall be provided to the CM within 2 weeks of install. As-built files shall include elevations and location.
15. Blasting is not permitted. This subcontractor is responsible for controlling dust from excavation activities and dust from hauling off spoils.
16. This contractor is responsible for field verifying existing grades.
17. If import soils are required, this subcontractor shall provide proof that the fill brought from another source meets the specifications. This proof shall be provided four weeks in advance of the import operations. This contractor is responsible for the cutting, handling, hauling, etc., of all import material.
18. Provide all temporary road plates, traffic barriers, signage, etc. to maintain existing street operations for local traffic including flaggers.
19. Restore all areas outside of the project site limits, disturbed by this contractor to a state equal to or above the existing conditions before construction began.
20. This contractor shall control mud and dust during the excavation work, and until completion of this scope of work, to prevent/protect pedestrians, roadways, vehicles, and buildings in adjacent areas from dirt and debris.
21. All roadways, public or private, used by this contractor must be kept clean and free of dirt and debris at all times. This contractor shall provide street sweeping at least twice a day while on site and continuously when hauling out dirt or bringing dirt into the site. This contractor will be responsible to repair any damage it causes to these structures.
22. This contractor shall protect existing utility systems to remain, when performing demolition & excavation. Hand dig or hydro/vac-excavate where applicable to achieve proposed grade.
23. This contractor shall provide the temporary signage, shoring, bracing, barricades and flagman to conduct their work while maintaining the safety of his/her employees, other tradesman and the general public, including temporary fencing around open trenches.
24. This contractor shall provide all dewatering made necessary by this scope of work. This contractor, at all times shall protect the work from damage by rain water, ground water, sewer back-up, and other types of water. This contractor shall provide all pumps, equipment, enclosures, etc. to provide adequate protection and dewatering, to maintain the progress of construction in accordance with the construction schedule.
25. The building pad shall be left at 9 inches below the Finish Floor Elevations until after foundations are installed.
26. This contractor must supply their own necessary power via generators.
27. This subcontractor must maintain parking egress to Lot F at all times.

28. Provide unit pricing for import and export 1 cubic yard of spoils based on each truck hauling 12cys.

END OF BID CATEGORY BC-02

### **BC-03 – Drilled Piers**

The Scope of Work in this Contract BC-02 includes all labor, material, equipment, layout, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-03, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00- Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Report
Section 03 33 00	Cast-in Place Concrete (As Applicable)
Section 05 12 00	Structural Steel (as applicable for reinforcing steel)
Section 31 63 20	Drilled Piers

The following items represent specific inclusions in the contract. They are provided as a guide to aid in the assignment of work and in no way should be construed as being all-inclusive:

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Provide and install all excavation, reinforcing steel, concrete materials, and placement required to complete the deep foundation piers as shown on the drawings.
4. Drilled piers shall comply with the Geotechnical Report located in the Project Manual.
5. Subgrade shall be provided at **94'-0"** by the BC-02 subcontractor. This BC-03 subcontractor shall return the subgrade to its original compacted condition at the same elevation in which it was provided. Notify the CM of any discrepancies prior to beginning the drilled pier activity.
6. This contractor is responsible for protective barriers around the drilled piers while drilling, setting cages, pouring concrete and after they are poured.
7. This BC-03 scope includes the following:
  - a. Submit shop drawings per Section 31 63 20
  - b. Include reinforcing steel shop drawings for all steel embedded in drilled piers (horizontal grade beam resteel by others)
  - c. Include any rebar column dowels that extend into the tops of piers
  - d. Include and implement a safety plan that prevents exposure to falls and includes impalement protection at ALL times



- e. Provide all engineered layout
  - f. Included all hoisting required for this scope of work
  - g. Excavate drilled pier shaft and rock socket as required
  - h. Support owners Testing Agency to confirm drilled pier excavation meets design specification
  - i. Fabricate and install all reinforcing steel
  - j. Haul all spoils off site on a daily basis.
  - k. Provide and install concrete materials as specified
  - l. Top of pier elevation shall be held down to match the bottom of the lowest intersecting footing or to construction joint (per typical steel column/drilled pier on S002) where anchor bolts are included. This BC-03 scope includes chipping or adding to piers that are out of the allowable tolerance.
  - m. Provide as-built survey documents that include elevations and location as piers are being completed.
  - n. Provide gravel backfill
8. BC-03 is responsible for dewatering as needed to complete the drilled piers. This includes the removal of ground water as necessary to install reinforcing steel and concrete per the owner testing agency and Geotechnical Engineer.
9. BC-03 Shall not drill any more piers in a day than can poured back in that same day.
10. This subcontractor is responsible to keep all drilled piers barricaded until poured.
11. This subcontractor is responsible to have a drill rig fixed or replaced to not allow any more than 24 hours down time.
12. This subcontractor shall coordinate the installation of the grounding cabling with the electrical contractor.
13. This subcontractor shall be responsible for all mobilization cost as needed to complete this scope of work.
14. This subcontractor shall provide restoration of piers not installed to plan elevations or tolerances.
15. All pier load tests and documentation shall be provided by this subcontractor as specified by the Engineer. The testing shall be coordinated with the CM and Geotechnical Engineer.
16. All holes are to be inspected for dryness and cleanliness by the Geotechnical Testing Engineers prior to the placement of steel and concrete. In the event of unsuitable soils, this subcontractor shall provide a casing and water pumping, etc. for the hole to allow for proper installation of the drilled pier.
17. BC-03 is to review the Geotechnical report for water table elevations.

18. BC-03 is to follow all procedures necessary to properly install the drilled piers per the direction of the Geotechnical Testing Engineer and as called out in the drawings and specifications.
19. This subcontractor shall submit unit prices for added or deleted lengths of piers according to the conditions in the field.
20. This subcontractor is responsible for engineering and layout of their work using benchmarks and control points provided by the CM.
21. This subcontractor must attend a preconstruction meeting to present the Construction Manager with their plan for construction procedures, control of dirt, fumes, and safety program. In addition, this subcontractor shall coordinate work with all other subcontractors and participate in a subcontractor coordination planning session prior to the commencement of work and other planning sessions as requested during the duration of this scope of work.
22. This subcontractor is responsible for controlling dust from drilling and dust from hauling off spoils.
23. This subcontractor is responsible for keeping the streets clean at all times for this scope of work.
24. This contractor shall provide his/her own unloading, hoisting and rigging as required to perform this scope of work.
25. This contractor shall coordinate elevations and other items with BC-04 foundation installer.
26. This contractor is responsible for pouring the drilled piers. Concrete supplier shall washout concrete chutes only in washout containment per detail 2 on C702 provided by this BC-03 subcontractor.
27. This contractor is responsible for protective barriers around the drilled piers while drilling, setting cages, pouring concrete and after they are poured. This contractor shall either backfill tops of piers with grits (wash off of pea gravel) or provide hole covers as
28. This contractor shall provide layout and engineering required for this scope of work
29. This contractor shall provide his/her own unloading, hoisting and rigging as required to perform this scope of work.

END OF BID CATEGORY BC-03



**BC-04 – Concrete Foundations, Reinforcing Steel, Concrete Materials P.P.F**

The Scope of Work in this Contract BC-04 includes all labor, material, equipment, layout, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-04, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00- Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Report
Section 03 33 00	Cast-In-Place Concrete
Section 03 35 11	Concrete Floor Finishes (as applicable)
Section 05 12 00	Structural Steel (as applicable)
Section 05 30 00	Metal Decking (as applicable)
Section 05 40 00	Cold-Formed Metal Framing (as applicable)
Section 05 51 13	Metal Pan Stairs (as applicable)
Section 06 10 00	Rough Carpentry (as applicable)
Section 07 10 00	Waterproofing
Section 07 21 00	Thermal Insulation
Section 07 26 16	Below Grade Vapor Retarders
Section 12 48 13	Entrance Floors Mats and Frames
Section 31 20 00	Earthwork (as applicable)
Section 31 63 20	Drilled Piers

The following items represent specific inclusions in the contract. They are provided as a guide to aid in the assignment of work and in no way should be construed as being all-inclusive:

1. Messer Construction will **not** be bidding or performing any direct work on this project per State Of Kentucky Laws regarding Construction Management Contracts.
2. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
3. There is a goal of **18% M/WBE** participation on this project.
4. Review the Geotechnical Report provided in the Project Manual and include all material, labor, services, and means/methods necessary to provide a complete foundation installation.
5. This scope includes a mock-up.
6. Provide and maintain a concrete washout structure per the detail on S702 for all concrete wash out need.
7. The BC-02 Earthwork Site Utilities subcontractor shall cut the building pad to 97'-0" for the shaded area shown on A001. The lower area that is not shaded shall be cut to 94'-0". This BC-04 subcontractor shall excavate or form all footings and walls above or below

this grade as needed.

8. Once foundations and underslab utilities have been installed, this BC-04 subcontractor shall provide compacted backfill, insulation, vapor barrier and reinforcing steel required for completed slab on grade concrete base.
9. The following scope will be provided by others:
  - a. Undercut per the Geotechnical Report.
  - b. Drilled piers (excavation, resteel, concrete, spoils haul off)
  - c. Slab on grade backfill/compaction of soils and gravel shall be provided by BC-02. BC-04 shall backfill footing/wall excavations.
  - d. BC-01 shall grout structural steel baseplates. This BC-04 scope includes forming boxouts, removing all forming material, cleaning anchor bolts, and leaving the box-out free of all debris. Provide hole covers at all boxouts.
10. This BC-04 scope includes all labor, material, equipment, layout, services, and supervision required to provide the following (Drilled Piers & Drilled Piers Reinforcing Material/Labor by others):
  - a. Engineering and Layout.
  - b. Submittals, Shop Drawings, and design for Rock Anchors S002
  - c. Templates and installation of column dowels or embedded bolts into drilled piers are included in this scope.
  - d. Excavation, spoils haul-off, dewatering, forming, concrete materials, and concrete placement of all footings, grade beams, and walls.
  - e. The BC-03 Drilled Piers installer shall hold the top of concrete in the piers down to the construction joint elevation shown in the Typical Steel Column/Drilled Pier detail on S002. This BC-04 scope shall include providing template and bracing necessary to install the anchor bolts in the correct location with the correct projection. Protect all threads from damage and concrete. Clean all threads prior to releasing to the Structural Steel installer
  - f. Setting all anchor bolts
  - g. Include all template, bracing, and layout required for anchor bolt installation
  - h. Backfill concrete under footings
  - i. Rock anchors with lock off plate
  - j. Keyways in footings or tops of walls
  - k. Slab on grade vapor barrier labor and material. Include sealing all penetrations, splices, and perimeter edges to walls or footings.
  - l. Waterproofing/damp proofing around the elevator pit and where required
  - m. Installation of foundation drains and backfill to subgrade per items c. above (BC-02 will

- connect to the foundation drain 5ft outside the building)
- n. Elevator sump pump pit box out and grate ledge forming
  - o. Bentonite waterstop
  - p. Perimeter rigid insulation (vertical and horizontal). The top edge of the vertical insulation shall be cut at a 45 degree angle to conceal the top edge of insulation along the perimeter walls.
  - q. Form steps in footings
  - r. Install brick ledges and chamfer where required
  - s. Form all depressions
  - t. Install all embedded items provided by others
  - u. Depressed area for walk-off mat(s) and ADA tile floor depressions
  - v. Form, pour in-fills, wreck, and protect slab box-outs around columns
  - w. Slab on grade details on S002 are included (isolation joints, expansion joints, keyway, bulkheads, bond breaks, and dowels)
  - x. Provide and install compacted backfill around all footings and walls
- 11. Install embedded plates per detail 1/S211, 25/S40.
  - 12. Provide shop drawings and material submittals within 2 weeks of Notice to Proceed.
  - 13. Reinforcing steel for drilled piers and site concrete curbs/sidewalks is not included in this scope of work.
  - 14. Each elevation shall include (2) separate resteel installations and concrete pours.
  - 15. Include all reinforcing steel materials and installation labor for the following:
    - a. Footings and Grade Beams (drilled pier reinforcement by others)
    - b. Walls and Curbs
    - c. Concrete slab on grade (S.O.G.)
    - d. Elevator pit slab and walls (includes sump pump well)
    - e. S.O.G. boxouts pour back per S002
    - f. Design shall include CMU dowels to be drilled and epoxied to install after slabs have been placed. This contractor shall provide embedment bars to length that include the lap splice and embedment "tail" for the Mason to install
    - g. Splice bars, Z-bars, re-entrant bars, and all other reinforcing steel including special shapes similar to detail 1 on S211
    - h. Bar reinforcing under all mesh
    - i. Construction joint dowels
    - j. Backup, support, and profile bars
    - k. All reinforcing (bars and mesh) for slabs on all supported metal decks
    - l. All reinforcing for roof top equipment per details 27 & 28 on S402
    - m. All metal pan stair and landing reinforcing (7/S401).
    - n. Additional reinforcing for sleeves and penetrations through slabs and walls

16. This scope includes all field cutting and bending as necessary for a complete installation.
17. All cribbing shall be stored in an organized fashion and discarded if no longer in use.
18. This scope includes disposing of all tie-wire scraps, tags, or any other scraps created from the installation of reinforcing steel in the provided dumpster.
19. At the completion of installation of resteel for each pour, excess materials shall be removed and staged in designated area.
20. Provide and install all tie-wire bar supports, standees, chairs, bolsters, and concrete brick, for suspended slabs, walls and slabs on grade.
21. Include all construction joint relief cuts as required
22. Provide and install impalement protection or 180 degree ends on any steel that pose an impalement risk.
23. The reinforcing steel installer shall be present for all deck pours. Provide sufficient qualified labor to monitor, make adjustments, repair and re-tie the reinforcing steel within the pour.
24. This Subcontractor to be present for all resteel inspections. Corrections shall be made immediately to keep from delaying pours. Overtime will be this contractor's responsibility if required. Sign-off of concrete pour required by this subcontractor.
25. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.
26. Provide and maintain a concrete washout structure per the detail on S702 for all concrete wash out need.
27. Include all layout and engineering required. The CM shall provide benchmark elevations, this BC-04 scope includes pinning or other means of establishing top of slab elevations.
28. This BC-04 scope includes: submittals, shop drawings (control joint layout), providing concrete materials (including all admixtures), pumping of all concrete slabs (on grade and supported), finishing of all concrete slabs (on grade and supported), concrete filled pan stairs, (2) roof top concrete equipment pads, concrete infills around ground floor columns, and all concrete curing.
29. Include 2 pours per floor for levels Ground-Level 5 (10 mobilizations). Include (2) mobilization for each concrete filled metal stair (4 mobilizations total). Include (1) mobilization for the roof top concrete slabs. Include a total of 15 mobilizations for the project.

30. See MEPFP drawings for slab penetrations/sleeves. See Structural Drawings for embedded connections. Include detailing around all penetrations and sleeves.
31. Due to the structural decking weight capacities, the decking at midspan (Detail 4/S401) requires additional shoring and/or the use of only walk behind finishing equipment. This BC-04 subcontractor shall submit all weights to the Structural Engineer for review.
32. Include all SOG and elevated slabs and beams.
33. This scope includes meeting all FF/FL requirements.
34. Detailing around all penetrations, embeds and hold downs
35. Repair or replace all damaged materials due to use of system.
36. Remove all debris from the deck the day of the pour. This includes wrappers, drink bottles, and concrete debris from trowel machines, tools, and equipment.
37. Provide all labor, equipment, and concrete material, to place and finish the metal pan stairs. This work will not be phased with the slab pours. Include all extruded aluminum nosing's, caulking, sealing, taping, and oiling of stairs before pour. Include all cleanup of excess concrete on all risers, landings, handrails, edges, and adjacent surfaces immediately following the stair pour.
38. This Subcontractor is responsible for providing proper slope to all drains to allow positive drainage and no ponding of water.
39. Visit site a minimum of 24hrs in advance of each pour to verify everything is ready for your portion of work.
40. This BC-04 scope includes all crane and hoisting needs required to complete the Level 5 concrete. The telehandler provided by the CM will not reach Level 5
41. Include hot water, accelerators, curing compounds, wet curing, surface retarders or any other add-mixture required to achieve the specified concrete finish per specifications.
42. Include all hot and cold weather procedures as necessary for a complete concrete pump, place, finish, and cure scope of work.
43. This scope includes all concrete curing per the specifications. This includes, installation, maintenance and removal of any wet curing materials.
44. Include pump slick packs as needed. No grout shall be used.
45. Provide pour stop in CMU doorway openings for slab edges.
46. Include 1 person for traffic control and tire wash and 1 person at the back of the pump for each pour mobilization.
47. Comply with flatness and levelness requirements. Use of check rod included.
48. To insure consistency, provide the same finishing foreman, vibrator operator and concrete pump hose operator throughout the duration of the project. One alternative may be named for each position to be considered by the CM in the event of scheduling conflicts. All foreman must be approved by the CM and reserves the right to replace a

foreman or operators during the project if their performance becomes unsatisfactory.

49. This scope includes the responsibility for making the decision to pour the concrete slabs due to inclement weather. If the concrete pour is canceled, the pour shall be moved to following day including Saturday if required.

END OF BID CATEGORY BC-04



**BC- 05: Structural & Miscellaneous Steel**

The Scope of Work in this Contract BC-05 includes all labor, material, equipment, services, layout, and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-05, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Exploration Report
Section 03 33 00	Cast-In-Place Concrete (as applicable)
Section 04 00 00	Masonry (as applicable)
Section 05 12 00	Structural Steel
Section 05 30 00	Metal Decking
Section 05 40 00	Cold Formed Metal Framing (as applicable)
Section 05 51 13	Metal Pan Stairs
Section 06 10 00	Rough Carpentry (as applicable)
Section 09 91 00	Paints and Coatings
Section 10 73 16	Canopies (as applicable)
Section 10 82 13	Rooftop Equipment Screens (as applicable)
Section 12 36 00	Countertops and Window Stools (as applicable)

The following items represent specific inclusions in this Contract BC-05: Structural & Miscellaneous Steel. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included.
4. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.
5. This scope includes a mock-up.
6. The Metal Framing, Drywall, & Acoustical Ceiling installer shall provide and install all loadbearing metals studs, light gauge metal studs, box headers, cold formed track, cold formed

hold down anchors, cold form straps, and cold form metal shear walls.

7. CM will layout an offset of column lines B and 8 for all trades use. This subcontractor will be responsible for laying out their work off of these control lines. This subcontractor is also responsible to field verify critical dimensions prior to fabrication whenever possible.
8. Include the following:
  - a. Wide flange shapes
  - b. Anchor bolts and labeled baseplate templates for installations
  - c. Steel pipes
  - d. Hollow structural sections
  - e. Rolled shapes
  - f. Plates and bars
  - g. Headed shear studs
  - h. Metal decking
  - i. Bolts
  - j. Anchor rods
  - k. All welding materials and welded connections
  - l. Beams bearing on CMU including embedded
  - m. Mechanical box-outs
  - n. HSS beam per details 21/S402 and 22/S402. Occurs at the Lobby near the elevator.
  - o. HSS beam and columns on column line 6.9 between E & F. Typical at the Study room on each floor.
  - p. W shape beam and support columns at column line A between 7 & 9 and column line 9 between A & C lines per detail 47, 48 on S403 at levels 3-Roof. See pages S103, S104, S105, & S106. Typical at the Lounge on each floor.
  - q. Embedded/Welded plates per 1/S211, 3/S401, 8/S401, 25/S402, 35/S403, 40/S403,
  - r. Support Angle and anchors per details: 7/S401, 24/S402, 32/S402, 36/S403, 46/S403, 49/S403, 11/S401
  - s. Pour stops, closures, and fillers tight enough to contain concrete materials
  - t. Design of all members and connections not currently designed by a Professional Engineer Licensed in the State of Kentucky is included.
  - u. Provide and install an elevator hoistway beam with a 7,500lb tie-off capacity
  - v. Detail A/S106 for stairwell roof structure and decking.

9. Grouting of baseplates are by others. Grout holes in column baseplates to be provided by this subcontractor. See typical detail per S601.
10. All structural items to be cast into the concrete shall be pre-drilled / punched for attachment to formwork prior to arriving on site to allow for immediate installation upon arrival.
11. This scope includes all temporary or permanent bracing and supports necessary.
12. This work includes all structural steel framing members, joist, decking, baseplates, bracing, anchor bolts, washers, nuts, angles, closure strips, embedded plates, loose lintels, etc.
13. All structural bolted connections are to be done with load indicating bolts.
14. Include all post install anchors and adhesive anchoring to concrete required by this scope of work.
15. This subcontractor shall verify anchor bolt placement prior to erection. This must be done a minimum of 10 days prior to the scheduled steel erection to allow repair time.
16. This subcontractor will be required to patch all holes and openings in the steel decks prior to concrete pours. This includes any opening that may allow concrete slurry to penetrate the deck.
17. All edge angle and pour stops shall be included. Construction joints for concrete placement by others.
18. This subcontractor is required to be present at all steel inspections and provide access for inspecting agencies. This representative shall be capable of correcting all items found during the inspection.
19. This subcontractor shall include all hoisting, rigging, scaffolding, ladders, temporary planking, netting, guying, fall protection temporary shoring, supplemental bracing, etc. required for this scope of work. The CM will have a telehandler with 10,000lb lifting capacity for your use to unload and shift materials. This equipment will be shared amongst the site so coordination for its use is required.
20. This contractor shall be required to submit a site-specific safety and fall-protection plan to the construction manager for approval within 4 weeks of contract award.
21. The steel at the top of both egress stairwells
22. This contractor is responsible for the removal of deleterious materials from erected steel (i.e. mud, mill scale, etc.)
23. This contractor shall work with the construction manager, concrete contractor, testing agency and structural engineer to create a process for concrete slab on metal deck approval. This will formalize the procedure by which the concrete slab on metal deck preparations are assessed and deemed complete for the placement of concrete. The process basically consists of a checklist to verify items such as:
  - a. Integrity of horizontal and vertical structural frame
  - b. Installation of mechanical/electrical rough-in items.
  - c. Installation of reinforcing steel and mesh
  - d. Cleanliness of the placement area

- e. The process also acknowledges that the work space has been properly transferred to the control of follow-on activities after completion of the structural frame erection scope of work.
- 24. Provide steel countertop support brackets for all restroom countertops (1/A812, 4/A850, 1/A814, 5/A814, & 4/A850).
- 25. Provide steel plate supports for install by others (1/A811, 3/A811, 11/A850)
- 26. Provide steel angle per detail 4/A850
- 27. Provide elevator pit ladders. Provide elevator sump pit covers
- 28. Provide and install site railings and guardrails. See Civil and Landscape drawings.
- 29. Provide all metal pan stair assemblies and alternating tread stairs including, but not limited to, framing members, landings, treads, plates, grout, fasteners, etc.
- 30. Provide engineered drawings, stamped by a Registered Engineer licensed in the State of Kentucky for all items provided in this scope of work, at a minimum, The Engineer will be required to have a Professional Liability Policy for errors and omissions.
- 31. Complete set of stairs at Lobby 100. See details on A603. Include all wooden handrails, railings, and infill panels.
- 32. Stair 2 on A602 in its entirety
  - a. Include a separate mobilization and crane to set and detail Stair 2 from the ground through the 3<sup>rd</sup> floor. This activity will start as soon as the concrete on the 3<sup>rd</sup> floor has been placed. The second mobilization to complete these stairs shall occur as soon as the roof decking is being installed. Wall rails will be installed after the CMU has been painted.
- 33. Stair 1 on A601 in its entirety
  - a. Immediately following the install of Stair 2 from the ground to L3, this stairwell shall be set from the ground through the 3<sup>rd</sup> floor. The second mobilization to complete these stairs shall occur as soon as the roof decking is completed. Wall rails will be installed after the CMU has been painted.
- 34. Provide and install all cane rails (11/A620).
- 35. Provide assistance in field layout of any necessary blocking for steel handrails.
- 36. Galvanized loose laid masonry lintels provided to the mason for installation
- 37. Welded wire fabric and all reinforcing bars are not included in this scope of work.
- 38. Painting or galvanizing of all welds shall be included.
- 39. This subcontractor is required to be present at all steel inspections and provide access for inspecting agencies. This representative shall be capable of correcting all items found during the inspection.
- 40. This subcontractor shall provide all anchors as required to install their scope of work.
- 41. All cutting and patching necessary to complete this scope of work shall be included.

42. Provide elevator sills – assume 6 lineal feet each per floor (5 total).
43. Furnish (4) bollards for installation by the general trades contractor. Assume bollards will be galvanized, 8' long and 6" in diameter.
44. Steel contractor should be aware & comply with all LEED, domestic steel & recycled content requirements as outlined in the specifications.
45. This contractor shall provide shop drawings for approval that a qualified professional engineer has signed & sealed. This includes the steel fabricator certification & contractor certification statements located in the specification.
46. Floor Infill Procedure: Drill, Clean & Place Bolts (Inspector Witness), Pull Test (Inspector Witness), Bolted Connections or angle, Metal Deck Welded. This is the protocol for floor in-fills and is included in this scope.
47. All Structural Inspections are to be scheduled through Construction Manager.
48. Structural Steel contractor must correct any deviations not approved by the structural inspector within (1) week of the deviation report
49. All exterior steel will be galvanized, including bolted connections, welds, pins, etc.
50. Include all shoring per not 4/S401

END OF BID CATEGORY BC-05

**BC-06: Masonry**

The Scope of Work in this Contract BC-06 includes all labor, material, equipment, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-06, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Exploration Report
Division 02	Existing Conditions
Section 03 30 00	Cast in Place Concrete (as applicable)
Section 04 00 00	Masonry
Section 05 12 00	Structural Steel (as applicable)
Section 06 10 00	Rough Carpentry (as applicable)
Section 07 92 00	Joint Sealants (as applicable)
Section 08 11 00	Steel Doors and Frames (as applicable)

The following items represent specific inclusions in this contract. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included.
4. This subcontractor shall include all hoisting, rigging, scaffolding, ladders, temporary planking, netting, guying, fall protection temporary shoring, supplemental bracing, etc. required for this scope of work. The CM will have a telehandler with 10,000lb lifting capacity for your use to unload and shift materials. This equipment will be shared amongst the site so coordination for its use is required.
5. Include a mock-up for viewing of materials.
6. All CMU, mortar, water, reinforcing, cast stone, associated flashings, grouting, miscellaneous anchors, ties, joint reinforcement, reinforcing steel, rigid masonry-cell insulation, and any other accessories for masonry work are included.
7. All lintels will be furnished by others. In openings where the brick ledge is attached to the tube steel lintel, the installation shall be by the structural steel contractor. Scheduling and coordination of the lintels and brick ledges from the structural steel supplier shall be included in this scope of work.
8. Receiving and unloading of material, supplied by others and installed by this contractor, shall be included. Once the material is delivered this subcontractor shall take full responsibility for the

material. Stocking of material, relocation of material, and protecting of material shall be included. This subcontractor will be responsible for keeping the material clean once it is on site. This subcontractor is responsible for verifying material deliveries. Each delivery shall be checked for accuracy upon arrival. Any missing material after accepting the delivery will be the responsibility of this subcontractor.

9. All masonry caulking shall be by others. The masonry contractor shall provide clean uniform joints for caulking by others.
10. Provide all masonry cleaning and sealing. Protection of adjacent work, i.e. precast, aluminum, etc., installed by others is included. Proper PPE is required per the MSDS for materials used in the brick cleaning process. This contractor shall protect existing finishes and isolate the cleaning operation from other ongoing construction. An eye-wash station must be present during this operation.
11. The masonry contractor shall coordinate all penetrations with other trades so that a uniform sealed joint can be provided. The exterior of all CMU shall be rubbed flush and patched so that a continuous damp proofing.
12. Reinforcing steel shall be furnished by others. This masonry scope includes drilling and epoxying the bars required at the foundation level and extending the reinforcing throughout the CMU walls as required. Grouting of all CMU walls is to be provided and installed by this contractor.
13. This scope includes a separate mobilization for the installation of a few courses of CMU to extend above the concrete finished floor. These courses shall be installed prior to the slab on grade being graded (see details 9, 10, & 12 on S301).
14. Include grouting of all door frames once they have been installed.
15. Include compressible joint filler in expansion joints in connection with masonry walls.
16. Protect other trades scope of work where necessary when performing this scope of work.
17. All hoisting, scaffolding, walk planks, mortar boards and tubs, mixers, fork trucks, and etc., as needed to complete this scope of work, shall be included.
18. All rubbing, stoning, and point/patch of this work shall be included.
19. This contractor is responsible for coordination of all recessed items and openings in masonry walls, such as, electric boxes, hose bibs, light fixtures, etc.
20. Designation of the laydown area for material shall be addressed and determined with the CM prior to delivering any material to the site.
21. It shall be the responsibility of this contractor to create "limited access zones" when necessary, as required by OSHA standards.
22. Full engagement and participation in the exterior commissioning process is included in this subcontract.

End of Section BC-06

**BC-07 -Metal Framing, Drywall & Acoustical Ceilings**

The Scope of Work in this Contract BC-07 includes all labor, material, equipment, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-07, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Exploration Report
Division 02	Existing Conditions
Section 02 41 13	Selective Site Demolition
Division 03	Concrete
Section 03 30 00	Cast in Place Concrete
Division 05	Metals (as applicable)
Division 06	Wood, Plastics, and Composites
Section 06 10 00	Rough Carpentry
Division 07	Thermal & Moisture Protection (as applicable)
Division 14	Conveying Equipment (as applicable)
Division 20	Mechanical (as applicable)
Division 21	Fire Protection (as applicable)
Division 22	Plumbing (as applicable)
Division 23	HVAC (as applicable)
Division 26	Electrical (as applicable)
Division 27	Communication (as applicable)
Division 31	Earthwork
Section 31 00 00	Site Clearing
Section 31 20 00	Earth Moving
Section 31 63 20	Drilled Piers (as applicable)
Division 32	Exterior Improvements
Section 32 12 16	Asphalt Paving
Divisions 33	Utilities (as applicable)

The following items represent specific inclusions in this Contract BC-07: Metal Framing, Drywall & Acoustical Ceilings. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included.
4. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload



deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.

5. This scope includes a mock-up.
6. This scope include delivery of material on an “as-needed” basis (for use within 1 week) and stored only with coordination from the CM.
7. Provide all cold-formed metal framing, load bearing, LGMF, furring, bracing, hold downs, shear connections, angles, clips, metal edge trim, light gauge metal framing, insulation, fire caulk, fire proofing, fire stopping, draft stops, acoustical caulk, embedded plates and bolts, gypsum wall board, plaster, expansion and control joints, sheathing, fluid applied membrane air barrier, and finishing.
8. Provide necessary hoisting, scaffolding, lifts, or swing stage required to complete exterior framing and finishes for this scope of work. This includes necessary shoring, re-shoring, and bases required for installation of scaffolding or swing stage (existing grades in some area may not be level). Documentation to be provided by a registered Professional Engineer indicating the safe installation and uses of the scaffolding or swing stage. Protection of roof and flashing to also be included. If scaffolding is utilized on the roof of the Event Center or loading dock, re-shoring may be required. This Bid category is responsible for all hoisting required to perform the scope of this Bid category.
9. Provide the interior and exterior load bearing and non-load bearing metal stud framing. Provide the batt, rigid, and mineral fiber insulation within the interior and exterior wall/ceiling systems as indicated on the documents. Include all damproofing (include at CMU), spray-in acoustic and thermal insulation required for a complete exterior air/water barrier. Include all “Z” girts, vertical sub-girts, all exterior metal panels, siding, soffits, trims, closures and con interior and exterior gypsum sheathing, gypsum shaft-wall assemblies, ceilings complete, and joint sealers. Design responsibility for load bearing walls shall also be included (design by and Indiana registered Professional Engineer).
10. The Structural and Miscellaneous steel contractor shall provide and install anchor bolts, red iron column, W beams, tubing, rolled shapes, HSS material, W shapes, anchor bolts, metal decking, decking closure angles, and all welded connections. This BC-07scope includes all other cold formed metal framing and connections.
11. Review all reflected ceiling drawings for exposed ceilings locations. This scope includes installing only non-damaged or paint ready surfaces at exposed ceiling locations.
12. This contractor shall be responsible for providing, installing, maintain, and removing the perimeter leading edge guardrail. This includes all leading edges at mechanical floor openings, chases, elevator/stair openings, and the roof. The guardrail system shall be located on the exterior side of the slab edge to allow for concrete placement and wall framing to progress with the structure. Include a mid-rail and toe-rail (if required) around the inside face of parapet walls until the sheathing has been installed. This scope includes guardrails at openings such as windows and doors prior to removal of the perimeter guardrail (2x4's are acceptable). This perimeter guardrail system must meet OSHA/Messer requirements. M.E.P. contractors shall be responsible for floor covers over sleeves or core drilled holes they install.

13. Provide all perimeter building guardrail system for each floor as the building progresses. Anticipate the following process for installation/removal:
- a. Temporary guardrails located around the slab on grade concrete elevation change and elevator pit.
  - b. Temporary perimeter exterior guardrails for floor levels 2-5. Include the following:
  - c. Guardrails shall be constructed in compliance with OSHA Standards.
  - d. Shall include top rail, mid rail, toe rail, and highly visible mesh or approved equivalent.
  - e. Perimeter guardrails are required prior to work progressing on the floor above so the timing of installation will be critical to the schedule.
  - f. Perimeter guardrails shall be constructed so that they do not interfere with the structure of the floor above.
  - g. The perimeter guardrail shall be installed in approximately ½ of the building at a time. The interior or leading edge fall protection (adjustable) where construction is continuing across that floor shall be provided by this Metal Framing subcontractor.
  - h. Once the exterior walls have been installed this subcontractor shall install window or door opening protection as required to allow the removal of the exterior guardrail and relocate to a floor above. Assume a minimum of 2 floors worth of protection will be needed at any given time and plan for material accordingly.
  - i. This scope include removal as the guardrails are no longer required.
14. This contractor shall provide (2) means of egress on and off the decks at all times until the temporary stairs have been installed.
15. This contractor is responsible for protection of stored materials used as part of this contract. Any damaged materials will be rejected and must be replaced. Storage of these items must be coordinated with the CM.
16. Sleeves penetrating drywall will be provided by others and set by this contractor. Centering the sleeves shall be coordinated between this contractor and the contractor requiring the penetration. Taping, finishing, and sealing around sleeves is by this contractor. Sealing between pipes and sleeves is by others.
17. Coordinate the locations of the steel framing for the floor and roof openings with the mechanical contractors. Cut any required openings in the decks and provide bend plate as needed. Protection of openings responsibility of this contractor.
18. Fire rated sealant, L-Bead steel deflection track, closure pieces, and sealants shown in conjunction with stud walls are part of this contract. This includes caulking partitions to exposed ceilings.
19. All stud partitions to be laid out to the dimensions shown on the drawings. Any discrepancies shall be brought to the CM's attention in the form of an RFI.
20. Plumbing chase walls are to be framed independently from the remainder of project on schedule. The construction of walls with plumbing chases will required multiple inspections and separate mobilizations

21. This contractor shall thoroughly scrape drywall compound and remove all stains from the floors on a daily basis. This includes cleaning drywall compound off HM frames, borrowed-lites, and other adjacent structures.
22. Framing for all thru-wall and recessed mechanical, electrical, plumbing, architectural, fire extinguisher cabinets, dryer boxes, access panels, etc. items is by this contractor.
23. All drywall soffits, bulkheads, ceilings, framing, and support systems are by this contractor. This includes cutting drywall partitions and soffits to follow the profile of the fluked metal decks. Provide non-combustible material in deck flutes above top track on rated partitions.
24. All caulking, seals, closure pieces, etc. required at the base and top of the drywall partitions if necessary are by this contractor.
25. Provide non-combustible material in deck flutes above top track on rated partitions.
26. Hollow metal door frames will be set by the general trade's contractor. This contractor is responsible to ensure that hollow metal door frames remain true and plumb during wall construction.
27. This contractor shall coordinate the setting of the hollow metal door frames with the general trade's contractor. The exact location of the door frames shall be laid out by this metal framing subcontractor.
28. This subcontractor is to provide firestopping per governing building code at walls, partitions, bulkheads, chases, and column enclosures.
29. Provide all framing (including welding if required) to brace studs back to structural elements.
30. Provide engineered drawings, stamped by a Registered Engineer licensed in the State of Kentucky for all items provided in this scope of work. At a minimum, The Engineer will be required to have a Professional Liability Policy for errors and omissions.
31. This contractor shall coordinate all rough openings with the glass & glazing subcontractor to insure sizes are coordinated with storefront, curtainwall, windowwall and punched openings.
32. This contractor shall coordinate all flashings and exterior framing with the metal and fibercement panels to insure framing will properly accommodate panel installation.
33. This contractor shall provide moisture resistant drywall in the mechanical rooms, electric rooms, pump rooms, data center and data closets to permit the MEPS contractors to begin equipment installation prior to the building being 100% water-tight. This includes S2 and S4 walls for mechanical chases.
34. Acoustic ceilings, Cloud Ceilings, Wood Slate Ceilings (A224), and hard ceilings in their entirety are included in this scope.
35. This contractor is responsible to coordinate with the MEPS contractors (HVAC, plumbing, fire protection, electric) for all fixtures and equipment installed in, supported by, or otherwise affecting ceiling construction. This contractor is responsible for coordinating their ceiling work with the MEPS contractors. This includes bridging around large ducts, etc.
36. This contractor is to provide all sound attenuation blankets in the acoustical ceilings.
37. This contractor is to provide all expansion joint assemblies as required in acoustical ceilings.

38. Suspending system can only be supported from the structural system. Fastening to conduit, duct, piping, etc. is not acceptable. This contractor is responsible for all cutouts in ceiling tiles.
39. Grid and tile to be installed as separate operations. "Device" tiles to be installed with grid.
40. Include all layout within this scope of this Bid category.

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END OF BID CATEGORY BC-07

### BC- 08 – Elevators

The Scope of Work in this Contract BC-08 includes all labor, material, equipment, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-08, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Exploration Report
Division 03	Concrete (as applicable)
Division 05	Metals (as applicable)
Section 07 84 00	Firestopping (as applicable)
Section 07 92 00	Joint Sealants
Section 14 24 23	Hydraulic Passenger Elevators
Division 20	Mechanical (as applicable)
Division 21	Fire Protection (as applicable)
Division 22	Plumbing (as applicable)
Division 23	HVAC (as applicable)
Division 26	Electrical (as applicable)
Division 27	Communication (as applicable)
Division 28	Electronic Safety and Security (as applicable)
Division 31	Earthwork (as applicable)

The following items represent specific inclusions in this Contract BC-08: Elevators. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included.
4. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.
5. This subcontractor shall include layout, hoisting, lifts, equipment, and field engineering required for a complete system.

6. Drilling of any shaft holes and installation of casings is included in this scope. Removal of spoils and protection of any exposed holes is the responsibility of this subcontractor.
7. Shop drawings and submittals are included. This subcontractor shall review the project documents prior to bid and locate equipment accordingly. Revisions necessary for the equipment closets or hoistways shall be noted with the bid submission. Costs associated with revisions to these areas not noted with the bid will be the responsibility of this contractor. Shop drawings shall be job specific. Any shop drawings not showing the equipment closet, slab openings, elevations, and dimensions as designed on the contract set of drawings will not be reviewed.
8. The elevator warranties shall begin on the date of Project Substantial Completion regardless of installation date, start up date, finish date, etc. The elevator will be utilized for construction use (assume 4 months of construction use). Extended warranties as required should be included in the base bid. Maintenance during construction use will be the responsibility of this subcontractor and shall be included in the bid.
9. This subcontractor will be required to attend (2) pre-testing sessions. They shall be present at all fire alarm testing and inspections, including pre-testing. This subcontractor will be required to have a representative available on site to instruct and coordinate the fire alarm/elevator connections with the electrical subcontractor. Elevator pre-testing will not be considered complete, until the elevator subcontractor, in conjunction with the electrical subcontractor demonstrates that all aspects of the elevator work as designed. Under no circumstances shall the elevator be pre-tested the day of inspection.
10. The elevator subcontractor shall verify all shafts prior to commencing work and notify the Construction Manager of any unacceptable conditions. Commencement of work will indicate acceptance of the existing conditions.
11. This subcontractor shall fire caulk any penetrations made while completing this scope of work.
12. Provide 40 labor hours to operate the elevator for other trades to perform work inside the elevator shafts.
13. Provide car pads to protect the finishes.
14. Provide all concrete embedded items and shop drawings with layout for installation by others. Any items not provided to meet the schedule shall become the responsibility of this elevator subcontractor to install.
15. Provide elevator pit ladder. The sump pump cover and hoistway beam are to be provided and installed by others.
16. The owner may add a camera to the car at a later date. This scope includes provisions for this camera to be installed by the owner and plugged into a jack in the elevator machine room. Provide a wire in the elevator raceway as required to power the future camera.

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END OF BID CATEGORY BC-08

**Bid Category BC-09 Mechanical, Geothermal, and HVAC**

The Scope of Work in this Contract BC-09 includes all labor, material, layout, equipment, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-09, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Report
Division 03	Concrete (As Applicable)
Division 05	Metals (As Applicable)
Division 07	Thermal & Moisture Protection (As Applicable)
Division 08	Doors & Windows (As Applicable)
Section 08 91 19	Fixed Louvers
Division 20	Mechanical
Division 21	Fire Protection (As Applicable)
Division 22	Plumbing (As Applicable)
Division 23	HVAC
Division 25	Building Automation System
Division 26	Electrical (As Applicable)
Division 27	Communication (As Applicable)
Division 31	Earthwork (As Applicable)

The following items represent specific inclusions in this Contract BC-09: Mechanical and HVAC. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included. Schedule and arrange for all required inspections. Do not cover up any work prior to inspection and acceptance by the Jurisdictional Inspector, Consulting Engineer, and the Contractor.
4. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.
5. Provide all necessary mechanical equipment and appurtenances, as shown and/or inferred, for a



complete operating system, installed in strict code compliance based on equipment and fixtures indicated on the Contract Documents.

6. All hangers and supports shall comply with Structural General Notes. Specifically, the metal decking manufactures have specific and proprietary hangers/connection that will primarily need to be utilized on the underside of the roof deck. In the majority of the areas located on the underside of the slab on metal deck, “traditional” and/or Unistrut can be utilized.
7. This scope includes a complete Geothermal System
8. This scope includes a complete HVAC System
9. This scope include a complete Mechanical Systems and piping
10. This scope includes the Division 25 Building Automation System installed by NKU preferred vendors.
11. This scope includes all testing and balancing of air, water, and geothermal systems.
12. This scope includes all insulation for the mechanical, HVAC, and geothermal equipment.
13. This scope includes all sleeves, core drilling, fire caulking, sealants, fire dampers, and access doors required for a complete system.
14. This scope includes completing all geothermal scope outside the building immediately after foundations have been installed. The existing asphalt parking lot where the new wells are to be drilled will remain in place until the spring of 2021. All geothermal underground wells and lateral connection shall be backfilled to the top of existing grade with CDF. As-built information that includes location and depth of all components are to be provided within 10 days of completing installation. Any underground utilities in the area of the geothermal shall hydro excavated to expose and protect from damage.
15. This BC-09 subcontractor shall include temporary heating, cooling, and humidity control from November 2, 2020 until the permanent HVAC system is operational. See Section 01 50 00 for additional information.
16. This scope shall provide and install all louvers and vents
17. This scope includes all concrete pads that are required for this scope but not scope on the drawings.
18. This subcontractor shall provide and install all duct smoke detectors, valves, dampers, and any other control requiring power for the electrician to make final connections too.
19. This scope includes a complete temperature controls system per specifications including but not limited to all control valves, dampers, etc. required for a complete system.
20. Provide all access doors and panels required, per the architectural drawings. Any additional access doors and panels required to access valves, equipment, etc... in drywall, masonry, chase walls, etc., which are not included on the architectural drawings, shall be the responsibility of this contractor.
21. All horizontal piping passing through walls and partitions and vertical piping passing through the floors shall be sleeved and sealed. All exposed piping passing through walls below ceilings shall



have escutcheon plates installed at each wall penetration. This contractor is responsible for sealing and firestopping their work.

22. All pipes and duct that are ran through common areas with exposed ceilings, shall be paint grip and contain no stickers or labels. Tagged notes M2 identify areas of painted duct and M36 identify hydronic piping.
23. All equipment purchased by this contractor will be inspected and started up by factory trained and authorized personnel. Provide copies of start up reports upon start up and included copies in the close out projected manual. Prestart-up checklists are also required to be developed and filled out on each piece of equipment. This contractor is to provide a detailed quality control program including detailed standard and customized forms and procedures for review and approval. During the commissioning and start-up phases of the project, include not only component and systems start-up time, but additional time with all applicable equipment vendors to validate, pre-test components and systems as deemed necessary. Multiple visits beyond the “normal” start-up are anticipated.
24. This contractor shall provide and set roof curbs for all equipment purchased under this contract. All roof curbs are to be shipped prior to the equipment delivery in accordance with the project schedule. This contractor shall provide exact opening size and locations during the submittal process. Provide curb heights as required for roof flashing. If additional support are required but not shown on the drawings, this contractor shall notify the CM during submittal review.
25. Provide valve tags at each valve location, include laminated tag schedule indicating valve number, system, descriptor and location of valve.
26. All ductwork shall be sealed while stored onsite. In addition, as systems are installed any open ends of ductwork shall be sealed. It is this contractor’s responsibility to protect the ductwork throughout the job and meet all LEED Silver requirements.
27. Provide 3 sets of filters for all equipment (including maintenance for 3 sets), one set for start-up and balancing, one set for commissioning, one set to be changed or provided at turnover.
28. This subcontractor shall coordinate with HVAC, Electric and Temperature Control trade contractors to complete balancing work.
29. This subcontractor shall provide for re-installation of ceiling tile and repair of damaged ceiling grid if any above ceiling work is done after the pads have been installed.
30. This subcontractor shall provide all labor and materials to complete the commissioning activities as outlined in the commissioning specification.
31. All work must be completed as required to meet the Milestone Schedule. Multiple mobilizations will be required.
32. This contractor shall include the balancing of all piping & HVAC bridging required for this project.
33. Provide air readings prior to duct demo for all areas to be bridged and rebalance the same flows after bridging.
34. A full scale mock-up of a typical lab configuration will be provided. This subcontractor shall provide air flow measurements for supply, return and exhaust as instructed by the CM.

35. This subcontractor shall confirm and calibrate all airflow measuring devices. This subcontractor shall verify building pressurization.

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END OF BID CATEGORY BC-09

**Bid Category BC-10 Electric**

The Scope of Work in this Contract BC-10 includes all labor, material, layout, equipment, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-10, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
Division 03	Concrete (As Applicable)
Division 05	Metals (As Applicable)
Division 07	Thermal & Moisture Protection (As Applicable)
Division 08	Doors & Windows (As Applicable)
Division 20	Mechanical (As Applicable)
Division 21	Fire Protection (As Applicable)
Division 22	Plumbing (As Applicable)
Division 23	HVAC (As Applicable)
Division 25	Building Automation System (As Applicable)
Division 26	Electrical
Division 27	Communication
Division 28	Electronic Safety And Security
Division 31	Earthwork (As Applicable)
Division 32	Exterior Improvements (As Applicable)
Division 33	Utilities (As Applicable)

The following items represent specific inclusions in this Contract BC-10: Electrical. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.
4. This scope include pulling the fiber optic cable from the MDF Room at University Suites to the telecomm. Ductbank. From this location this contractor shall install temporary conduit to the Project Trailer in addition to a fiber line to support temporary data usage for the CM. This contractor shall also install the underground telephone conduit shown on EU01 running into the

building.

5. All hangers and supports shall comply with Structural General Notes. Specifically, the metal decking manufactures have specific and proprietary hangers/connection that will primarily need to be utilized on the underside of the roof deck. In the majority of the areas located on the underside of the slab on metal deck, “traditional” and/or Unistrut can be utilized.
6. The electric work contract Price shall not be altered for any work that could have been reasonably inferred from the contract documents, and shall allow for the following:
  - a. Variations to avoid interference and obstructions.
  - b. Allow for “minimal” dimensional and plan changes, including ceiling height revisions, as required to fit the requirements of the building and final Architectural details.
  - c. The providing of all necessary electric equipment and appurtenances, as shown and/or inferred, for a complete operating system, installed in strict code compliance based on equipment and fixtures indicated on the contract documents.
7. Provide and install all underground electric, data, and communication including the emergency call box per Civil and Electrical drawings. Include:
  - a. Utility Locating Services
  - b. Excavation, haul-off of spoils, and backfill. Include CDF backfill for all underground conduit under a finished concrete or asphalt finish. Include reflective, traceable warning tape on top of conduits.
  - c. Coordinate telecommunication feeds with the installation of the gas line so they can utilize the same trench
  - d. Provide the CM all electronic as-built documents that include location and depth to top of conduit within 2 weeks of installation.
8. Include all audio, visual, and low voltage systems required for a complete operating system. This include conduits with pull strings where required.
9. Provide all and install all electrical transformers or system required for an operational elevator.
10. The mechanical contractor shall provide and install all duct smokes, louvers, etc., this electrical contractor shall make all connection required for a functioning system.
11. Provide and install all card reader: conduits, wiring, connections, testing, required for a functions system per LV200 and LV201 (not including note 3 on LV201).
  - a. Include a conduit with a pull string from the middle hinge of each unit entry door the turns out above ceiling in the corridor for future use by the owner (See note 3 on LV201-LV205). Include all fire stopping required to pass rating inspections.
12. Include the following work to release the site to the demolition contractor:
  - a. This electrical contractor shall disconnect site lighting and make the power safe (lock-out/tag-out)
  - b. Remove the pole head per note 6 on C200 and return to the owner
  - c. Excavate existing underground conduit, install hand holes per EU01 and install new re-

- routed conduit per C500 and EU01. Include the conduit, concrete bases and (2) new OP1 parking lot light poles per EU01 on the south side of the site (lighting required for students using the new sidewalk).
- d. Coordinate the demo of existing storm per note 9 on C200 with the excavation contractor.
  - e. Remove old conductors, install new conductors and re-connect the existing high mast light shown on C500 and EU01.
  - f. Remove the light pole per note 4 on C200 and relocate per C500 and EU01.
13. All hangers and supports shall comply with Structural General Notes. Specifically, the metal decking manufactures have specific and proprietary hangers/connection that will primarily need to be utilized on the underside of the roof deck. In the majority of the areas located on the underside of the slab on metal deck, “traditional” and/or Unistrut can be utilized.
14. Include permitting, installation, inspection, and removal of temporary electric and data for the CM’s job trailer located along Kenton Ave. Review the Site Logistics Plan for additional information.
15. Provide complete electrical distribution systems including raceways, conduit, wireways, connectors, fittings, conductors, cabling, terminations, junction boxes, pull boxes, strut, supports, hangers, anchors, grounding, transient voltage surge suppressors, switchboards, power monitoring, panelboards, transformers, disconnects, starters, contactors, busways, identification, sleeve seals, etc per the Bid Documents.
16. Provide complete emergency system including emergency generator, transfer switches, remote monitor, block heater, battery charger and associated low voltage circuits. Include raceways, connectors, fittings, conductors, cabling, terminations, junction boxes, pull boxes, strut, supports, hangers, anchors, grounding, transient voltage surge suppressors, switchboards, power monitoring, panelboards, transformers, disconnects, starters, contactors, busways, transfer switches, identification, sleeve seals, etc per the Bid Documents. The plumbing contractor shall provide the generator gas service as required per the direction of this electrical contractor.
17. Provide complete electrical power systems including raceways, conduit, wireways, connectors, fittings, conductors, cabling, junction boxes, pull boxes, outlet boxes/covers, strut, supports, hangers, anchors, grounding, switches, receptacles, wall plates, transient voltage surge suppressors, plugstrips, identification, sleeve seals, etc per the Bid Documents.
18. All access doors required to access this contractor’s conduit, equipment, boxes, etc. that are not shown on the current design construction documents are the responsibility of this contractor to provide and install. Each door must meet partition requirements including fire ratings, partition type, flange depth and width, etc.
19. Provide complete lighting system and lighting controls including raceways, conduit, wireways, connectors, fittings, conductors, control wiring, cabling, junction boxes, pull boxes, outlet boxes/covers, strut, supports, hangers, anchors, grounding, switches, wall plates, contactors, interior and exterior luminaires, photocells, timers, identification, sleeve seals, etc per the Bid Documents.
20. All concrete housekeeping pads for electrical equipment that are not shown in the bid documents are to be provided by this contractor. Generator pad and transformer pad will be provided by the BC-01 General Trades contractor. This subcontractor shall provide all dimensions and/or any

box-out locations and sizes that are required.

21. Provide temporary power and lighting under this contract per section 01 50 00 in the contract documents.
  - a. Include (6) exterior 36W or greater LED wall packs controlled by a timer.
  - b. Provide and install heat trace wiring on the Project Trailer water supply line
  - c. Include (2) 20amp duplex outlets outside the Project Trailer for vending or ice machines.
  - d. Include temporary lighting on the exterior stair tower
  - e. Include temporary power for the material hoist.
22. Provide a complete Fire Alarm System. The Fire Protection contractor shall provide and install all tampers and flow switches that shall be wired by this electrical contractor.
23. Provide a complete Voice/Data System. This includes all raceways, sleeves, and rated pass-through devices.
24. Install Data racks provided by the owner
25. Owner will mount camera at locations shown on the drawings. This BC-12 Electric subcontractor shall provide and install all other components.
26. Provide all connections to elevator equipment per the Bid Documents.
27. Provide electrical coordination, arc flash and short circuit studies per the bid documents.
28. Provide arc flash labels per NEC.
29. Provide all sleeves in horizontal and vertical surfaces, as required by the specifications or building codes. Monitor and maintain accurate placement of the sleeves during all construction operations.
30. Provide fire-safing, sleeves, closer plates and closer angles required at fire-rated penetrations. For penetrations not in fire rated walls, seal with acoustic rated caulk. Coordinate all openings with other trades.
31. Provide all permits and inspections associated with this Bid Category. Contractor shall only provide the General Building Permit. Schedule and arrange for all required inspections. Notify the Contractor prior to all scheduled inspections. Do not cover up any work prior to inspection and acceptance by the Jurisdictional Inspector, Consulting Engineer, and the Contractor.
32. Provide the festoon lighting and lightpoles on the exterior patio.
33. This subcontract includes a complete design-build lightning protection system.
34. Submit with O&M manuals a chart listing all equipment furnished under this contract with associated recommended maintenance including intervals and tools and materials necessary for performing the work.
35. Provide training on all systems installed is included in this contract. Closeout documentation

must be submitted and approved prior to training beginning. Contractor is responsible for providing detailed outlines of training topics for approval. Applicable materials from O&M manuals to be provided to the owner for use during training. If not indicated in the contract documents a minimum of 8 hours to be provided.

36. Electrical testing to be included in this contract per the contract documents, test each system for continuity and ground faults prior to energizing. All feeders and motor branch circuits to be Meggered prior to energizing. It is the responsibility of this contract to document all testing, CM to witness testing.
37. Provide wire tags on all feeders in pull boxes, panelboards and switchboard wiring gutters per the contract documents.
38. Provide continuous colored insulation on all wiring indicating phasing. Tapped ends are not acceptable per the contract documents.
39. Provide field mounted disconnects, fused disconnects, motor starters and combination motor starters as indicated in contract drawings. All fuses and overloads the responsibility of this contract, overloads to match FLA on motor.
40. Smoke dampers power including final terminations shall be provided under this contract.
41. All materials installed outdoors shall be stainless steel or galvanized unless directed otherwise by contract documents.
42. All equipment provided under this contract is the responsibility of this contract to ensure proper required access and maintenance clearances as well as a path to install the equipment upon receipt.
43. Alternate No. 2: The General Trades and Electrical Contractors shall include alternate pricing to provide and install card readers and electrified hardware at all residential suite entry doors.
  - a. BC-01 General Trades shall include pricing for the following:
    - i. Provide one of the following card readers: HID iCLASS SE® RM40 or Allegion® MTMS15 (aptiQ®) Multi-Technology, Magnetic Stripe Reader (Black). The electrical contractor shall pullall wires and make all connections
    - ii. Provide and install electronic lockset L9092EU-07B. The electrical contractor shall pull all wires and make connection
    - iii. Provide electrified hinge per the hardware specifications
  - b. BC-10 Electrical Contractor shall provide pricing for the following:
    - i. Pull all wires from MDG/IDF through conduits installed in base bid, connect and install card readers, install electrified hinge provided by BC-01 and connect to wires to electrified hardware on one side of the hinge and the MDF/IDF on the other.

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END OF BID CATEGORY BC-10

## Bid Category BC-11: Plumbing

The Scope of Work in this Contract BC-11 includes all labor, material, layout, equipment, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-11, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Report
Division 03	Concrete (As Applicable)
Division 05	Metals (As Applicable)
Division 07	Thermal & Moisture Protection (As Applicable)
Division 08	Doors & Windows (As Applicable)
Division 20	Mechanical (As Applicable)
Division 22	Plumbing
Division 23	HVAC (As Applicable)
Division 26	Electrical (As Applicable)
Division 31	Earthwork (As Applicable)
Division 32	Exterior Improvements (As Applicable)
Division 33	Utilities (As Applicable)

The following items represent specific inclusions in this Contract BC-11: Plumbing. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included. Schedule and arrange for all required inspections. Do not cover up any work prior to inspection and acceptance by the Jurisdictional Inspector, Consulting Engineer, and the Contractor.
4. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.
5. The CM will provide (4) temporary restroom structures that are approximately the same size as a



portolet.

- a. This plumbing scope includes providing and installing (4) floor mount toilets into the permanent domestic supply and sanitary plumbing system. The goal would be to install (2) of the units in Lounge 401 and the other remaining (2) Lounge 201.
  - b. Provide and install (3) stationary tubs and fixtures. Install 1 tub in Laundry 111. Mount the other (2) on the side of the temp restroom on Levels 2 and 4.
  - c. Provide any required maintenance during the project (not cleaning). At the direction of the CM, remove the fixture and cap tie-ins to a satisfactory condition.
6. Provide and install all underslab plumbing including compacted backfill and spoils haul-off.
  7. All hangers and supports shall comply with Structural General Notes. Specifically, the metal decking manufactures have specific and proprietary hangers/connection that will primarily need to be utilized on the underside of the roof deck. In the majority of the areas located on the underside of the slab on metal deck, "traditional" and/or Unistrut can be utilized.
  8. This subcontractor will be responsible for coordinating and providing all required sleeves in concrete slabs. All sleeves shall be installed in an acceptable manner prior to each concrete pour. During each concrete pour, this contractor shall provide necessary manpower to monitor and adjust sleeves as required.
  9. All joint sealants, firecaulking, or firestopping as required for all piping passing through floors or walls.
  10. Provide and install roof drains. Include temporary piping as necessary.
  11. This subcontractor is responsible for all cutting and patching associated with work of this category.
  12. Install floor drains in all ADA shower rooms. The general trade's contractor shall form a floor recess in the concrete in front of all ADA showers to allow for slope to be added with the flooring.
  13. Provide and install (1) additional adjustable slide bar for handheld showerheads in each of the ADA units. This additional bar shall be mounted on the "short" wall so that the water isn't directed at the curtain.
  14. No serviceable items shall be installed above concealed hard and/or gypsum board ceilings including but not limited to unions, valves, equipment, etc...
  15. The general trades subcontractor shall provide all access doors and panels required, per the architectural drawings. Any additional access doors and panels required to access valves, equipment, etc... in dry wall, chase walls, etc., which are not included on the architectural drawings, shall be the responsibility of this contractor. Coordinate final locations with CM.
  16. All pipe pressure tests must be complete prior to shafts being closed in and the insulation being installed. This subcontractor shall provide for re-installation of ceiling tile and repair of damaged ceiling grid if any above ceiling work is done after the pads have been installed.
  17. All pressure testing as specified shall be documented and witnessed by the CM prior to inspection. Pressure test reports shall be turned over to the CM and included in the O&M's

18. For pipe penetrations, this subcontractor is responsible for providing pipe sleeves in all partitions and providing smoke rating at smoke rated partitions including sleeve, mineral wool, and caulking. For fire rated partitions, this subcontractor shall provide sleeve along with smoke and/or fire stopping as required.
19. Provide complete natural gas system including pipe, fittings, gauges, gas cocks, hangers, supports, anchors, escutcheons, valves, pressure regulating valves down to burner pressure, labeling, pipe markers, valve tags, etc per the Bid Documents. The BC-02 site contractor shall install gas into the building and to the generator pad. This plumbing contract includes running all interior piping including RTU's and making all final connections to the generator and to the service entrance inside the building. Include coordination with Duke to set the meter.
20. Provide and install all plumbing pipe insulation per code or as shown. Include insulation on the hot water return system.
21. Provide irrigation; backflow, meter, and supply located 5' beyond the sidewalk in the landscaping bed.
22. This subcontractor shall include any concrete pad that is required but not shown on the drawings. All concrete pad at are shown will be installed by the General Trades contractor.
23. All shop drawings and submittals must be completed as required to meet the Milestone Schedule, allowing sufficient time for review and re-submittals if necessary. All Trade Contractors shall provide shop drawing or submittal information to other Trade Contractors as needed for the timely completion of their work. Assume 3 weeks for all submittal and shop drawing review
24. This subcontractor is to provide personnel (flagmen) for traffic control and traffic coordination during all deliveries of material and equipment required in this scope of work. This Subcontractor shall coordinate all such activities with the CM.
25. All roofing penetrations, curbs, supports sleeves etc... that penetrate the main roof or penthouse roof shall be completed prior to the new roofing system being installed.
26. This subcontractor shall provide all labor and materials to complete the commissioning activities as outlined in the commissioning specification.
27. All shutdowns and tie-ins will be off-hours / weekends. All shutdown and tie-ins shall be scheduled with the CM. This subcontractor shall include all premium time in their base bid to account for this. No additional premium time will be given for off hours / weekend shutdown or tie-in work.
28. This subcontractor shall provide a detailed list of scheduled equipment delivery dates upon approval of submittals.
29. This Subcontractor shall protect the permanent Plumbing systems included in this contract from dust and other contaminants and from abnormal usage, damage or abuse during construction.
30. Provide complete plumbing fixtures including water closets, urinals, lavatories, shower valves, water coolers, countertop sinks, service sinks, emergency fixtures, carriers, fixture seats, flush valves, strainers, aerators, escutcheons, bolt caps, traps, vacuum breakers, faucets, shutoff valves, trim, accessories, etc per the Bid Documents. Caulk all plumbing fixtures installed by this Bid Category. Provide under lavatory pipe guards.
31. Provide final plumbing connections to all kitchen equipment per the Bid Documents. Include

installation and connection of all dishwashers and icemakers. Washers shall be connected by the owner.

32. Equipment shall be started up and used prior to completion of construction. Include all cost for extended warranties as required.
33. Pipe identification, sealing penetration, repairing damaged insulation, and valve tagging must be completed prior to the closing up of ceiling systems and prior to above ceiling punch lists.
34. Include a complete elevator sump pump system as required.
35. This subcontractor shall provide and install all hose bibs and roof top frost free connections.
36. Off-site disposal of all excavation spoils is included.
37. The Site Utilities subcontractor shall provide a domestic water supply turned up 12" above finish floor. This section of pipe shall be inspected, tested, flushed, sterilized, and capped 12" above the finished floor where shown on the drawings. Tie in by this BC-13 Plumbing subcontractor is required from this point.
38. This subcontractor shall pressure test the under slab piping prior to slab-on-grade pours. This pipe shall be under pressure during the pour and a representative from this subcontractor shall be present during the pour to monitor the system.
39. This subcontractor is shall install all underground waste and vent piping to 10' outside the building and tie into existing sanitary that is provided by others.
40. Provide under slab drainage system 5' outside the building for tie-in by others. All under slab piping shall be backfilled by others. Section of piping outside the building shall be backfilled by this plumbing contractor.
41. All underground piping outside the footprint of the building that is located under a paved surface shall be set on a bed course of compacted gravel and covered to subgrade with CDF.
42. The interior plumbing contractor shall provide necessary pipe valves, fittings, chemical injection and testing to perform sanitizing of new water piping as required by the plumbing code. E. Coli Coliform and Legionella testing are required for every water sample taken to ensure water supply is suitable. The work shall be done before building occupancy and in time for Legionella testing results to be available before occupancy (this may take 7-10 days to get test results). Testing results are to be provided to Engineer of Record (EOR) for approval. EOR approved results are to be provided to the Owner and AHJ.
  - a. A minimum of (6) samples per wing per floor should be taken (3 DHW, 3 DCW)
  - b. E. Coli Coliform testing is required at each sample location
  - c. Legionella testing is required at each sample location
43. For water systems that are put in place more than 2 weeks prior to building turnover/occupancy needs to have water systems exercised to ensure water does not become stagnant. Contractor is responsible to flow each outlet for a minimum of (5) minutes once every (3) days. A log of such activities should be kept specifically noting the fixture, date, time and duration of fixture flow.

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END OF BID CATEGORY BC-11



### **Bid Category BC-12: Fire Protection**

The Scope of Work in this Contract BC-12 includes all labor, material, layout, equipment, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-12, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00- Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Report
Division 03	Concrete (As Applicable)
Division 05	Metals (As Applicable)
Division 06	Wood, Plastics and Composites (as applicable)
Division 07	Thermal & Moisture Protection(as applicable)
Division 08	Doors & Windows (As Applicable)
Division 20	Mechanical (As Applicable)
Division 21	Fire Protection
Division 22	Plumbing (As Applicable)
Division 23	HVAC (As Applicable)
Division 26	Electrical (As Applicable)
Division 28	Electronic Safety and Security (as applicable)
Division 31	Earthwork (As Applicable)
Division 32	Exterior Improvements (As Applicable)
Division 33	Utilities (As Applicable)

The following items represent specific inclusions in this Contract BC-12: Fire Protection. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.
4. Provide all permits and inspections associated with this Bid Category. Construction Manager shall only provide the General Building Permit. Schedule and arrange for all required inspections. Notify the Construction Manager prior to all scheduled inspections. Do not cover up any work prior to inspection and acceptance by the Jurisdictional Inspector, Consulting Engineer, and the Construction Manager. Include additional hours for system drain downs for inspections and

testing.

5. Include flow tests of actual site conditions prior to validating hydraulic calculations. Submit results to Construction Manager prior to submission of permit drawings.
6. All hangers and supports shall comply with Structural General Notes. Specifically, the metal decking manufactures have specific and proprietary hangers/connection that will primarily need to be utilized on the underside of the roof deck. In the majority of the areas located on the underside of the slab on metal deck, "traditional" and/or Unistrut can be utilized.
7. The site utilities contractor shall provide and install the fire protection service 12" above finished floor in the Fire Pump Room and flush. This fire protection scope of work includes coordinating this location and providing a complete working system from this tie-in point.
8. Remove all stickers, tags, excess thread sealant from exposed ceiling areas where piping is to painted.
9. The Bid Documents show general arrangement of sprinkler heads and fire protection piping. Provide a complete sprinkler system in accordance with NFPA 13 and all other Local, State and Federal codes and regulations. No additional costs will be paid for additional heads required because of coordination, architectural details, or other items indicated on the drawings.
10. Provide work in complete compliance with codes and regulations as required by Local, State, and Federal governing agencies.
11. Provide complete fire protection systems pipe markers, valve tags, signage, pipe, fittings, escutcheons, drip pans, anchors, hangers, clamps, gate valves, swing check valves, alarm check valves, hose outlet valves, fire department connection, pressures gages, water flow indicators, supervisory switches, automatic sprinklers, wire guards, drains, inspectors tests, cabinet, wrench, etc per the Bid Documents.
12. Certification of backflow devices is included in this scope
13. Provide temporary stand pipe to meet local codes until permanent stand pipes have been tested and approved. Assume the location will be at the corner of the building where the lounges are located.
14. Center all sprinkler heads in acoustical ceiling pads, both directions. If coordination drawings do not allow for this address with the CM prior to installation
15. All flow and tamper switches shall be included. Wiring and terminations by Electrical subcontractor
16. Provide complete packaged fire pump system including piping, fire pump, jockey pump, motor, pre-wired, controller, disconnect, starters, hose valve header, hose valves with caps, automatic air release valve, casing relief valve, suction gauge, discharge gauge, steel base, fire pump test header, etc per the Bid Documents. Provide complete fire pump control system including low voltage wiring, cabling, raceways, boxes, supports, etc. Work shall comply with all Division 26 requirements.
17. Provide sprinkler protection with control valve and tamper switch for elevator pit and overhead hoistway.
18. Provide all concrete equipment pads and/or curbs as required that are not shown on the drawings.
19. Provide all sleeves in horizontal and vertical surfaces, as required by the specifications or building codes. Monitor and maintain accurate placement of the sleeves during all construction operations. Include core drilling for standpipes in stairwells.

20. Provide fire-safing, sleeves, closure plates and closure angles required at fire-rated penetrations. For penetrations not in fire rated walls, seal with acoustic rated caulk.
21. Provide all access panels that are not shown on the documents but are required for a complete fire protection system as required by code.
22. Provide final cleaning, start-up, testing and commissioning for all systems installed by this Bid Category. All start-up, testing, and commissioning activities shall be witnessed by the Construction Manager, Owner and Commissioning Agent. Provide assistance to others during start-up, testing, and commissioning of other systems, which interface with systems installed by this Bid Category. Provide provisions for piping water into nearby storm structure for fire pump flow test.
23. Provide operation/maintenance manuals and as-built drawings for all systems installed by this Bid Category, both electronically and hard copy. Include 2hrs of owner training.
24. Prior to connecting to site piping, this contract is responsible for witnessing and documenting the flush of piping to the point of connection for this contract.
25. All warranties shall begin at substantial completion regardless when systems are energized.

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END OF BID CATEGORY BC-12

**BC-13 – Roofing, Flashing, and Metal Trim**

The Scope of Work in this Contract BC-13 includes all labor, material, equipment, layout, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-13, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Exploration Report
Division 02	Existing Conditions
Section 03 30 00	Cast in Place Concrete
Division 05	Metals (as applicable)
Division 06	Wood, Plastics, and Composites
Division 07	Thermal & Moisture Protection (as applicable)
Division 10	Specialties (as applicable)
Division 14	Conveying Equipment (as applicable)
Division 20	Mechanical (as applicable)
Division 21	Fire Protection (as applicable)
Division 22	Plumbing (as applicable)
Division 23	HVAC (as applicable)
Division 26	Electrical (as applicable)
Division 27	Communication (as applicable)

The following items represent specific inclusions in this Contract BC-13: Roofing, Flashing, and Metal Trim. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.
4. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included.
5. Roofing must be FM Compliant.





6. Include a section mock-up as directed by the CM.
7. All insulation; substrate preparation including cleaning; fasteners; air/water resistant sheathing board, tapered insulation, membrane roofing; walk pads, roof decking pavers; flashing; coping, caulking; waterproofing; flashing at mechanical, electrical, and plumbing equipment and penetrations shall be included in this scope of work.
8. The general trades contractor shall provide sheathing and blocking on the exterior and top of the parapet. This roofing contract include the vertical inside face and the surface of the kickers as shown on A520.
9. This scope includes temporary multiple mobilizations to seal penetrations as work progress. Review all M.E.P. drawings for additional penetration information.
10. All work of this contractor is to be performed in complete compliance with all local, state, and federal codes and regulations.
11. All roof collector boxes and overflow drains shall be protected from debris entering during construction.
12. At the end of each day make sure that work area completed is water tight and all debris removed from the roof.
13. This contractor is responsible for all sealants and caulking associated with the roof system. This includes, but is not limited to, all mechanical and electrical penetrations, copings, etc.
14. Provide and install all flashing and counter-flashing. This includes flashing at all roof penetrations, RTU Equipment pads, elevator penthouse, stairwell roof, equipment screens, and roof curbs.
15. At the pre-award meeting this contractor is required to submit a detailed schedule showing the plan for completing the work of this scope.
16. The roof deck shall be left in rough cleaned condition. This contractor shall be responsible for fine cleaning substrate before installation of roofing system.
17. This contractor shall be responsible for the removal of snow, ice and water from the roof deck surface prior to installation of the roofing material.
18. There is to be no lunch debris left on the roof and debris and scrap materials are to be removed on daily basis.
19. The wood blocking and nailers that are shown on the drawings will be installed by the general trades contractor. Any additional blocking will be the responsibility of this BC-15 contractor.
20. The electrical contractor shall provide and install a lightning protection system per the specifications. This roofing contractor shall coordinate with this contractor for a completed watertight approved assembly.
21. Provide and install all scuppers, through-wall flashing, collector boxes, overflows, gutters and downspouts. This scope includes tying into the existing underground storm connections.
22. This scope includes any and all fall protection required to complete this roofing scope of work.
23. Full engagement and participation in the exterior commissioning process.



24. Provide an allowance of \$10,000 for miscellaneous materials or labor to be used as directed by the CM for miscellaneous additional scope.
25. Alternate No. 1: Provide alternate pricing to substitute the TPO Membrane Roofing for Section 07 51 13 2-ply Bitumen roofing system.

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END OF BID CATEGORY BC-13

### BC-14 – Metal Panels

The Scope of Work in this Contract BC-14 includes all labor, material, equipment, layout, engineering, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-14, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Exploration Report
Section 04 00 00	Masonry (as applicable)
Division 05	Metals (as applicable)
Division 06	Wood, Plastics, and Composites (as applicable)
Division 07	Thermal & Moisture Protection (as applicable)
Section 07 42 13	Metal Wall Panels
Division 08	Doors & Windows (as applicable)

The following items represent specific inclusions in this Contract BC-14: Metal Panels. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included.
4. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.
5. Provide and complete mock-up panel that include all materials included in this scope to illustrate the finished product.
6. This subcontractor shall account for the entire assembly of vertical and shingle style metal panels which includes but is not limited to: "Z" girts, clips, hat-channel, furring, rigid insulation, blocking, shims, soffits, accessories, fasteners, flashings, trims, break metal, expansion joints, caulking, sealants, factory & touch-up finishes, and final cleaning of these products. This metal panel installer shall provide/coordinate the correct layout for the support structure and all other

materials and installation for a finished weather and water-tight systems.

7. Include all caulking and sealants for this system in addition to any penetration or louver that located in this system. This includes any flashing, box-outs, trims and sealants at the aluminum canopy connections, collector boxes, and downspout connections. Include sealing this system to all surrounding materials.
8. Provide the head, jamb, and sill flashing around the windows and storefront.
9. The subcontractor is responsible to maintain the integrity of the fluid applied membrane air barrier installed by the exterior stud and sheathing contractor. All patching and touch-up of damages is included in this scope. Prior to completing or covering-up any exterior wall system, the Vapor Barrier subcontractor shall have the opportunity to address any anchor details or areas that may have been damaged or compromised and not properly repaired. Those areas that have been compromised as a result of this subcontractor shall be charged accordingly for repairs.
10. This subcontractor shall take part in (5) "Exterior Skin Coordination Meetings" to review shop drawings, details, materials, etc. This meeting will incorporate roofing installer, exterior skin installers, window installers, Architect, and Exterior Envelope Consultant. As part of this exercise subcontractors are to coordinate shop drawings to ensure consistency in materials, mullions and reveals alignments while accounting for the weather-tight integrity of the building.
11. Review Section 01 50 00 that illustrates the locations of a stair tower and material hoist. These locations will be the last areas to be completed. This scope includes additional mobilizations to complete these locations.
12. Provide an allowance of \$5,000 for miscellaneous materials or labor to be used as directed by the CM for miscellaneous additional scope.

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END OF BID CATEGORY BC-14

**BC-15: Aluminum Windows, Doors, and Storefront**

The Scope of Work in this Contract BC-15 includes all labor, material, equipment, layout, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-15, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Exploration Report
Section 03 30 00	Cast in Place Concrete (as applicable)
Section 04 00 00	Masonry (as applicable)
Section 05 40 00	Cold-Formed Metal Framing
Section 06 10 00	Rough Carpentry (as applicable)
Section 06 16 00	Sheathing
Division 07	Thermal & Moisture Protection (as applicable)
Section 08 40 00	Aluminum Framing Systems
Section 08 41 13	Aluminum-Framed Entrances and Storefronts
Section 08 51 13	Fixed Aluminum Windows
Section 08 71 00	Door Hardware (as applicable)
Section 08 71 13	Automatic Door Operators
Section 08 81 00	Glass and Glazing
Section 09 91 00	Paintings and Coatings (as applicable)
Division 26	Electrical (as applicable)

The following items represent specific inclusions in this Contract BC-15: Aluminum Windows, Doors, and Storefront. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included.
4. A mock-up panel will be required to verify workmanship and performance before systems are installed. The expectation will be to acquire materials prior to full order arriving and shop drawing approval in order to verify installation details.
5. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and



rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.

6. Review Section 01 50 00 that illustrates the locations of a stair tower and material hoist near the study and lounges. The general trade's contract includes providing temporary openings at Vestibules 135V, 100V and 120A until the project nears completion to prevent damage. These locations will be the last areas to be completed. This scope includes additional mobilizations to complete these locations.
7. This scope of work shall include:
  - a. Detailed shop drawings of every elevation/opening
  - b. Aluminum-Framed Entrances and Storefronts (interior and exterior).
  - c. Aluminum Framed Windows
  - d. Window head, jamb, and sill flashings. Windows shall be installed prior to completion of exterior finishes to aid in dry-in. Include all necessary accommodations with flashings to meet this requirement.
  - e. Glazing, glazing, trim, flashing supports, entrances, curtain wall, shims, and all caulking and sealants adjacent to window frames.
  - f. System per 8/A720 at Stair 105S at Study 101. Include break-metal cover per detail 8/A822.
  - g. All aluminum doors per floor plans and A701 door schedule. Include all hardware, closures, automatic operators, power supplies required for a completed opening. The electrical contractor shall provide all wiring and connections to devices installed by this contractor.
  - h. Field verification of all existing conditions prior to starting work.
  - i. Provide all glass and glassing in wood doors.
8. This contractor is responsible for the design and installation of the attachment hardware and flashing for all windows and doors in this Bid Category and all items required to attach the window frames and door frames to the metal stud, masonry, and sheathing over metal framing. Include any miscellaneous blocking or iron not sized or specified on the contract documents.
9. This contractor shall be responsible for the following caulking:
  - a. Caulking within the curtainwall/window wall systems
  - b. Aluminum to masonry
  - c. Aluminum to fiber cement
  - d. Aluminum to concrete
  - e. Aluminum to drywall
  - f. Aluminum to metal panels
10. Include all flashing and other miscellaneous items, whether shown on drawings or not, to ensure

that a watertight system is provided.

11. Windows and frames are to be thoroughly cleaned and free of stickers, cork, protection, etc. prior to being accepted by the CM.
12. Full engagement and participation in the exterior commissioning process
13. Include any blocking not shown on the drawings.
14. Provide engineered drawings, stamped by a Registered Engineer licensed in the State of Kentucky for all items provided in this scope of work, At a minimum, The Engineer will be required to have a one-million dollar Professional Liability Policy for errors and omissions.
15. This subcontractor shall take part in (5) "Exterior Skin Coordination Meetings" to review shop drawings, details, materials, etc. This meeting will incorporate roofing installer, exterior skin installers, window installers, Architect, and Exterior Envelope Consultant. As part of this exercise subcontractors are to coordinate shop drawings to ensure consistency in materials, mullions and reveals alignments while accounting for the weather-tight integrity of the building.
16. Provide an allowance of \$5,000 for miscellaneous materials or labor to be used as directed by the CM for miscellaneous additional scope.

\*\*\*\*\*

END OF BID CATEGORY BC-15

## BC- 16 - Painting

The Scope of Work in this Contract BC-16 includes all labor, material, equipment, layout, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-16, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00- Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Exploration Report
Division 05	Metals (as applicable)
Division 06	Wood, Plastics, and Composites (as applicable)
Division 07	Thermal & Moisture Protection (as applicable)
Division 08	Doors & Windows (as applicable)
Section 09 84 14	Acoustic Stretched-Fabric Wall and Ceiling System
Section 09 91 19	Paint and Coatings
Division 20	Mechanical (as applicable)
Division 21	Fire Protection (as applicable)
Division 22	Plumbing (as applicable)
Division 23	HVAC (as applicable)
Division 26	Electrical (as applicable)
Division 27	Communication (as applicable)

The following items represent specific inclusions in this Contract BC-16: Painting. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included.
4. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.
5. Provide and install intumescent paint. See details on A120, A124, 6/A824, 6/A220 and note 4 on A220 for columns and lounges.

6. This scope includes the following:
  - a. Interior & Exterior painting as identified
  - b. Acoustic Stretched-Fabric Wall and Ceiling Systems in their entirety
  - c. Surface preparation and painting of materials and equipment to be painted. This include mechanical duct, piping and supports in areas without drop ceilings or soffits.
  - d. Caulking of the following locations:
    - i. All interior HM and wood door frames to adjoining surfaces
    - ii. Interior side of exterior HM door frames to all adjoining surfaces
    - iii. Window stools to adjoining materials
    - iv. Aluminum frames to drywall
    - v. Intersection of cabinets, casework and similar items applied to or recessed in walls.
    - vi. Sealing between plumbing fixtures and the floors and walls
    - vii. Sealing at plastic laminate tops and side/backsplashes to each other and the wall
    - viii. Fire Extinguisher cabinets to adjoining surfaces
    - ix. Stair landings and stringers to adjoining surfaces
  - e. Block filler and painting of CMU stairwell and surface mounted conduits
  - f. Paint (4) exterior pipe bollards
7. Primer, and first coat of paint shall be completed upon wall completion. All final painting shall be completed after installation of ceilings, floors, devices, cover plates, casework, accessories, door stops, etc. This subcontractor shall include cutting in final coat of paint as necessary.
8. All priming and painting of soffits, bulkheads, drywall partitions, and ceilings is by this contractor. It is this contractor's responsibility to advise the CM if any substrate is not of the quality necessary to produce a final quality product.
9. Paint ductwork inside air grilles flat black
10. Paint the bottom of exposed decks.
11. Paint exposed ceilings & bulkheads above wood ceiling system.
12. Painting of stairs and railings, including bottom of stringer and landings is part of this contract.
13. Paint the dumpster surrounds and roof top screens.
14. This contractor shall exercise extreme care not to splatter paint on adjacent finishes. All splatters and spills must be cleaned up immediately. It is the contractor's responsibility to repair or replace any material or equipment damaged during the painting operation.
15. The CM will designate a room for storage of painting materials. Materials must be stored in accordance with OSHA safety standards. It is the responsibility of this subcontractor to assure all



materials are stored in accordance with the LEED indoor air quality plan.

16. This contractor shall be responsible for all touch-up as required to deliver a final, finished product.
17. Include a \$5,000 allowance for touch-up and patching as requested by the construction manager.

\*\*\*\*\*

END OF BID CATEGORY BC-16

## BC- 17 – Flooring, Ceramic Tile, and Polished Concrete Floors

The Scope of Work in this Contract BC-17 includes all labor, material, equipment, layout, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-17, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00- Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Exploration Report
Division 03	Concrete (as applicable)
Division 05	Metals (as applicable)
Division 06	Wood, Plastics, and Composites (as applicable)
Section 03 35 11	Concrete Floor Finishes
Section 09 05 61	Preparation of Concrete to Receive Adhesively Installed
Flooring	
Section 09 60 10	Flooring Transitions
Section 09 65 00	Resilient Flooring
Division 07	Thermal & Moisture Protection (as applicable)

The following items represent specific inclusions in this Contract BC-17: Flooring, Ceramic Tile, and Stained/Polished Concrete Floors. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included.
4. The CM shall provide a shared telehandler (lull) with a 10,000lb lifting capacity for this subcontractors use (equipment only that reaches Level ground through Level 4) to unload deliveries distribute materials. Once the roof decking has been installed a material hoist (Jr. Buckhoist) with a 3000lb lifting capacity will be installed to move materials from the Ground-Level 5. This scope includes providing your own hoisting for roof top materials that cannot be moved up the stairs. This scope includes providing a trained operator of the telehandler and rigging certified along with any material chokers, belts, or slings required to hoist all material and equipment to the floors. All deliveries and hoisting shall be scheduled with the CM.
5. **The installation of all LVT flooring in corridors and residential units will take place on 2<sup>nd</sup> shift during (4) 10 hour days M-Th.**
6. All testing (moisture, adhesion, pH, etc.) as required by the specifications and material manufacturers shall be included. Notify the Construction Manager of any unsatisfactory results

prior to commencing work. Commencement of work shall serve as acceptance of all substrates.

7. Provide a complete flooring system. Include floor preparation, miscellaneous patching and leveling per industry standards. Include adhesives, floor material, base, transition strips, thresholds, underlayment's, primers, moisture testing, etc. for a complete flooring installation.
8. Slabs/floors will be left in rough, clean condition. Include final sweeping and vacuuming of room and preparation.
9. Resilient base on casework as shown on the drawings shall be included.
10. Provide all floor and/or wall tile, base, waterproof membrane, thinset, setting and grouting, sealants, waterproofing, schuler strip, etc. for a complete tile system.
11. Seal all mechanical room floors in the residence suites prior to the units being installed.
12. This contractor is responsible for the final cleaning and sealing of all tile. All walls/floors shall be free from grout film and any stains removed at the completion of the project.
13. Any caulking of tile/stone joints to provide a complete, watertight system is included.
14. This scope includes Polished Concrete floors where indicated on the finish plan. Include color matching concrete patches of imperfections or damage. Clean and fill all control joints and concrete cracks. Grind, polish, and seal floor as specified. Provide a separate mobilization just prior to turn-over to re-polish the floors to establish a like new finish. Include an in-place mock-up to determine color and finish.
15. Provide all concrete sealers as specified in Custodial, IDF, MDF, Unit Mech, Electrical, Storage, Mechanical, Fire Pump, Elev Mach, and Stairwell Rooms. Sealer shall be applied in accordance with the manufacturer's recommendations and this include sanding, grinding or etching as required for a correct application. This contractor shall plan on sealing floors immediately upon completion (or as soon as recommended by the manufacturer). All floors cannot be sealed upon building completion in one mobilization. Include rubber base at all of these areas.
16. Provide only "wet saws" for cutting tile. Dry saws will not be allowed.
17. Include tile floor and base in ADA units Levels 2-5. See Alternates for waterproofing specifics.
18. Include concrete sealer in all mechanical units prior to HVAC units being installed.
19. Alternate No. 4: Provide waterproof membrane under the tile floors in the ADA units located on levels 2-5.
  - a. The BC-17 Resilient Flooring, Ceramic Tile, and Polished Concrete subcontractor shall provide an alternate price to include a water proof membrane under the tile flooring of the shower rooms in the ADA units on Levels 2-5.
20. Alternate No. 5: Provide waterproof membrane in the drying area of the shower room and the toilet room on levels 2-5.
  - a. The BC-17 Resilient Flooring, Ceramic Tile, and Polished Concrete subcontractor shall provide an alternate price to waterproof membrane in the drying area of the shower room and the toilet room on levels 2-5.
21. Provide separate attachment to the 00 41 00 Bid Form that include pricing for the following:

- a. Floor Filling/Leveling
- b. Description: Provide self-leveling cementitious material to level floors and fill floor voids.
- c. Unit Cost: Include material and labor. Include all floor preparation, aggregate and surface finishing.
- d. Unit of Measure: 400 Square Foot: ¼" deep
- e. Specification Reference: Section 03 62 13

22. Include a \$5,000 allowance to be utilized as requested by the construction manager.

\*\*\*\*\*

END OF BID CATEGORY BC-17

## BC- 18– Landscaping and Irrigation

The Scope of Work in this Contract BC-18 includes all labor, material, equipment, layout, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-18, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00- Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Exploration Report
Division 22	Plumbing (as applicable)
Division 26	Electrical (as applicable)
Section 31 00 00	Site Work (as applicable)
Section 31 15 00	Site Preparation
Section 32 84 00	Planting Irrigation
Section 32 91 13	Soil Preparation
Section 32 92 00	Turf and Grasses
Section 32 93 00	Plants
Section 33 11 00	Water Distribution (as applicable)
Section 33 46 00	Subdrainage (as applicable)

The following items represent specific inclusions in this Contract BC-18: Landscaping and Irrigation. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included.
4. Include private utility locating prior to beginning any excavation or plantings.
5. This scope includes all landscaping, plantings, irrigation, soil preparation, topsoil, turf and grasses, stone cobble, and utility drainage piping as shown on Landscape and Civil drawings including all materials, equipment, labor, layout, and supervision required to install all irrigation, plants and trees per project plans and specifications.
6. This contractor shall be responsible for installing a complete and operational irrigation system per contract documents. The plumbing contractor shall provide an irrigation connection in the landscape near the generator. This Landscape scope shall include the valve box at this location and all other components for a complete system from this location. The electrician shall provide a PVC sleeve into the pump room for irrigation connection. It is this contractor's responsibility to provide locations/shop drawings on irrigation sleeves required

for this system. The site concrete installer shall provide underground sleeves.

7. This subcontractor will be responsible for erosion and sediment control measures upon starting their scope of work as it pertains to installing their work. It will be this subcontractor's responsibility to remove all erosion control and restore these areas.
8. Final grade will be brought to within +/- 1/2". Provide all fine grading and compaction for areas covered under this scope of work as indicated on the drawings.
9. Include irrigation sleeves under concrete walks as need for a complete system.
10. Provide and install all topsoil as required for turf areas.
11. Benchmark shall be provided by others. Include all detailed layout as required for completion of this scope of work.
12. Where resultant from this scope of this work, this subcontractor shall include broom cleaning of streets and sidewalks surrounding the project site for the full duration of this scope via street sweepers, water trucks, and other necessary equipment.
13. Dewatering as required to perform this scope of work is this contractor's responsibility. Dewatering shall be pumped and filtered to an approved location as to prevent sediment from reaching existing sanitary and/or storm system.
14. Owner training shall be included.
15. Temporary watering of installed plantings and or grasses shall be included.

\*\*\*\*\*

END OF BID CATEGORY BC-18

### BC-19 Window Treatments

The Scope of Work in this Contract BC-19 includes all labor, material, equipment, layout, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-19, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Exploration Report
Section 12 21 13	Horizontal Louvered Blinds
Section 12 24 13	Window Shade Systems

The following items represent specific inclusions in this Contract BC-19: Window Treatments. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

1. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
2. There is a goal of **18% M/WBE** participation on this project.
3. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included.
4. This scope includes providing and installing horizontal louver blinds at all openings shown on the drawings. Include screws long enough to penetrate the metal framing of the substrate the blinds are being attached to.
5. Include field measuring as required.
6. No blinds shall be attached to aluminum storefront assemblies.
7. Include 6 mobilizations to install window blinds.

\*\*\*\*\*

END OF BID CATEGORY BC-19



### **BC-20 Canopies**

The Scope of Work in this Contract BC-20 includes all labor, material, equipment, layout, services and supervision necessary to complete all work specified herein, in accordance with the Contract Documents, as described below.

The scope of work shall include all work indicated in this Contract Description BC-20, the List of Drawings, Bidding Requirements, Contract Forms, Forms of Agreement, Division 00-Procurement & Contracting Requirements and Division 01 - General Requirements. This scope of work includes, but is not necessarily limited to, the following:

Division 00	Procurement and Contracting Requirements
Division 01	General Requirements
	Geotechnical Exploration Report
Division 05	Metals (as applicable)
Division 07	Thermal & Moisture Protection (as applicable)
Division 09	Finishes (as applicable)
Section 10 73 16	Canopies

The following items represent specific inclusions in this Contract BC-20: Window Treatments. They are provided as a guide to aid in the assignment of work and in no way should be construed to be all-inclusive.

8. This project is being constructed to a LEED Silver standard. This subcontractor shall comply with all requirements to meet this level of construction.
9. There is a goal of **18% M/WBE** participation on this project.
10. Construction Manager will apply and pay for general building permit. All other permits, taxes, fees, usage fees, tap fees, inspections fees and cost associated with this scope of work shall be included.
11. See the following details for information and details on the canopies:
  - a. 1/A402
  - b. 1/A502
  - c. 2/A502
  - d. 1/S102
  - e. 44/S403
12. Include field measuring and engineering.
13. Provide any additional blocking requirements within 3 weeks of award.

**END OF SECTION 00 24 13**



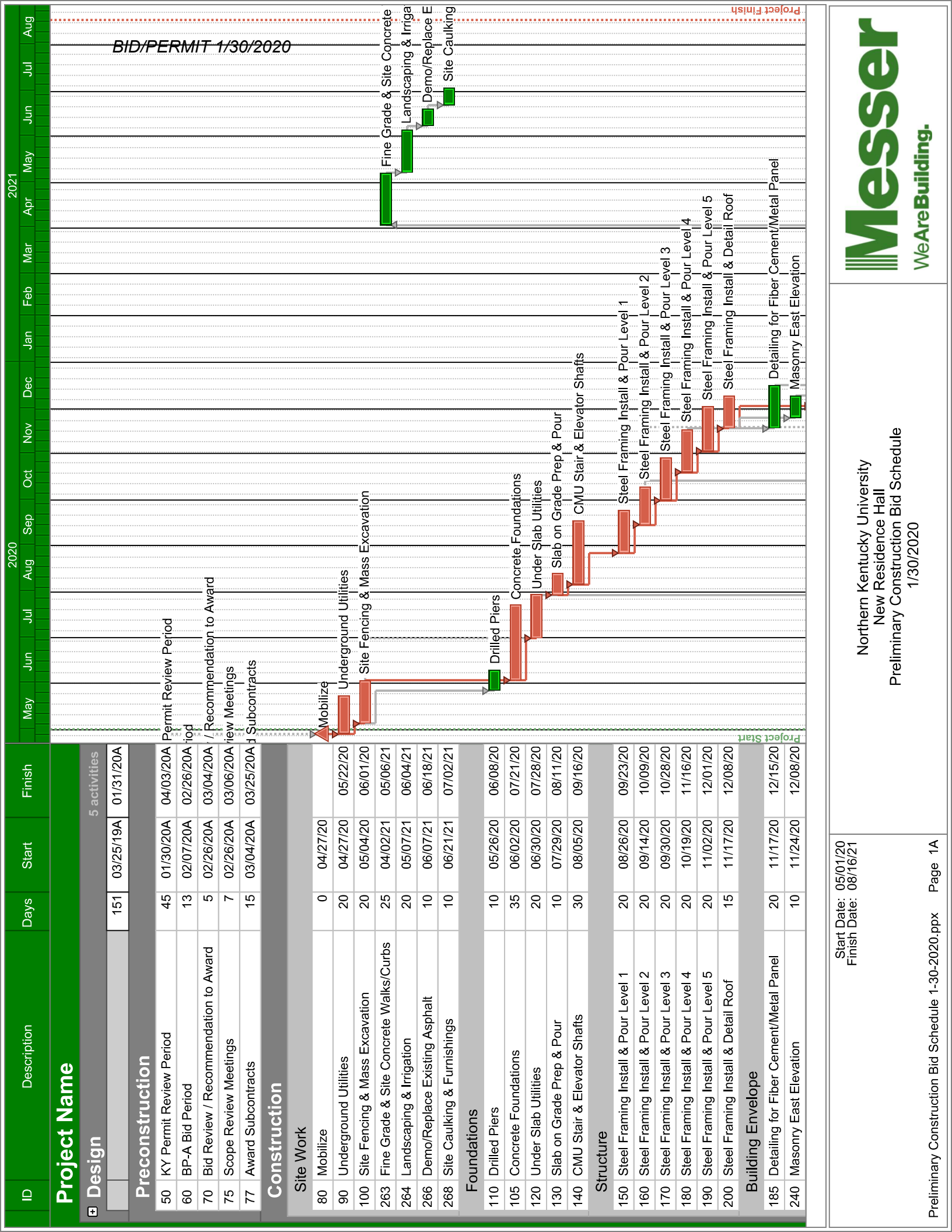


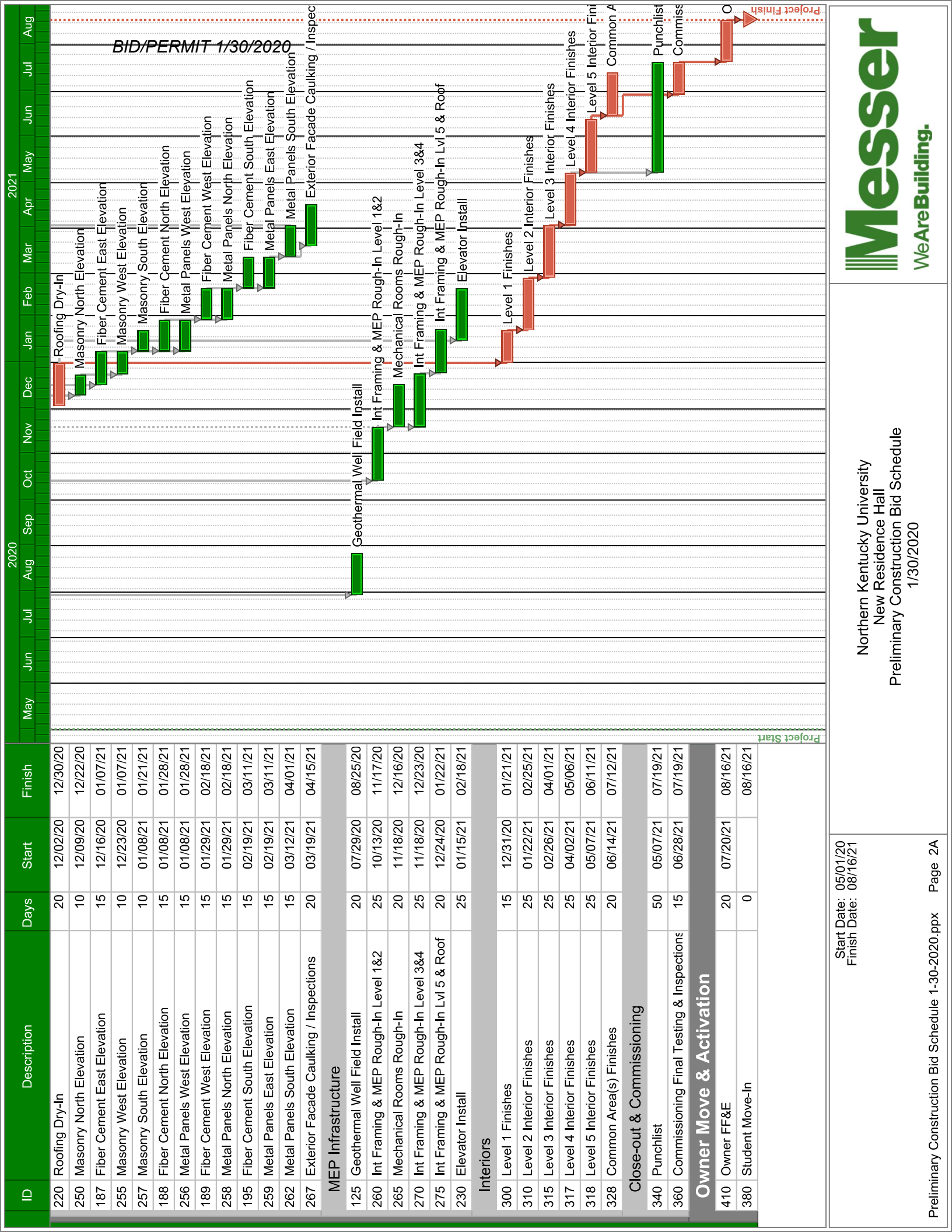
**SECTION 00 31 13 - PRELIMINARY SCHEDULES**

**1.1 PROJECT SCHEDULE**

- A. The Milestone Schedule prepared by the Contractor defines major areas of work, phasing requirements and establishes milestone dates for the entire project.
- B. The Milestone Schedule for bidding and has a “data date” of 1/30/2020 and is included in this Project Manual.
- C. Each Subcontractor, by submitting a bid, acknowledges that they have reviewed this schedule and have included the means to meet this schedule in their bid.
- D. It is the responsibility of all Subcontractors to complete their portions of the Project within established milestone dates in order to ensure completion of all work of the project by the final completion date. Subcontractors shall include costs required for overtime work, increased work force or other means to achieve the project schedule without change in the Contract Sum or Contract Time.
- E. The Milestone Schedule shall be expanded into a Construction Schedule during the course of the project and will be reviewed at the weekly construction progress meetings and updated monthly and or at other intervals as needed for proper execution of the work. The Subcontractor shall notify the Contractor within 10 days if a schedule update adversely affects its scope of work. See Section 01 32 16 for more information on Construction Progress Scheduling.

**END OF SECTION 00 31 13**





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**SECTION 00 31 32**  
**GEOTECHNICAL INVESTIGATIONS**

**PART 1      GENERAL**

**1.01      SOIL BORINGS**

- A.      Test borings have been made at the site of the improvements. Logs of the test borings are included
  - 1.      A copy of the report is included in this Project Manual.
- B.      Logs of the test borings are not warranted by the Owner or the Architect, except that they reflect the best and only information available at the time of design.

**END OF SECTION**

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**GEOTECHNICAL EXPLORATION  
NORTHERN KENTUCKY UNIVERSITY  
NEW RESIDENCE HALL  
HIGHLAND HEIGHTS, KENTUCKY**

Prepared for:  
**MOODY NOLAN  
COVINGTON, KENTUCKY**

Prepared by:  
**GEOTECHNOLOGY, INC.  
ERLANGER, KENTUCKY**

Date:  
**AUGUST 7, 2019**

Geotechnology Project No.:  
**J032441.01**

**SAFETY  
QUALITY  
INTEGRITY  
PARTNERSHIP  
OPPORTUNITY  
RESPONSIVENESS**



August 7, 2019

Ms. Cheryl Sydzyik  
Moody Nolan  
434 Madison Avenue  
Covington, Kentucky 41011


Re: Geotechnical Exploration  
Northern Kentucky University  
New Residence Hall  
Highland Heights, Kentucky  
Geotechnology Project No. J032441.01

Dear Ms. Sydzyik:

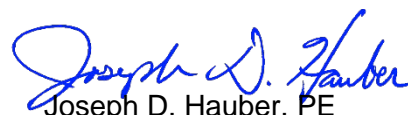
Presented in this report are the results of our geotechnical exploration completed for the Northern Kentucky University New Residence Hall in Highland Heights, Kentucky. Our services were performed in general accordance with the terms of our April 11, 2019 Subcontract Agreement with Moody Nolan, which references Geotechnology's January 23, 2019 Proposal No. J032441.01.

We appreciate the opportunity to provide the geotechnical services for this project. If you have any questions regarding this report, or if we may be of any additional service to you, please do not hesitate to contact us.

Respectfully submitted,  
**GEOTECHNOLOGY, INC.**

  
John S. Nealon, PhD, PE, PG  
Principal Engineer



  
Joseph D. Hauber, PE  
Senior Project Manager

JSN/JDH

Copies submitted: Client (email/2 mail)  
THP Limited, Inc. (email)





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**GEOTECHNICAL EXPLORATION  
NORTHERN KENTUCKY UNIVERSITY  
NEW RESIDENCE HALL  
HIGHLAND HEIGHTS, KENTUCKY  
August 7, 2019 | Geotechnology Project No. J032441.01**

## **1.0 INTRODUCTION**

Geotechnology, Inc. (Geotechnology) has prepared this geotechnical exploration report for Moody Nolan for the proposed Northern Kentucky University (NKU) New Residence Hall to be located on the eastern corner of Kenton Drive and Carroll Drive in Highland Heights, Kentucky. Our services documented in this report were provided in general accordance with the terms of our April 11, 2019 Subcontract Agreement with Moody Nolan, which references Geotechnology's January 23, 2019 Proposal No. J032441.01.

At the outset of the project, the purposes of the geotechnical exploration were to 1) evaluate the general subsurface profile at the Campbell Drive site (not the Kenton and Carroll Drives site noted above) and the engineering properties of the soils and bedrock, and 2) to develop recommendations for the geotechnical aspects of the design and construction of the project, as defined in our proposal. Our original scope of services included geotechnical borings, laboratory testing, engineering analyses, and preparation of a geotechnical report for the Campbell Drive site. However, following completion of drilling and laboratory testing for the Campbell Drive site, a decision was made to move the residence hall location to the western corner of the existing Parking Lot F. This report is for the latter site and not the former.

## **2.0 PROJECT INFORMATION**

As previously stated, a decision was made to move the residence hall location to the western corner of the existing Parking Lot F, following completion of drilling and laboratory testing for the Campbell Drive site. Parking Lot F is bordered to the northwest by Kenton Drive and to the southwest by Carroll Drive. The Lot F location had been previously explored and evaluated in 2016 by Thelen Associates, A Division of Geotechnology, Inc. (Geotechnology). The geotechnical report for the Lot F site was submitted by Geotechnology on December 16, 2016 (Geotechnology Project No. J028765.01).

The proposed residence hall footprint will cover approximately 15,600 square feet and will be a five-story, L-shaped, wood-frame or cold-formed-steel-frame, slab-on-grade building having its ground floor at El. 821.70.<sup>1</sup> In the wing of the building running parallel to Kenton Drive, the load-

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<sup>1</sup> The elevations in this report are referenced to North American Vertical Datum of 1988 (NAVD 88) in units of feet, unless noted otherwise.



bearing walls will extend to foundation level, and will be supported by continuous footings where possible, and by structural grade beams spanning between drilled shafts where shallow foundation support is not feasible or economical. Along the wing running perpendicular to Kenton Drive, the first floor will be of steel-frame construction, and widely-spaced columns will be used to create a podium level that will provide an open common space for the students. Maximum column and wall loads will be 375 kips and 14.5 kips per lineal foot (klf), respectively.

Proposed site grades are not available at this time. However, based on comparison of boring elevations and the proposed ground floor elevation of 821.70, about 4 feet of cut and 5 feet of new fill will be required to establish the building pad and surrounding grades for the residence hall.

### **3.0 SITE CONDITIONS**

The site location and pre-development topography of the project site are shown on the Site and Boring Plan (Sheet No.1) and the 1963 Topography Plan (Sheet No. 2) included in Appendix B. The 1963 Topography Plan was derived from 1963 topographic mapping that was published by the Northern Kentucky Area Planning Commission (NKAPC).

The existing site terrain slopes gently downward to the northeast in the vicinity of the proposed building pad, and slopes steeply downward beyond the northeast edge of Lot F. The building site is completely occupied by Lot F, a large, asphaltic concrete student parking lot. Past bulk grading activities to construct the parking lot area involved filling in a drainage valley (cf. the 1963 Topography Plan on Sheet No. 2) and cutting down the adjacent ridges. Maximum depths of previous cutting and filling are estimated to have been on the order of 40 feet and 30 feet, respectively. Approximately 15 feet of relief currently exists across the existing parking lot, and about 10 feet across the building area. An approximately 30-foot-high, 2.5-horizontal-to-1-vertical (2.5H:1V) fill slope bounds the east side of Lot F and descends to the northeast. The base of this 2.5H:1V slope steepens to approximately 1.5H:1V for the lowest 10 feet of grade change in the vicinity of an outlet for an existing storm sewer that roughly follows the now-buried valley alignment. An approximate 15- to 20-foot-high, 4H:1V slope extends upwards from the southeast edge of Lot F to an adjacent student parking lot (Lot I).

### **4.0 SUBSURFACE EXPLORATION**

The subsurface exploration for Geotechnology Project No. J028765.01 consisted of eleven borings, numbered 1 through 11. The boring locations were selected by Geotechnology, and were staked in the field by a Geotechnology survey crew relative to a given benchmark elevation of EL. 813.75 at the rim of a storm sewer catch basin immediately southeast of the intersection of Campbell Drive and Kenton Drive. We note that the rim elevation of this catch basin is posted as 813.28 on the base plan provided by Moody Nolan on June 20, 2019. The locations of the borings are shown on our Site and Boring Plan, which is included in Appendix B.



The borings were drilled on November 23 and November 25, 2016 with a buggy-mounted drill rig advancing hollow-stem augers, as indicated on the boring logs presented in Appendix C. Sampling of the overburden soils and bedrock was accomplished ahead of the augers at the depths indicated on the boring logs, with either 2-inch-outside-diameter (O.D.) split-spoons or 3-inch-O.D., thin-walled Shelby tube samplers in general accordance with the procedures outlined by ASTM D1586 and ASTM D1587, respectively. Standard Penetration Tests (SPTs) were performed on the split-spoon samples to obtain the N-values<sup>2</sup> of the sampled materials.

Observations for groundwater were made in the borings during drilling, at the completion of drilling, and before backfilling the boreholes.

As each boring was advanced, the Drilling Foreman kept a field log of the subsurface profile noting the soil and bedrock types and stratifications, groundwater, SPT results, and other pertinent data. Representative portions of the split-spoon samples were placed in glass jars with lids to preserve the in-situ moisture contents of the samples. The Shelby tubes were capped and taped at their ends to preserve the in-situ moisture contents and densities of the samples, and the tubes were transported and stored in an upright position. The glass jars and Shelby tubes were marked and labeled in the field for identification when returned to our laboratory.

The boring logs were prepared by an Engineering Geologist on the basis of the field logs, visual classification of the soil and bedrock samples in the laboratory, and the laboratory test results. Soil and Rock Classification Sheets are also included in Appendix C, which describe the terms and symbols used on the boring logs. The dashed lines on the boring logs indicate an approximate change in strata as estimated between samples, whereas a solid line indicates that the change in strata occurred within a sample where a more precise measurement could be made. The transition between strata can be abrupt or gradual.

## **5.0 LABORATORY REVIEW AND TESTING**

Upon completion of the fieldwork, the samples recovered from the borings were transported to our Soil Mechanics Laboratory, where they were visually reviewed and classified by the Project Engineering Geologist.

Laboratory testing was performed on selected soil and rock samples to estimate engineering and index properties. Laboratory testing of the selected soil samples included moisture content, Atterberg limits, and unconfined compression tests. The test results are summarized in the

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<sup>2</sup> The Standard Penetration Test Value, or N-value, is defined as the number of blows required to drive the split-spoon sampler 12 inches with a 140-pound hammer falling 30 inches. Since the split spoon sampler is driven 18 inches or until refusal, the blows for the first 6 inches are for seating the sampler, and the number of blows for the final 12 inches is the N-value. Additionally, "refusal" of the split-spoon sampler occurs when the sampler is driven less than 6 inches with 50 blows of the hammer.



Tabulation of Laboratory Tests in Appendix D, along with the unconfined compressive strength test forms.

## **6.0 SUBSURFACE CONDITIONS**

The borings revealed a general soil and bedrock profile consisting of variable depths of uncontrolled fill underlain by colluvial and/or residual soils and by the interbedded shale and limestone bedrock. More specific descriptions of the subsurface strata are provided below, and boring logs containing detailed material descriptions are located in Appendix C

### **6.1 Stratification**

#### **6.1.1 Pavement**

Six of the borings were drilled through the existing pavement of parking Lot F, including Borings 2 through 5, 7, and 10. Four of the borings revealed approximately 5 to 6 inches of asphaltic concrete (AC) directly over the uncontrolled fill. Two of the borings revealed 6 to 9 inches of AC over 3 to 6 inches of granular base.

#### **6.1.2 Topsoil**

Topsoil was encountered at the ground surface in Borings 6, 9, and 11. The thickness of the topsoil in these borings varied from 0.2 to 0.3 feet.

#### **6.1.3 Fill**

Existing fill was encountered in each of the borings with the exception of Boring 2. The fill in the borings varied from 2 to 28 feet thick and was generally comprised of a mixture of clayey soils and shale and limestone from the bedrock, presumably from the previous bedrock cuts across the site. Additionally, the fill was described as medium stiff to very stiff with variable moisture contents and intermittent zones of nested shale fragments and limestone floaters. Because of the random moisture content and in-situ density of the fill, and because the fill was placed without compaction testing over intermittent low-density soils, the fill is considered to be uncontrolled.

Moisture content testing on the fill soils revealed a wide range in moisture content percentages ranging from 13.3 to 32.0 percent. Atterberg limits testing was performed on three samples of the fill. Two of the samples revealed liquid limits ranging from 39 to 46 percent and plasticity indices ranging from 18 to 23 percent, and were therefore classified as CL soils according to the Unified Soil Classification System (USCS). The remaining sample revealed a liquid limit of 61 percent and a plasticity index of 34 percent, and classified as a CH (i.e., highly plastic) soil per the USCS. Three unconfined compressive strength tests on the fill from Boring 4 yielded unconfined compressive strengths ranging from 3,030 to 4,650 pounds per square foot (psf).

#### **6.1.4 Sediments**

Sediments consist of recent, low-density alluvial soils that are deposited by fluvial or flowing water systems (e.g., swales, streams, rivers, etc.). Sediment was encountered beneath the fill in Boring 10 between the depths of 22 and 28.5 feet. The sediment was described as a dark gray, moist to



wet, soft, silty clay with silt seams. A moisture content test on the sediment indicated 34.3 percent moisture.

#### **6.1.5 Colluvium**

Colluvial soils form on hillsides by the downslope transport of soil and rock material under the influence of gravity. Colluvium was encountered beneath the fill in Borings 3, 5, 7, 9, and 11. The colluvium in these borings was described as brown and gray, moist to wet, medium stiff to very stiff, silty clay with shale and limestone fragments.

Moisture content testing on the colluvium revealed moisture contents ranging from 14.4 to 26.8 percent.

#### **6.1.6 Residuum**

Residual soils form by in-situ weathering of the underlying bedrock into a soil. Occasionally, bedrock remnants (i.e., shale or limestone layers) may be encountered within the residual soils. Residual soils were encountered in Borings 2 and 9, and were described as brown and gray, moist, stiff to very stiff, silty clay and clay with trace bedding planes.

Moisture content testing of the residuum yielded moisture contents ranging from 18.0 to 38.7 percent. An Atterberg limits test performed on a sample from Boring 2 yielded a liquid limit of 73 percent and a plasticity index of 44 percent, which classified the soil as a CH (i.e., highly plastic) soil per the USCS.

#### **6.1.7 Bedrock**

The overburden soils at the site are underlain by bedrock consisting of interbedded shale and limestone layers. Bedrock was encountered at depths ranging from 2.0 to 28.5 feet below the ground surface in the borings.

According to the 1962 USGS Geologic Map of the Newport Quadrangle, Newport, Kentucky, the bedrock immediately underlying the overburden soils belongs to the Ordovician-aged Fairview Formation. The referenced USGS Map indicates that the Fairview Formation is comprised of interbedded shale and limestone of approximately equal percentages. Limestone layers are regularly between 4 to 8 inches thick, but can be 14 inches thick or more in some locations.

Bedrock in the Northern Kentucky Area is typically categorized as highly weathered, weathered, or unweathered, based on the degree of weathering of the shale component. The highly weathered zone is typically the uppermost zone, wherein the shale is brown to olive brown in color and has almost weathered to a clay. In the intermediate weathered zone, the shale is typically olive brown with occasional gray and is stronger than the shale in the highly weathered zone. In the unweathered parent zone, the shale is gray and is stronger than the shale in the weathered zones. Each zone is interbedded with limestone. It is common for one or both of the weathered shale bedrock zones to be absent due to differential weathering, erosion, or prior excavation. The Rock Classification Sheet, which is included in Appendix C, describes the varying





degrees of weathering along with the rock strength descriptions that are used on the appended boring logs.

Regarding the limestone, these layers are predominantly unweathered, and their strengths are estimated to range from medium strong to very strong (i.e., uniaxial compressive strengths ranging from 4,000 psi to upwards of 30,000 psi). Occasionally, layers are encountered within the bedrock profile where groundwater seepage is concentrated, and weathering of the limestone layers is more advanced.

Interbedded, highly weathered shale and limestone bedrock was encountered in Borings 2, 8, 10, and 11 at variable depths within the previous fill and cut areas. The thickness of the highly weathered to weathered bedrock, where penetrated, varied from 2.5 to 5.0 feet. The highly weathered shale was described as extremely weak. Moisture content testing on the highly weathered shale revealed moisture contents ranging from 8.8 to 18.9 percent.

Interbedded, weathered shale and limestone bedrock was encountered in Borings 1, 2, 3, 7 and 9. The thickness, where penetrated, was approximately 2.5 feet. The weathered shale was described as extremely weak. Moisture contents of two samples of the weathered shale were 5.9 and 15.1 percent.

Interbedded, unweathered shale and limestone bedrock was encountered in Borings 1, 3 through 9, and 11. The depth to the top of the unweathered bedrock, where encountered, ranged from 2 feet to 29.5 feet from the ground surface in Borings 6 and 11, respectively. The unweathered shale was described as extremely weak. Moisture contents of four samples of the unweathered shale varied from 5.1 to 13.5 percent.

## **6.2 Groundwater Conditions**

As mentioned in Section 4.0, groundwater observations were made in the borings during drilling, at the completion of drilling, and before backfilling the boring holes.

In general, groundwater was first encountered in Borings 5, 9, 10, and 11 at the soil/bedrock interface; however groundwater levels rose in each of these four test borings and established artesian conditions (i.e., groundwater under head pressure) over a 24-hour period. The maximum increase in groundwater level over the 24-hour period was 17.5 feet in Boring B-11, in which the artesian head rose to within 7 feet of the existing ground surface. The borings in which groundwater was encountered are centered in the now-buried valley that had been filled with uncontrolled fill.

Based on the groundwater observations and our local experience, groundwater seepage is anticipated along the soil/bedrock interface and in saturated zones of fill or native soils that are within the perched groundwater zones, or that are below the groundwater table. Locally concentrated flow may occur due to saturated layers of fill or native soils or along fractures in the





bedrock. Additionally, groundwater levels and seepage amounts are expected to vary with time, location, season of the year, and amounts of precipitation.

## **7.0 CONCLUSIONS AND RECOMMENDATIONS**

Based on the boring logs, visual examination of the recovered samples, the laboratory test results, our understanding of the proposed project, our engineering analyses, and our experience as Consulting Soil and Foundation Engineers in the Northern Kentucky Area, we have reached the following conclusions and make the following recommendations of this report.

### **7.1 Subsurface Conditions**

As discussed in Section 3.0, the project site is an existing large, gently-sloped parking lot that was established by cutting of nearby ridgetops and filling of a pre-existing, northeast-trending drainage valley. The ground surface or pavement in the project area is underlain by variable depths of uncontrolled fill soils over intermittent native sediment, colluvial, and residual soils over the interbedded shale and limestone bedrock. Refer to Section 6.0 and the boring logs in Appendix C for additional information on the subsurface strata.

As discussed in Section 6.0, four of the borings encountered an artesian groundwater condition at the soil/bedrock interface. Presumably, this has resulted from the filling of the aforementioned drainage valley without providing subsurface drainage. The groundwater seepage that typically flows along the soil/bedrock interface, within layers of the bedrock, and along the former valley bottom has been restrained by the valley fill, which is acting as an aquitard. We anticipate that the groundwater at the soil/bedrock interface discharges into the valley to the northeast of the project site in the proximity of the storm sewer outlet discussed in Section 3.0 of this report.

### **7.2 Excavation Support**

Excavation support should be the responsibility of the Contractor. Excavation support should be designed and implemented such that excavations are adequately ventilated and braced, shored, and/or sloped in order to protect and ensure the safety of workers within and near the excavations and to protect adjacent ground, slopes, structures, and infrastructure. Federal, state, and local safety regulations should be satisfied. The analyses, discussions, conclusions, and recommendations throughout this report are not to be interpreted as pre-engineering compliance with any safety regulation.

### **7.3 Site Preparation and Earthwork**

As stated in Section 2.0, earthwork for this project will involve cuts and fills up to approximately 5 feet.

The initial preparation of the site for grading should include the removal of vegetation, heavy root systems, topsoil, and existing pavement from the proposed cut, fill, pavement, and structure areas. The topsoil may be stockpiled for future use on the completed cut and fill slopes or in landscaped areas, if permitted by specification, whereas the vegetation, including the heavy root systems should be disposed of off-site in accordance with applicable regulations.



Existing pavements within the grading and proposed structure limits should be demolished and removed. Asphaltic concrete, rubble, and debris associated with the pavement removal should be disposed of off-site, unless there are provisions in the specifications for on-site reclamation of these materials. We should review these provisions to evaluate their impact on the recommendations of this report. Pavements outside of the footprints of the proposed structures may temporarily be left in place prior to removal and/or replacement to provide a stable base for construction equipment.

Experience indicates that the overburden soils and the highly weathered and weathered zones of the bedrock can be excavated with dozers and scrapers, although ripping is necessary to loosen the bedrock so that it can be picked up by the scrapers. Excavations that extend into the unweathered gray shale and limestone bedrock become more difficult with depth, and more ripping may be required to loosen the bedrock.

Historically, structures at NKU having floor slabs supported on fresh exposures of gray, unweathered shale have experienced issues with floor slab heave as the shale has absorbed moisture following construction. We also note that highly plastic soils were encountered on this project site in the uncontrolled fill and in the residuum (with measured plasticity indices of 34 and 44 percent). Therefore, after clearing, grubbing, and making the required excavations in cut areas, we recommend that the exposed subgrade in areas that will require less than 2 feet of fill first be reviewed by the Project Geotechnical Engineer for the presence of highly plastic clays and unweathered bedrock, which have the potential of swelling with increases in moisture content, and which can result in heave of building foundations and floor slabs. We recommend that test pits be excavated to evaluate the extents of these materials across the building subgrade. If highly plastic clays or unweathered bedrock are encountered, we recommend that they be undercut to a depth of at least 2 feet below proposed floor slab subgrade elevations, and then be replaced with lean clay soils having plasticity indices of 22 percent or less, or with free-draining granular soils as is discussed subsequently. This recommendation was implemented successfully in the NKU Student Union structure, which, to our knowledge, has not experienced floor slab heave issues.

The base of the undercuts, as well as the remaining cut areas outside of the undercuts, should then be thoroughly proofrolled using a heavily loaded piece of equipment under the review of the Project Geotechnical Engineer, or a representative thereof. Soft or yielding soils observed during the proofrolling should be undercut to stiff non-yielding cohesive soils. If cohesionless soils are used for backfilling undercuts, the base of the undercut should be graded to drain towards a gravity outlet that will provide permanent subsurface drainage of the granular-filled undercut. The Project Geotechnical Engineer should also provide recommendations for the permanent subsurface drainage system(s) based on site conditions at the time of undercutting. The cohesionless soil should consist of free-draining granular material containing less than 3 percent fines, and should be separated from overlying and underlying cohesive soils with a non-woven filtration geotextile (such as Mirafi 140N or approved equivalent) to mitigate the migration of fines into the cohesionless soil over time.



Preferably, the undercuts should be backfilled with new compacted clayey fill satisfying the material and compaction requirements presented in this section. The undercut soils may be reused provided that they conform to the recommendations contained in this report regarding acceptable fill materials. We recommend that the Contract Documents include a bid item for the recommended undercutting, as deemed necessary, and the replacement with new compacted and tested fill on a “per cubic yard of in-place compacted fill” basis.

Fill materials should consist of approved on-site lean clayey soils, bedrock, or approved lean clay borrow materials that are relatively free of topsoil, vegetation, trash, construction or demolition debris, frozen materials, particles over 6 inches in maximum dimension, or other deleterious materials. Moderately to highly plastic clays that are obtained from cut areas or from utility excavations may be reused as new fill in paving or landscaping areas outside of the building limits, and even then should be restricted to at least 2 feet below pavement subgrade elevations.

The shale and limestone bedrock may be incorporated into the fill provided that the gray, unweathered shale is first pulverized to a soil-like consistency and then moisture-conditioned, and provided that the limestone is broken up and dispersed so as not to cause nesting or retard compaction. The maximum dimension of the broken-up limestone floaters in the fills should be limited to 18 inches, with a maximum thickness of 6 inches. Thicker layers or larger pieces of limestone, if not capable of being broken up, should be wasted off site. Additionally, limestone floaters should be restricted from the fill in the upper 2 feet below floor slab subgrade elevations within and up to 5 feet outside of the structure footprint. In pavement areas, we recommend that limestone floaters be restricted within 1 foot of pavement subgrade elevations.

The fill should be placed in shallow level lifts (or layers), 6 to 8 inches in loose thickness. Each lift should be moisture-conditioned to within the acceptable moisture content range provided in Table 1 (on the following page), and then compacted with a sheepsfoot roller or self-propelled compactor to at least the minimum percent compaction indicated in the same table. Moisture-conditioning may include aeration and drying of wetter soils, wetting of drier soils, and/or thorough mixing of wetter and drier soils into a uniform mixture. Additionally, if shale is used in the fill, water will likely need to be blended with the shale to moisture-condition it. Where free-draining granular backfill is used to backfill undercuts, it should be compacted to at least the minimum relative densities indicated in Table 2 (on the following page).

Where fill is placed on sloping terrain that is steeper than 4H:1V, the fill should be placed on continuous horizontal benches up the sloping terrain, with the initial bench having a minimum width of 15 feet and all subsequent benches being at least 5 feet wide. The initial 15-foot wide bench should be located at the toe of the proposed fill, unless noted otherwise. The benching operations should remove surficial medium stiff or softer soils and expose stiff native soils or undisturbed, intact bedrock on the surfaces of the benches. The benches should not be made until the fill is ready to be placed. If groundwater seepage is noted on the benches, the Project Geotechnical Engineer should be contacted for underdrainage recommendations before the soils are replaced and compacted.



**Table 1. Percent compaction and moisture-conditioning requirements for fill and backfill.**

Area	Minimum Percent Compaction <sup>a,b</sup>	Acceptable Moisture Content Range <sup>c</sup>
Structural <sup>d</sup>	98% SPMDD	-2% to +3% of OMC
Non-structural	95% SPMDD	±3% of OMC
Floor slab subgrade	98% SPMDD	0% to +3% of OMC
Pavement subgrade ≤ 12 inches below subgrade	100% SPMDD	0% to +2% of OMC

<sup>a</sup> SPMDD = standard Proctor maximum dry density determined from ASTM D698.

<sup>b</sup> For granular soils that do not exhibit a well-defined moisture-density relationship, refer to Table 2 for minimum relative density requirements.

<sup>c</sup> OMC = optimum moisture content determined from ASTM D698.

<sup>d</sup> Structural fill and backfill for foundations are defined as fill and backfill located within the zones of influence of existing and proposed structures. The zone of influence of a structure is defined as the area below the footprint of the structure and 2H:1V downward and outward projections from the bearing elevation of the structure.

**Table 2. Relative density compaction requirements for granular fill and backfill.**

Area	Minimum Relative Density <sup>a,b</sup>
Structural <sup>c</sup>	80%
Non-structural	75%
Floor slab and pavement subbase	80%

<sup>a</sup> Relative density evaluated on the basis of the maximum and minimum index densities determined from ASTM D4253 and D4254, respectively.

<sup>b</sup> For granular soils that exhibit a well-defined moisture-density relationship, refer to Table 1 for minimum percent compaction and moisture-conditioning requirements.

<sup>c</sup> Structural fill and backfill for foundations are defined as fill and backfill located within the zones of influence of existing and proposed structures. The zone of influence of a structure is defined as the area below the footprint of the structure and 2H:1V downward and outward projections from the bearing elevation of the structure.

We recommend that the permanent cut and fill slopes for this project be designed not steeper than 3H:1V. Gentler slopes should be used whenever possible for ease of maintenance. Additionally, we recommend that the fill slopes be slightly overbuilt and then trimmed back to the design slope to achieve a well-compacted surface. Silt and/or sand soils should also be excluded from the face of the fill slopes, as these materials are more susceptible to erosion.

Topsoil should be track-compacted on the proposed cut and fill slopes. We recommend that a maximum of 6 inches of topsoil be placed on the slopes. We note that bedrock exposures at proposed grades may not consistently hold the topsoil layer, and small pop-outs may occur, especially at points of seepage.



Groundwater is not expected to have an adverse effect on the proposed earthwork construction. However, the Contractor must be prepared to remove seepage that accumulates during excavation on fill surfaces or at subgrade levels.

Maintaining the moisture content of cohesive bearing and subgrade soils within the acceptable range provided in Table 1 is very important during and after construction for the proposed structure. The clayey bearing and subgrade soils should not be allowed to become excessively wet or dried during or after construction, and measures should be taken to prevent water from ponding on these soils and to prevent these soils from desiccating during dry weather.

Positive drainage should be established to promote the rapid drainage of surface water away from the structure, and to prevent the ponding of water adjacent to the structure. Finish grading in grass and landscaped areas should be sloped down and away from the structure at a gradient of at least 10 percent for at least 10 feet, and then at a gradient of at least 2 percent beyond the initial 10 feet from the structure. Proposed pavements should drain away from the structure at a minimum of 2 percent. The final grades should direct the surface water to storm water collection systems.

Deep-rooted vegetation should not be planted within 1.5 times their projected mature foliage radius from foundations, as the roots of such vegetation can extract moisture from plastic and low-plastic soils alike, causing them to shrink, which can potentially create foundation and floor slab settlement issues. Additionally, smaller bushes or flowerbeds adjacent to the proposed structure should not be watered by ponding water in the beds where the bushes or flowers may be growing, which could lead to swelling and heave of the foundation soils.

We recommend that the earthwork operations be carried out during the drier season of the year. In our experience, weather conditions are historically more favorable for earthwork during the months of May through October in the Northern Kentucky Area. Regardless of the time of year, asphalt, concrete, or fill should not be placed over frozen or saturated soils, and frozen or saturated soils should not be used as compacted fill or backfill.

Best management practices (BMPs) should be implemented to reduce the effects of erosion and the siltation of adjacent properties. Upon completion of earthwork, disturbed areas should be stabilized. It is also recommended that riprap and/or suitable armoring be used at the outlets of storm sewers and headwalls to reduce flow velocities and protect against erosion.

#### **7.4 Site Classification and Seismic Design Category**

Based on the borings and our interpretation of the 2018 Edition of the Kentucky Building Code (2018 KBC), it is our opinion that the site class and seismic parameters in Table 3 are applicable for this project.



**Table 3. Site class and seismic design category per the 2018 Kentucky Building Code (2018 International Building Code).**

Category/ Parameter	Designation/ Value	Notes
S <sub>s</sub>	0.158 g	Campbell County, Kentucky, per Table 1613.3.1 of the 2018 KBC
S <sub>1</sub>	0.081 g	
Site Class	D	Per Chapter 20 of ASCE 7
F <sub>a</sub>	1.2	Per Table 11.4-1 of ASCE 7
F <sub>v</sub>	1.7	Per Table 11.4-2 of ASCE 7
S <sub>MS</sub>	0.176 g	Per Equation 11.4-1 of ASCE 7
S <sub>M1</sub>	0.134 g	Per Equation 11.4-2 of ASCE 7
S <sub>DS</sub>	0.118 g	Per Equation 11.4-3 of ASCE 7
S <sub>D1</sub>	0.090 g	Per Equation 11.4-4 of ASCE 7

## 7.5 Foundation Design and Construction

Relatively heavy column and wall loads are planned for this project. Variable thicknesses of uncontrolled fill with localized low-density sediment soils were encountered in some of the borings, and shallow bedrock was encountered within 1 foot of the proposed finish floor elevation in Boring 8. In our opinion, intolerable differential settlements may be expected if the proposed structure is supported on shallow spread footings bearing in or over the undocumented fill. In addition, differential settlements would be exacerbated in areas where shallow foundations would bear on the bedrock and settlements would be negligible. Therefore, we recommend that the structure be supported either on combination of drilled shafts and shallow spread footings extended to or into the bedrock, or on shallow spread footings bearing on the bedrock or on fill soils improved by rammed aggregate piers (RAPs). The elevations of the bedrock surface can be estimated from the approximate bedrock surface contours depicted on Sheet 1 in Appendix B. Continuous footings may be used to support wall loads to a depth of roughly 5 feet below subgrade levels existing at the time of excavation. Narrow trenches excavated to extend shallow foundation bearing depths to more than about 5 feet become difficult to keep open and to keep free of sloughed soils prior to concrete placement. Where it may be necessary to extend foundations to depths of 5 feet or more to reach bedrock, drilled shafts or RAPs should be used.

Section 7.5.1 discusses the shallow foundation components. Sections 7.5.2 and 7.5.3 discuss the drilled shaft and RAPs, respectively.

### 7.5.1 Shallow Foundations on Bedrock

Shallow foundations can be used when suitable bearing materials are encountered at shallow bearing elevations. Shallow foundations should consist of continuous wall footings and isolated





column pads bearing on or in undisturbed, intact bedrock. Footings bearing on highly weathered, weathered, and unweathered bedrock may be proportioned for respective maximum net allowable bearing pressures of 6,000, 10,000, and 30,000 pounds per square foot (psf), full dead and full live load. We recommend that the minimum lateral dimensions for continuous wall footings and isolated column footings be at least 18 and 24 inches, respectively.

Exterior footings and footings in unheated interior areas should bear at least 30 inches below the lowest adjacent exterior/unheated grade for protection from frost penetration. Additionally, the foundation bearing elevations should not be located higher than a relationship of 2H:1V above proposed adjacent foundations or the inverts of nearby existing or proposed utilities that parallel or nearly parallel the foundations, without a site-specific evaluation of the conditions by the Project Geotechnical Engineer.

We recommend that foundation excavations be cut to neat lines and grades so that concrete may be placed directly against the banks of the excavations without forming. Loose, soft, wet, frozen, or otherwise disturbed materials should be removed from the bearing surfaces of the foundations prior to the placement of reinforcing steel and concrete. If a limestone layer is exposed in the bottom of the footing excavation, we recommend that the excavation be deepened to penetrate the limestone layer, unless it can be determined that there is no softening of the shale beneath the limestone. Additionally, disturbed or loosened beds of limestone should be removed from the bearing surfaces. If a crusted or saturated surface develops at a foundation bearing surface, we recommend that it be skimmed to expose a fresh surface before reinforcing steel and concrete are placed. Foundation concrete should be placed the same day as the excavation is made to prevent saturation or desiccation of the bearing surfaces.

Concrete mud mats may be placed over the bearing surfaces to protect the bearing materials from desiccation or softening via saturation. If concrete mud mats are utilized, the concrete should have a minimum compressive strength of 1,500 psi and a minimum thickness of 2 inches. The excavated bearing surface should be lowered at least the thickness of the mud mat, and the top of the mud mat should be at or below the design bearing elevation of the foundation. Prior to the placement of the concrete mud mat, the bearing surfaces should be cleaned of loose, soft, wet, frozen, or otherwise disturbed material.

Water should not be allowed to pond on top of the bedrock within footing excavations, or on or around completed footings, in order to mitigate potential softening or swelling of the bearing materials.

We recommend that foundation steps have a maximum height of 2 feet and a corresponding minimum length of 4 feet. Reinforcing steel and concrete should remain continuous through the foundation steps.



We recommend that foundation excavations be reviewed by the Project Geotechnical Engineer or his representative prior to placing concrete in order to confirm that the bearing materials and surfaces are consistent with the design recommendations of this report.

Refer to Section 7.6 for a discussion of lateral earth pressures.

### 7.5.2 Drilled Shafts

Axial load capacity for drilled shafts may be provided by the allowable base resistance values provided in Table 4. We recommend that drilled shafts bear at least 3 times the shaft diameter below the ground surface and grade beams, where applicable. We recommend that drilled shafts be spaced at least 2 times the shaft diameter on-center, unless an accounting is made for group effects. If the drilled shafts need to be designed to resist uplift loads, it is our opinion that some uplift resistance can be provided by the adhesion between the drilled shaft concrete and the soil and bedrock strata that they penetrate. Table 4 also summarizes recommended allowable adhesion values for the overburden and bedrock strata, which may be used in combination with an appropriate safety factor.

**Table 4. Drilled shaft base and adhesion parameters.**

Soil or Bedrock Type	Maximum Net Allowable Base Resistance, $\sigma_{b,all}$ (psf)	Minimum Embedment Depth Below Top of Stratum	Allowable Adhesion (psf) <sup>a</sup>
New Structural Fill	--	--	320
Uncontrolled Fill	--	--	100
Stiff to Very Stiff Native Soils	--	--	400
Highly weathered shale bedrock	6,000	6 inches	750
Weathered shale bedrock	10,000	6 inches	1,200
Unweathered shale bedrock	30,000	6 inches	1,500
Unweathered shale bedrock	80,000	2 feet	1,500

<sup>a</sup> Side resistance should be ignored within 5 feet of the proposed ground surface grades.

Where the drilled shafts will be supporting lateral loads, the drilled shafts should be designed using a p-y approach. Table 5 provides cohesive soil parameters for p-y analyses of laterally loaded deep foundation elements, while Table 6 provides p-y parameters for the shale bedrock.





Lateral resistance for deep foundations should be ignored above the frost line (i.e., above a depth of 30 inches from the ground surface).

Where the spacing of laterally loaded deep foundations will be close enough that their areas of resistance overlap (i.e., less than 5 times their shaft diameter), we recommend that an appropriate p-multiplier be applied in the analyses to account for the overlap and reduction in lateral resistance. We recommend that the p-multiplier be estimated per Section 10.7.2.4-1 from the *AASHTO LRFD Bridge Design Specifications* (AASHTO 2012).

**Table 5. Cohesive soil parameters for p-y analyses of laterally loaded deep foundation elements.**

Soil Description from Boring Log	p-y Curve Model/ Material Type	Unit Weight, $\gamma$ (pcf)	Saturated Unit Weight, $\gamma_{sat}$ (pcf)	Cohesion, $c$ (psf)	Friction Angle, $\phi$ (°)	Strain, $\epsilon_{50}$	Initial Horizontal Subgrade Reaction, $k$ (pci)	
							Static	Cyclic
Uncontrolled Fill Soils	Soft Clay	120	125	750	-	0.01	100	-
Stiff Native Soils or New Compacted Fill	Stiff Clay	125	130	1,500	-	0.007	500	200
Highly Weathered Shale Bedrock	Stiff Clay	140	140	4,500	-	0.002	-	-

<sup>a</sup> Highly weathered shale bedrock should be modeled with a stiff clay model. See Table 6 for p-y parameters for other bedrock types.

**Table 6. Bedrock parameters for p-y analyses of laterally loaded deep foundation elements.**

Bedrock Description from Boring Log	p-y Curve Model/ Material Type	Unit Weight, $\gamma$ (pcf)	Uniaxial Compressive Strength, $q_u$ (psf)	Initial Modulus of Rock Mass, $E_m$ (psi)	Strain, $\epsilon_{50}$ or Strain Factor, $k_{rm}$
Highly Weathered Shale Bedrock	See Table 5.				
Weathered Shale Bedrock	Weak Rock	140	12,000	4,165	0.0005
Unweathered Shale Bedrock	Weak Rock	150	30,000	10,400	0.0005



Drilled shaft excavations should be made straight and plumb with level bottoms, using dry construction methods. Loose, soft, wet, or otherwise disturbed materials should be removed from the bearing surfaces to expose undisturbed bedrock before the reinforcing steel and concrete are placed. Concrete should not be placed through more than 3 inches of water in the bottom of any shaft, and the rate of inflow of groundwater should be less than 12 inches per hour, unless wet construction methods are implemented. We recommend that each drilled shaft excavation be reviewed by the Project Geotechnical Engineer or his representative to confirm that the soil and bedrock conditions encountered within the drilled shaft are consistent with those encountered in the borings and with the design recommendations of this report.

Considering the groundwater conditions encountered in the borings, full-depth temporary casing from the ground surface to the top of bedrock may be needed to control groundwater and/or caving overburden soils. We recommend that the Contract Documents include a bid item for casing shafts as recommended by the Project Geotechnical Engineer or his representative on a cost-per-cased-shaft basis.

Bottoms of grade beams should extend 30 inches below proposed exterior grades. Similar to the shallow foundations on bedrock, grade beams between drilled shafts should be excavated to neat lines and grades so that concrete may be placed directly against the banks of the excavations without forming. If the excavation becomes desiccated prior to placement of concrete, the sides and bottoms of the excavation should be trimmed to expose fresh, moist soils to reduce the potential of the desiccated soils absorbing water and swelling, resulting in uplift pressures on the grade beams.

### **7.5.3 Rammed Aggregate Piers**

The proposed structure can also be supported by spread footings bearing on new and existing fill and native soils reinforced by rammed aggregate pier (RAP) elements. In this case, the piers would be constructed by augering 24- to 36-inch diameter holes to the bedrock surface and then backfilling the holes with thin lifts of compacted aggregate. Compaction is achieved using high-frequency impact hammers that deliver vertical ramming energy that densifies the aggregate and forces it laterally into the sidewalls of the hole. This action increases the lateral stresses in the surrounding soil, further stiffening the stabilized composite soil mass. The result of the RAP installation is to strengthen and stiffen the subsurface soils that then support the footing and floor slab loads.

RAP construction may reduce time and cost for foundation placement as compared to other deep foundation systems because 1) conventional spread and wall foundations are placed directly on the reinforced soil mass, and 2) there is no set up time for the aggregate pier elements.

Typically, a net allowable bearing pressure for shallow spread footings of 4,000 to 6,000 psf is available where RAP elements are used to reinforce the subsurface soil profile.



If a RAP-enhanced foundation system is selected, we recommend that the following issues be considered prior to construction:

- Specifications for rammed aggregate pier foundation systems should be prepared by a design/build RAP contractor.
- At a minimum, the design/build RAP contractor should evaluate the composite soil mass following installation of the RAPs to confirm the allowable shallow foundation bearing capacity and to estimate maximum total and differential settlements. (Typically, settlements of the aggregate-pier supported footings are estimated to be on the order of 1 inch or less.)
- All of the RAP element installations, as well as the post-installation evaluation testing of the composite soil mass, should be reviewed by the Project Geotechnical Engineer or his representative to verify proper installation procedures and to document observed changes in the explored soil conditions.

Exterior shallow foundations bearing on the RAP-reinforced soil should bear at least 30 inches below the lowest adjacent exterior/unheated grade for protection from frost penetration unless moderately to highly plastic clays are encountered at bearing elevations. In this case, the bearing elevation should be lowered to a depth of 42 inches below final exterior grade to further mitigate potential shrinkage or heave of the plastic soils.

After the foundation soils have been reinforced with RAP elements, adequate protection of the reinforced ground is required, including proper drainage to mitigate ponding water and maintenance of minimum excavation distances from the installed piers, as per the design/build RAP contractor's recommendations. Prior to foundation installation, the reinforced ground surface should be cleared and cleaned to the satisfaction of the Project Geotechnical Engineer or his representative.

Lateral loads can be resisted by passive soil pressures in accordance with Table 7. Additionally, a friction coefficient of 0.5 between the concrete footings and underlying aggregate pier-enhanced soil can be used in combination with passive earth pressures to resist lateral loads. The coefficient of friction should be applied to dead normal loads only.

## **7.6 Lateral Loads and Earth Pressures**

Lateral load resistance for drilled shaft foundations using a p-y approach was discussed in Section 7.5.2. Where shallow foundations will be subjected to lateral loads, sliding resistance may be provided by a combination of friction and passive resistance. Frictional resistance can be estimated using an ultimate static friction coefficient between cast-in-place concrete and bedrock or cast-in-place concrete and RAP-enhanced soils of 0.50, in combination with an appropriate safety factor. The ultimate static friction coefficient should be applied to dead normal loads only.



Lateral loads may also be resisted by passive soil pressures acting against the portions of footings and grade beams below the 30-inch frost depth in accordance with Table 7.

**Table 7. Lateral earth pressures for level (horizontal) ground surfaces.**

	<b>Active<sup>a</sup></b>	<b>At-Rest<sup>a</sup></b>	<b>Passive<sup>a,b</sup></b>
<b>Lateral earth pressure coefficient, K</b>	0.39	0.56	2.56
<b>Drained equivalent fluid weight, EFW (pcf)</b>	49	70	320
<b>Undrained equivalent fluid weight, EFW<sub>u</sub> (pcf)<sup>c</sup></b>	87	98	222

<sup>a</sup> Parameters are based on level ground surfaces, a soil unit weight ( $\gamma$ ) of 125 pcf, and a soil internal angle of friction ( $\phi$ ) of 26 degrees.

<sup>b</sup> Passive resistance may be considered where concrete is cast against free-standing vertical faces of soil or bedrock, but should be ignored in the upper 30 inches below proposed grade due to seasonal variations in moisture and frost penetration. If the ground is sloping down and away from the foundation in the area of passive resistance, we should be contacted to provide site-specific recommendations.

<sup>c</sup> Includes hydrostatic pressure of 62.4 pcf.

Where foundation and retaining walls for this project will be subjected to unbalanced lateral earth pressures, we recommend that the lateral earth pressures be computed on the basis of equivalent fluid weights of the backfill, plus surcharges for pavement loads, sloping backfill, etc. Table 7 provides the recommended equivalent fluid weights for soil under drained and undrained conditions, and also the recommended earth pressure coefficients for proposed surcharges. Unless a site-specific analysis is performed, we recommend that surcharges be modeled as a uniform horizontal pressure equal to the vertical intensity of the surcharge multiplied by the recommended lateral earth pressure coefficient.

The values provided in Table 7 assume that the ground surface above the top of the wall is level and not sloping toward the wall. For ground sloping behind the wall on its active or at-rest side, we recommend that it be accounted for as a surcharge on the wall, as discussed above, unless site-specific equivalent fluid weights are computed on the basis of the backfill slope.

The decision to use active or at-rest earth pressures should be based on the ability of the wall to deflect as a result of the lateral earth pressures. In cohesionless granular backfill, active earth pressures are assumed to be applicable if the top of the wall is able to deflect a minimum of 0.002 times the height of the wall. In cohesive clayey backfill, the minimum deflection at the top of the wall for active earth pressures to develop is 0.02 times the height of the wall. If these minimum horizontal deflections at the top of the wall are restrained from occurring or are unacceptable to the structure, at-rest earth pressures are applicable.

Undrained equivalent fluid weights should be used in computing the lateral loads on the wall wherever the backfill is unable to be drained by a drainage system (discussed below). For the drained equivalent fluid weights to be applicable, a drainage system should be incorporated along the backfilled face of the wall (i.e., the high side of the wall) consisting of either a prefabricated



drainage board or an approximately 18-inch width of free-draining gravel with less than 3 percent fines wrapped with a non-woven drainage geotextile. At the base of the drainage board or free-draining gravel should be a minimum 12-inch-thick by 12-inch-wide gravel zone wrapped with a non-woven drainage geotextile. Within the wrapped gravel at its base should be a 4-inch-diameter rigid perforated plastic pipe. The plastic pipe should be connected to a suitable gravity outlet (e.g., the proposed storm sewer system). The granular backfill should be compacted to at least 75 percent relative density per ASTM D4253 and D4254. We recommend that the drainage system extend to subgrade elevation beneath pavements or floor slabs; otherwise the drainage system should extend to within 2 feet of finished grade and be capped with at least 2 feet of compacted clayey soils to reduce the infiltration of surface water behind the wall. Clayey backfill should be compacted per the requirements presented in Table 1. The drainage system should not connect to interior drainage systems below floor slabs. These interior drainage systems should have separate, independent outlets.

In the case of exterior retaining walls that are subject to freezing temperatures, clayey backfill will be subject to freezing that may result in frost heave pressures against the wall. This can be mitigated either by using free-draining granular backfill against the exterior wall in lieu of clayey backfill and a manufactured drainage mat, or by installing a minimum 1.5-inch thickness of rigid, polystyrene foamboard insulation between the backfilled wall face and the manufactured drainage mat.

## **7.7 Utility Construction**

Excavation difficulty in utility trenches will vary with location, depth of utility, and depth of previous cuts made during original bulk grading of the native topography. The combined depths of previous bulk grading cuts and planned utility trenches will likely extend into the weathered and unweathered bedrock in certain areas of the site, based on the borings and on comparison of existing and pre-development topography. Because of the anticipated limestone percentages that will be encountered in the bedrock, there will be excavation difficulties within the utility trenches. The difficulty of making the trench excavations in the highly weathered to weathered bedrock arises because of the need to shear limestone layers from the bottoms and sides of the trenches. The excavation difficulties will substantially increase in the trenches that penetrate into the unweathered bedrock. Excavations in the unweathered bedrock will necessitate the use of large trackhoes with ripping teeth and/or the use of rock saws or hoe rams.

Section 7.3 discussed ongoing floor slab heave issues that have historically affected structures at NKU having floor slabs supported on fresh exposures of gray, unweathered shale as it has absorbed moisture following construction. Backfilling of utility trenches with granular soils or poorly-compacted clayey soils has contributed to these problems as subsurface groundwater seepage has accessed highly plastic overburden soils and/or the unweathered shale exposed in the trench sidewalls. We recommend that utility trenches within and up to 5 feet outside of the new structure limits be backfilled full height with flowable fill having a minimum design strength of 30 psi and a maximum design strength of 100 psi for future excavatability. This recommendation



was implemented successfully in the NKU Student Union structure, which again, to our knowledge, has not experienced floor slab heave issues.

Prior to placing the bedding and/or utilities within the utility trench, soft, saturated, and compressible material should be removed from the bottom of the trench, exposing moist stiff soils or undisturbed bedrock.

We anticipate that select granular backfill will be used as pipe bedding and pipe zone backfill for the utility trenches occurring more than 5 feet outside of the structure limits. We recommend that the granular backfill be limited to the pipe bedding and minimum required pipe/utility cover. The remainder of the utility trenches should be backfilled with flowable fill or compacted clayey soils up to design subgrade elevation to reduce the potential for water collecting in these trenches and being absorbed by the surrounding clays and causing pavement heave.

Granular bedding and backfill that exhibits a well-defined moisture-density relationship should be compacted and moisture-conditioned per the requirements presented in Table 1; otherwise, the granular material should be compacted to at least the minimum relative densities indicated in Table 2. Utility trench backfill should be placed in 6- to 8-inch thick lifts with each lift compacted to at least the specified degree of compaction. Under no circumstances should the backfill be flushed in an attempt to obtain compaction.

## **7.8 Floor Slabs**

We anticipate that the floor slabs for the building will be designed as slab-on-grade concrete. The concrete floor slab thicknesses should be designed based on the native or compacted and tested, stiff soils at this site providing a modulus of subgrade reaction (k) of 75 pounds per cubic inch (pci).

As discussed in Section 6.1 of this report, we encountered CH (highly plastic clay) soils and unweathered bedrock within our borings. Where these materials are encountered at proposed floor slab subgrade elevation, refer to Section 7.3 for additional floor slab recommendations.

We recommend that the floor slab be underlain by a minimum 4-inch-thick granular subbase layer and by a plastic vapor barrier to serve as a capillary break and to reduce the potential for groundwater rising beneath and into the floor slab from the clayey subgrade via capillary action. The use of a plastic vapor barrier is especially important in areas that will have glued floor coverings. We understand that current flooring practice is to use water-based floor tile glues, which in our experience, can unset with time as subsurface vapor penetrates the concrete floor slab and raises its moisture content. The effects of the vapor barrier on curling of the concrete floor slab should be considered in the mix design and placement of the concrete floor slab.

Immediately prior to placement of the granular base, we recommend that the top 8 inches of clayey floor slab subgrade be compacted and moisture-conditioned per the requirements





presented in Table 1. The granular subbase should be compacted per the requirements presented in Table 1 or Table 2, whichever is applicable.

Care should be taken during slab-on-grade construction to not allow the subgrade to become desiccated or saturated. Additionally, consideration should be given to the timing of construction relative to the time of year and weather. If the slab construction is performed during relatively cold and wet weather, the use of lime- or cement-treatment of the subgrade may be beneficial to maintain progress during construction; otherwise, the subgrade is likely to be weakened by softening from saturation of rain weather, leading to delays in reworking the subgrade to prepare it back to its pre-softened condition. A cost-benefit analysis may need to be performed to evaluate the need for lime- or cement-treatment.

We recommend that control joints be provided within the concrete slab-on-grade floors. These joints should be sealed to mitigate surface water infiltration until the building is enclosed. We recommend that the floor slab be structurally separated from walls, columns, footings, and penetrations to allow independent movement of the floor.

## **7.9 Pavement Design and Construction**

Pavements for this project should be designed in accordance with expected axle loads, frequency of loading, and subgrade properties. The subgrade properties should be evaluated by field California Bearing Ratio (CBR) or plate load tests after final grading is completed, or by the correlation of field density tests to laboratory CBR tests.

Proposed pavement subgrades should be proofrolled with a heavily loaded piece of equipment under the review of the Project Geotechnical Engineer, or representative thereof. Soft or yielding soils observed during the proofrolling should be undercut to stiff, non-yielding soils; however, the depth of undercut below final subgrade elevations may be limited to 3 feet in light-duty traffic areas and 4 feet in heavy-duty traffic areas. The undercut should be backfilled with new compacted fill satisfying the material and compaction requirements presented in Section 7.3. We recommend that the Contract Documents include an item for undercutting unsuitable soils and replacing them with new compacted and tested fill on a “per cubic yard of compacted replacement fill” basis.

If soft or yielding soils are encountered at the maximum undercut depths specified above (i.e., 3 feet for light-duty traffic and 4 feet for heavy-duty traffic), the soft or yielding subgrade may be stabilized at those depths using an approved biaxial or triaxial geogrid (e.g., Tensar BX-1200 or TriAx TX160) and an 8-inch lift of compacted crushed stone. The remainder of the undercut should be backfilled with dense-graded aggregate or with clayey soils satisfying the material and compaction requirements presented in Section 7.3. If clayey soils are used, an approved separation geotextile should be provided at the interface between the crushed stone and the clayey soils.



Prior to the placement of pavement or an aggregate base, where provided, we recommend that the top 8 inches of clayey subgrade be scarified and recompacted per the requirements presented in Section 7.3.

If the proposed pavement section includes an aggregate base, we recommend that caution be exercised so that the proposed aggregate base does not become saturated during or after construction. Water trapped in the granular base is capable of freezing, causing it to expand within the voids it occupies. Consequently, ice lenses may form and potentially heave the pavement. Furthermore, the thawing process can soften underlying cohesive subgrades, which reduces the pavement support provided by the subgrade, giving rise to “pumping” of the pavements under loads. Preferably, the aggregate base should be a free-draining material with provisions for draining the base through a system of underdrains.

Surface drainage should be directed away from the edges of proposed or existing pavements so that water does not pond next to pavements or flow onto pavements from unpaved areas. Such ponding or flow can cause deterioration of pavement subgrades and premature failure of pavements. If drainage ditches are used to intercept surface water before it reaches the pavements, the ditches should have an invert at least 6 inches below the pavement subgrade, and have a sufficient longitudinal gradient to rapidly drain the ditches and prevent ponding of water. In those areas where exterior grades do not fully slope away from the edges of the proposed pavement, we recommend that edge drains be installed along the perimeter of the pavement.

If dumpsters are utilized at the project site, we recommend that the dumpster be supported on reinforced concrete slabs and that the slabs be sized to accommodate the loading wheels of the dumpster truck. The access lane to the dumpster should also be designed for the heavier wheel loads associated with dumpster trucks.

## **8.0 RECOMMENDED ADDITIONAL SERVICES**

The conclusions and recommendations given in this report are based on Geotechnology’s understanding of the proposed design and construction, as outlined in this report; site observations; interpretation of the exploration data; and our experience. Since the intent of the design recommendations is best understood by Geotechnology, we recommend that Geotechnology be included in the final design and construction process, and be retained to review the project plans and specifications to confirm that the recommendations given in this report have been correctly implemented. We recommend that Geotechnology be retained to participate in prebid and preconstruction conferences to reduce the risk of misinterpretation of the conclusions and recommendations in this report relative to the proposed construction of the NKU Residence Hall.

Since actual subsurface conditions between boring locations may vary from those encountered in the borings, our design recommendations are subject to adjustment in the field based on the subsurface conditions encountered during construction. Therefore, we recommend that





Geotechnology be retained to provide construction observation services as a continuation of the design process to confirm the recommendations in this report and to revise them accordingly to accommodate differing subsurface conditions. Construction observation is intended to enhance compliance with project plans and specifications. It is not insurance, nor does it constitute a warranty or guarantee of any type. Regardless of construction observation, contractors, suppliers, and others are solely responsible for the quality of their work and for adhering to plans and specifications.

## **9.0 LIMITATIONS**

This report has been prepared on behalf of, and for the exclusive use of, the client for specific application to the named project as described herein. If this report is provided to other parties, it should be provided in its entirety with all supplementary information. In addition, the client should make it clear that the information is provided for factual data only, and not as a warranty of subsurface conditions presented in this report.

Geotechnology has attempted to conduct the services reported herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions. The recommendations and conclusions contained in this report are professional opinions. The report is not a bidding document and should not be used for that purpose.

Our scope for this phase of the project did not include any environmental assessment or investigation for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site. Our scope did not include an assessment of the effects of flooding and erosion of creeks adjacent to or on the project site.

The analyses, conclusions, and recommendations contained in this report are based on the data obtained from the subsurface exploration. The field exploration methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Consequently, subsurface conditions may vary gradually, abruptly, and/or nonlinearly between sample locations and/or intervals.

The conclusions or recommendations presented in this report should not be used without Geotechnology's review and assessment if the nature, design, or location of the facilities is changed, if there is a substantial lapse in time between the submittal of this report and the start of work at the site, or if there is a substantial interruption or delay during work at the site. If changes are contemplated or delays occur, Geotechnology must be allowed to review them to assess their impact on the findings, conclusions, and/or design recommendations given in this report. Geotechnology will not be responsible for any claims, damages, or liability associated with any other party's interpretations of the subsurface data, or with reuse of the subsurface data or engineering analyses in this report.



The recommendations included in this report have been based in part on assumptions about variations in site stratigraphy that may be evaluated further during earthwork and foundation construction. Geotechnology should be retained to perform construction observation and continue its geotechnical engineering service using observational methods. Geotechnology cannot assume liability for the adequacy of its recommendations when they are used in the field without Geotechnology being retained to observe construction.

A copy of "Important Information about This Geotechnical-Engineering Report" that is published by the Geotechnical Business Council (GBC) of the Geoprofessional Business Association (GBA) is included in Appendix A for your review. The publication discusses some other limitations, as well as ways to manage risk associated with subsurface conditions.

***BID/PERMIT 1/30/2020***

Geotechnical Exploration

Northern Kentucky University

New Residence Hall | Highland Heights, Kentucky

August 7, 2019 | Geotechnology Project No. J032441.01

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## **APPENDIX A – IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT**

# Important Information about This Geotechnical-Engineering Report

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

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

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

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

## Read the Full Report

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

## Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

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

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

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

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an

assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

## Subsurface Conditions Can Change

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

## Most Geotechnical Findings Are Professional Opinions

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

## A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

## A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

### Do Not Redraw the Engineer's Logs

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

### Give Constructors a Complete Report and Guidance

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

### Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help

others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

### Environmental Concerns Are Not Covered

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

### Obtain Professional Assistance To Deal with Mold

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

### Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.



8811 Colesville Road/Suite G106, Silver Spring, MD 20910

Telephone: 301/565-2733 Facsimile: 301/589-2017

e-mail: [info@geoprofessional.org](mailto:info@geoprofessional.org) [www.geoprofessional.org](http://www.geoprofessional.org)

***BID/PERMIT 1/30/2020***

Geotechnical Exploration

Northern Kentucky University

New Residence Hall | Highland Heights, Kentucky

August 7, 2019 | Geotechnology Project No. J032441.01

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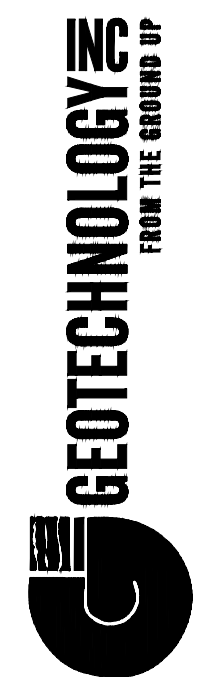
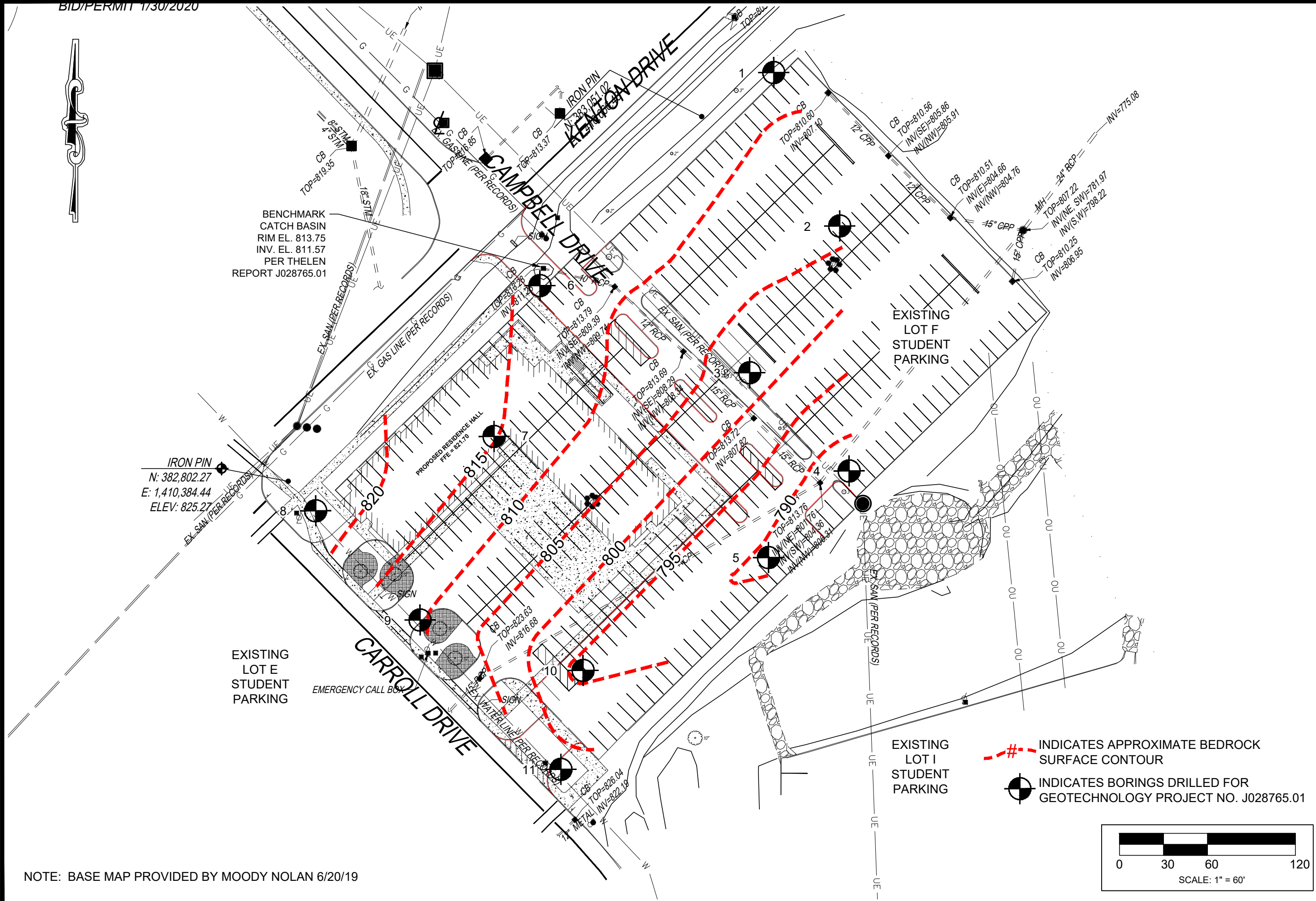
## **APPENDIX B – PLANS**

Boring Plan, Sheet 1

1963 Topography Plan, Sheet 2



BID/PERMIT 1/30/2020

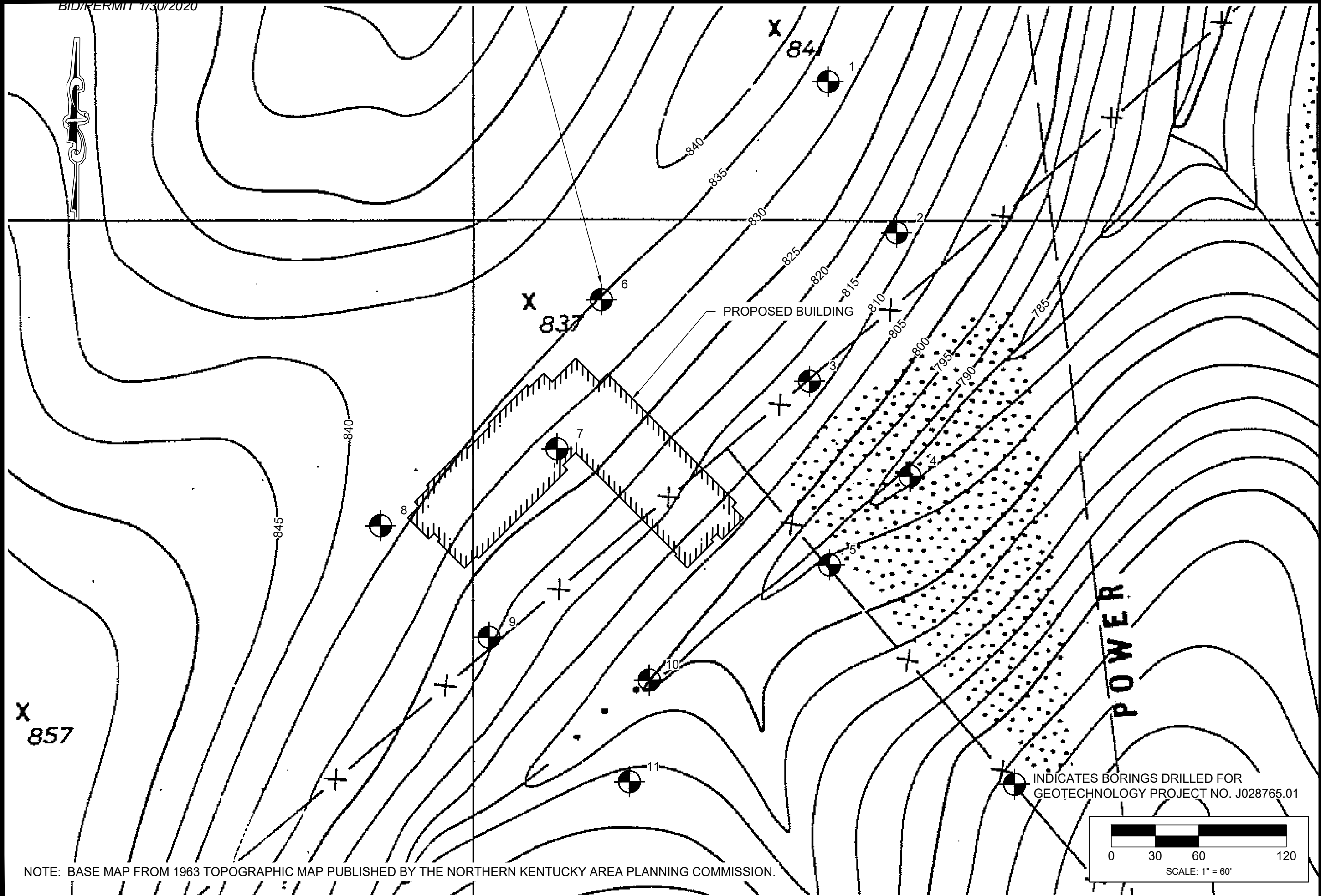


**Project:** NKU - New Residence Hall Building  
**Location:** Highland Heights, Kentucky


**Title:** SITE AND BORING PLAN  
**Client:** Moody Nolan, Inc.

**Date:** 8/7/2019  
**Project No.:** J032441.01  
**Sheet No.:** 1

BID/REMIT 1/30/2020



NOTE: BASE MAP FROM 1963 TOPOGRAPHIC MAP PUBLISHED BY THE NORTHERN KENTUCKY AREA PLANNING COMMISSION.



Project: Geotechnical Exploration  
NKU New Residence Hall Building  
Location: Highland Heights, Kentucky

Title: 1963 TOPOGRAPHY PLAN

Client: Moody Nolan

Date: 8/7/2019  
Project No.: J0320441.01  
Sheet No.: 2





## **APPENDIX C – BORING INFORMATION**

Boring Logs, Geotechnology Project No. J028765.01

Soil Classification Sheet

Rock Classification Sheet



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## LOG OF TEST BORING

CLIENT: American Campus Communities

BORING #: 1

PROJECT: Geotechnical Exploration, NKU Phase 1 Residence Hall

PROJECT #: J028765.01

Highland Heights, Kentucky

PAGE #: 1 of 1

LOCATION OF BORING: As shown on Boring Plan, Drawing 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6"	Recovery	
								Rock Core RQD (%)	(in.) (%)
813.6	Ground Surface	0.0	0						
813.1	Mixed brown moist medium stiff FILL, topsoil and clay.	0.5		I	1A	DS	3-4-5	18	100
811.6	Mixed brown moist stiff FILL, silty clay with roots, some limestone floaters.	2.0			1B				
	Interbedded brown and gray slightly moist extremely weak weathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).			I	2	DS	7-20-24	18	100
809.1		4.5							
808.1	Interbedded gray slightly moist extremely weak unweathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).	5.5	5	I	3	DS	75/3"	2	67
	Bottom of test boring at 5.5 feet.								
			10						
			15						
			20						
			25						
			30						

Datum: NAVD 88 Hammer Weight: 140 lb. Hole Diameter: 8 in. Drill Rig: CME 550 BD-1  
 Surface Elevation: 813.6 ft. Hammer Drop: 30 in. Rock Core Diameter: -- Foreman: L. Wanstrath  
 Date Started: 11/23/2016 Pipe Size: 2 in. O.D. Boring Method: HSA-3.25 Engineer: Mark A. Hushebeck  
 Date Completed: 11/23/2016

<b>BORING METHOD</b>	<b>SAMPLE TYPE</b>	<b>SAMPLE CONDITIONS</b>	<b>GROUNDWATER DEPTH</b>
HSA = Hollow Stem Augers	PC = Pavement Core	D = Disintegrated	First Noted None
CFA = Continuous Flight Augers	CA = Continuous Flight Auger	I = Intact	At Completion Dry
DC = Driving Casing	DS = Driven Split Spoon	U = Undisturbed	After 24 hrs. Dry
MD = Mud Drilling	PT = Pressed Shelby Tube	L = Lost	Backfilled 24 hrs.
	RC = Rock Core		

\* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals



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## LOG OF TEST BORING

CLIENT: American Campus Communities BORING #: 2  
 PROJECT: Geotechnical Exploration, NKU Phase 1 Residence Hall PROJECT #: J028765.01  
 Highland Heights, Kentucky PAGE #: 1 of 1  
 LOCATION OF BORING: As shown on Boring Plan, Drawing 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" Rock Core RQD (%)	Recovery	
812.7	Ground Surface	0.0	0					(in.)	(%)
812.2	ASPHALT (6 inches)	0.5							
810.7	Brown, trace gray moist stiff SILTY CLAY, trace of rock fragments.	2.0		I	1	DS	4-5-20	18	100
808.2	Brown, trace gray moist stiff to very stiff SILTY CLAY, trace bedding planes (residuum).	4.5		I	2	DS	5-6-8	18	100
805.7	Brown, trace gray very moist very stiff CLAY, trace bedding planes (residuum) (CH).	7.0		I	3	DS	3-4-6	18	100
800.7	Interbedded brown moist extremely weak highly weathered SHALE and gray medium strong to very strong LIMESTONE, with clay layers (bedrock).	12.0		I	4	DS	10-15-33	18	100
799.4	Interbedded gray and brown moist extremely weak weathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).	13.3		I	5	DS	50/3"	3	100
	Bottom of test boring at 13.3 feet.			I	6	DS	51-50/3"	6	67

Datum: NAVD 88 Hammer Weight: 140 lb. Hole Diameter: 8 in. Drill Rig: CME 550 BD-1  
 Surface Elevation: 812.7 ft. Hammer Drop: 30 in. Rock Core Diameter: -- Foreman: L. Wanstrath  
 Date Started: 11/23/2016 Pipe Size: 2 in. O.D. Boring Method: HSA-3.25 Engineer: Mark A. Hushebeck  
 Date Completed: 11/23/2016

<b>BORING METHOD</b>	<b>SAMPLE TYPE</b>	<b>SAMPLE CONDITIONS</b>	<b>GROUNDWATER DEPTH</b>
HSA = Hollow Stem Augers	PC = Pavement Core	D = Disintegrated	First Noted None
CFA = Continuous Flight Augers	CA = Continuous Flight Auger	I = Intact	At Completion Dry
DC = Driving Casing	DS = Driven Split Spoon	U = Undisturbed	After 24 hrs. Dry
MD = Mud Drilling	PT = Pressed Shelby Tube	L = Lost	Backfilled 24 hrs.
	RC = Rock Core		

\* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals



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## LOG OF TEST BORING

CLIENT: American Campus Communities BORING #: 3  
 PROJECT: Geotechnical Exploration, NKU Phase 1 Residence Hall PROJECT #: J028765.01  
 Highland Heights, Kentucky PAGE #: 1 of 1  
 LOCATION OF BORING: As shown on Boring Plan, Drawing 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" Rock Core RQD (%)	Recovery	
814.7	Ground Surface	0.0	0					(in.)	(%)
814.3	ASPHALT (5 inches)	0.4							
	Mixed brown, trace of gray moist stiff to very stiff FILL, silty clay and shale and limestone fragments.			I	1	DS	7-6-5	18	100
				I	2	DS	6-7-5	18	100
810.2		4.5	5						
	Mixed brown and gray moist to very moist medium stiff to stiff FILL, silty clay and shale and limestone fragments.			I	3	DS	7-8-20	6	33
807.7		7.0							
	Brown and gray moist very stiff SILTY CLAY, some oxide stains, trace shale fragments (colluvium).			I	4	DS	4-4-4	18	100
			10						
				I	5	DS	6-5-8	18	100
802.7		12.0							
	Interbedded brown to olive brown, trace of gray moist extremely weak weathered SHALE and gray medium strong to very strong LIMESTONE with clay layers (bedrock).			I	6	DS	58-52-50	18	100
800.2		14.5	15						
	Interbedded olive brown moist extremely weak weathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).			I	7	DS	17-26-16	18	100
798.2		16.5							
	Bottom of test boring at 16.5 feet.		20						
			25						
			30						

Datum: NAVD 88 Hammer Weight: 140 lb. Hole Diameter: 8 in. Drill Rig: CME 550 BD-1  
 Surface Elevation: 814.7 ft. Hammer Drop: 30 in. Rock Core Diameter: -- Foreman: L. Wanstrath  
 Date Started: 11/23/2016 Pipe Size: 2 in. O.D. Boring Method: HSA-3.25 Engineer: Mark A. Hushebeck  
 Date Completed: 11/23/2016

<b>BORING METHOD</b>	<b>SAMPLE TYPE</b>	<b>SAMPLE CONDITIONS</b>	<b>GROUNDWATER DEPTH</b>
HSA = Hollow Stem Augers	PC = Pavement Core	D = Disintegrated	First Noted None
CFA = Continuous Flight Augers	CA = Continuous Flight Auger	I = Intact	At Completion Dry
DC = Driving Casing	DS = Driven Split Spoon	U = Undisturbed	After 24 hrs. Dry
MD = Mud Drilling	PT = Pressed Shelby Tube	L = Lost	Backfilled 24 hrs.
	RC = Rock Core		

\* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals



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## LOG OF TEST BORING

CLIENT: American Campus Communities

BORING #: 4

PROJECT: Geotechnical Exploration, NKU Phase 1 Residence Hall

PROJECT #: J028765.01

Highland Heights, Kentucky

PAGE #: 1 of 1

LOCATION OF BORING: As shown on Boring Plan, Drawing 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6"	Recovery	
								Rock Core RQD (%)	
814.3	Ground Surface	0.0	0						
813.8	ASPHALT (6 inches)	0.5							
813.3	GRANULAR BASE (6 inches)	1.0							
				I	1	DS	2-6-7	18	100
	Mixed brown and gray moist stiff to very stiff FILL, silty clay and shale and limestone fragments, some nested zones of fragments.			I	2	DS	9-8-6	12	67
810.3		4.0							
			5	U	3	PT		16	67
808.3	Mixed brown moist stiff to very stiff FILL, silty clay, some shale and limestone fragments.	6.0							
				I	4	DS	5-5-5	18	100
806.8	Mixed brown and gray moist to very moist medium stiff FILL, silty clay, limestone fragments, and shale fragments.	7.5							
				I	5	DS	3-5-4	18	100
	Mixed brown and gray moist to very moist stiff to very stiff FILL, clay, some limestone and shale fragments, some gray shale fragment layers (CH).								
			10						
				I	6	DS	3-6-6	18	100
				I	7	DS	2-3-6	18	100
			15						
				I	8	DS	7-5-4	18	100
794.8		19.5		U	9	PT		21	88
	Mixed brown and gray moist to very moist stiff FILL, silty clay, little shale and limestone fragments.		20	I	10	DS	7-6-8	18	100
790.3		24.0							
	Mixed gray and brown moist stiff to very stiff FILL, silty clay and shale fragments and limestone floaters.		25						
				I	11	DS	9-16-10	18	100
786.3		28.0							
784.0	Interbedded gray slightly moist extremely weak unweathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).	30.3	30						
				I	12	DS	75/3"	3	100
	Bottom of test boring at 30.3 feet.								

Datum: NAVD 88 Hammer Weight: 140 lb. Hole Diameter: 8 in. Drill Rig: CME 550 BD-1  
 Surface Elevation: 814.3 ft. Hammer Drop: 30 in. Rock Core Diameter: -- Foreman: L. Wanstrath  
 Date Started: 11/23/2016 Pipe Size: 2 in. O.D. Boring Method: HSA-3.25 Engineer: Mark A. Hushebeck  
 Date Completed: 11/23/2016

<b>BORING METHOD</b>	<b>SAMPLE TYPE</b>	<b>SAMPLE CONDITIONS</b>	<b>GROUNDWATER DEPTH</b>
HSA = Hollow Stem Augers	PC = Pavement Core	D = Disintegrated	First Noted None
CFA = Continuous Flight Augers	CA = Continuous Flight Auger	I = Intact	At Completion Dry
DC = Driving Casing	DS = Driven Split Spoon	U = Undisturbed	After 24 hrs, Dry Cave @ 24 ft.
MD = Mud Drilling	PT = Pressed Shelby Tube	L = Lost	Backfilled 24 hrs.
	RC = Rock Core		

\* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals



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## LOG OF TEST BORING

CLIENT: American Campus Communities

BORING #: 5

PROJECT: Geotechnical Exploration, NKU Phase 1 Residence Hall

PROJECT #: J028765.01

Highland Heights, Kentucky

PAGE #: 1 of 1

LOCATION OF BORING: As shown on Boring Plan, Drawing 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6"	Recovery	
								Rock Core RQD (%)	
816.7	Ground Surface	0.0	0						
815.9	ASPHALT (9 inches)	0.8							
815.7	GRANULAR BASE (3 inches)	1.0							
	Mixed brown and gray very moist medium stiff to stiff FILL, silty clay with gravel and shale and limestone fragments.			I	1	DS	2-8-12	8	44
				I	2	DS	3-4-5	9	50
			5						
				I	3	DS	3-2-3	8	44
				I	4	DS	2-3-4	18	100
			10						
				I	5	DS	3-4-4	18	100
804.7		12.0							
				I	6	DS	4-6-8	12	67
802.2	Mixed brown, trace gray very moist stiff to very stiff FILL, silty clay and clay, trace of rock fragments and gravel.	14.5							
	Mixed brown and gray very moist stiff FILL, silty clay, trace limestone floaters.		15						
				I	7	DS	5-3-6	18	100
799.7	Mixed dark brown and gray very moist soft to medium stiff FILL, silty clay and topsoil with shale and limestone, some organic matter.	17.0							
				I	8	DS	4-8-25	18	100
797.2	Brown and gray very moist to wet stiff to medium stiff SILTY CLAY, trace shale and limestone fragments (possible colluvium).	19.5							
			20						
				I	9	DS	6-6-7	18	100
	Interbedded gray wet extremely weak unweathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).		25						
				I	10	DS	6-34-12	12	67
788.7		28.0							
786.4		30.3	30	I	11	DS	75/3"	3	100
	Bottom of test boring at 30.3 feet.								

Datum: NAVD 88 Hammer Weight: 140 lb. Hole Diameter: 8 in. Drill Rig: CME 550 BD-1  
 Surface Elevation: 816.7 ft. Hammer Drop: 30 in. Rock Core Diameter: -- Foreman: L. Wanstrath  
 Date Started: 11/23/2016 Pipe Size: 2 in. O.D. Boring Method: HSA-3.25 Engineer: Mark A. Hushebeck  
 Date Completed: 11/23/2016

BORING METHOD	SAMPLE TYPE	SAMPLE CONDITIONS	GROUNDWATER DEPTH
HSA = Hollow Stem Augers	PC = Pavement Core	D = Disintegrated	First Noted 30 ft.
CFA = Continuous Flight Augers	CA = Continuous Flight Auger	I = Intact	At Completion Dry
DC = Driving Casing	DS = Driven Split Spoon	U = Undisturbed	After 24 hrs. 16.0 ft.
MD = Mud Drilling	PT = Pressed Shelby Tube	L = Lost	Backfilled 24 hrs.
	RC = Rock Core		

\* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals



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## LOG OF TEST BORING

CLIENT: American Campus Communities BORING #: 6  
 PROJECT: Geotechnical Exploration, NKU Phase 1 Residence Hall PROJECT #: J028765.01  
 Highland Heights, Kentucky PAGE #: 1 of 1  
 LOCATION OF BORING: As shown on Boring Plan, Drawing 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6"	Recovery	
							Rock Core RQD (%)	(in.)	(%)
815.4	Ground Surface	0.0	0						
815.1	TOPSOIL (4 inches)	0.3		I	1A	DS	4-11-20	12	67
813.4	Mixed brown and olive brown very moist medium stiff FILL, silty clay with shale and limestone fragments.	2.0			1B				
812.6	Interbedded gray slightly moist extremely weak unweathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).	2.8		I	2	DS	100/3"	3	100
	Bottom of test boring at 2.8 feet.								
			5						
			10						
			15						
			20						
			25						
			30						

Datum: NAVD 88 Hammer Weight: 140 lb. Hole Diameter: 8 in. Drill Rig: CME 550 BD-1  
 Surface Elevation: 815.4 ft. Hammer Drop: 30 in. Rock Core Diameter: -- Foreman: L. Wanstrath  
 Date Started: 11/25/2016 Pipe Size: 2 in. O.D. Boring Method: HSA-3.25 Engineer: Mark A. Hushebeck  
 Date Completed: 11/25/2016

BORING METHOD	SAMPLE TYPE	SAMPLE CONDITIONS	GROUNDWATER DEPTH
HSA = Hollow Stem Augers	PC = Pavement Core	D = Disintegrated	First Noted None
CFA = Continuous Flight Augers	CA = Continuous Flight Auger	I = Intact	At Completion Dry
DC = Driving Casing	DS = Driven Split Spoon	U = Undisturbed	After 24 hrs. Dry
MD = Mud Drilling	PT = Pressed Shelby Tube	L = Lost	Backfilled 24 hrs.
	RC = Rock Core		

\* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals



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## LOG OF TEST BORING

CLIENT: American Campus Communities

BORING #: 7

PROJECT: Geotechnical Exploration, NKU Phase 1 Residence Hall

PROJECT #: J028765.01

Highland Heights, Kentucky

PAGE #: 1 of 1

LOCATION OF BORING: As shown on Boring Plan, Drawing 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6"	Recovery	
								Rock Core RQD (%)	(in.) (%)
819.8	Ground Surface	0.0	0						
819.3	ASPHALT (6 inches)	0.5							
817.8	Mixed brown and gray very moist stiff FILL, silty clay and shale and fragments.	2.0		I	1	DS	5-7-7	12	67
815.3	Olive brown moist stiff to very stiff SILTY CLAY, limestone fragments (colluvium).	4.5		I	2	DS	5-11-20	18	100
812.8	Interbedded brown to olive brown moist extremely weak weathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).	7.0		I	3	DS	75/6"	6	100
811.8	Interbedded gray slightly moist extremely weak unweathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).	8.0		I	4	DS	75/6"	6	100
	Bottom of test boring at 8.0 feet.								

Datum: NAVD 88 Hammer Weight: 140 lb. Hole Diameter: 8 in. Drill Rig: CME 550 BD-1  
 Surface Elevation: 819.8 ft. Hammer Drop: 30 in. Rock Core Diameter: -- Foreman: L. Wanstrath  
 Date Started: 11/25/2016 Pipe Size: 2 in. O.D. Boring Method: HSA-3.25 Engineer: Mark A. Hushebeck  
 Date Completed: 11/25/2016

**BORING METHOD**  
 HSA = Hollow Stem Augers  
 CFA = Continuous Flight Augers  
 DC = Driving Casing  
 MD = Mud Drilling

**SAMPLE TYPE**  
 PC = Pavement Core  
 CA = Continuous Flight Auger  
 DS = Driven Split Spoon  
 PT = Pressed Shelby Tube  
 RC = Rock Core

**SAMPLE CONDITIONS**  
 D = Disintegrated  
 I = Intact  
 U = Undisturbed  
 L = Lost

**GROUNDWATER DEPTH**  
 First Noted: None  
 At Completion: Dry  
 After: 24 hrs. Dry  
 Backfilled: 24 hrs.

\* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals





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## LOG OF TEST BORING

CLIENT: American Campus Communities

BORING #: 8

PROJECT: Geotechnical Exploration, NKU Phase 1 Residence Hall

PROJECT #: J028765.01

Highland Heights, Kentucky

PAGE #: 1 of 1

LOCATION OF BORING: As shown on Boring Plan, Drawing 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6"	Recovery	
							Rock Core RQD (%)	(in.)	(%)
825.2	Ground Surface	0.0	0						
824.2	Mixed brown moist very stiff FILL, silty clay, limestone fragments, trace of roots.	1.0		I	1A	DS	6-7-18	18	100
823.2	Mixed brown moist stiff FILL, silty clay with shale and limestone fragments.	2.0			1B				
				I	2	DS	58-50/3"	3	33
820.7	Interbedded brown moist extremely weak highly weathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).	4.5							
819.7	Interbedded gray slightly moist extremely weak unweathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).	5.5	5	I	3	DS	75/3"	3	100
	Bottom of test boring at 5.5 feet.								
			10						
			15						
			20						
			25						
			30						

Datum: NAVD 88 Hammer Weight: 140 lb. Hole Diameter: 8 in. Drill Rig: CME 550 BD-1  
 Surface Elevation: 825.2 ft. Hammer Drop: 30 in. Rock Core Diameter: -- Foreman: L. Wanstrath  
 Date Started: 11/25/2016 Pipe Size: 2 in. O.D. Boring Method: HSA-3.25 Engineer: Mark A. Hushebeck  
 Date Completed: 11/25/2016

BORING METHOD	SAMPLE TYPE	SAMPLE CONDITIONS	GROUNDWATER DEPTH
HSA = Hollow Stem Augers	PC = Pavement Core	D = Disintegrated	First Noted None
CFA = Continuous Flight Augers	CA = Continuous Flight Auger	I = Intact	At Completion Dry
DC = Driving Casing	DS = Driven Split Spoon	U = Undisturbed	After 24 hrs. Dry
MD = Mud Drilling	PT = Pressed Shelby Tube	L = Lost	Backfilled 24 hrs.
	RC = Rock Core		

\* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals



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## LOG OF TEST BORING

CLIENT: American Campus Communities BORING #: 9  
 PROJECT: Geotechnical Exploration, NKU Phase 1 Residence Hall PROJECT #: J028765.01  
 Highland Heights, Kentucky PAGE #: 1 of 1  
 LOCATION OF BORING: As shown on Boring Plan, Drawing 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6"	Recovery	
								Rock Core RQD (%)	(in.) (%)
824.9	Ground Surface	0.0	0						
824.7	TOPSOIL (3 inches)	0.2		I	1A	DS	4-4-2	18	100
	Mixed brown and gray moist stiff FILL, clay, some shale and limestone fragments.				1B				
				I	2	DS	2-3-4	18	100
			5						
				I	3	DS	3-4-4	18	100
817.9		7.0							
	Brown and gray very moist stiff to very stiff SILTY CLAY with shale and limestone fragments (possible colluvium).			I	4	DS	3-4-7	18	100
815.4		9.5							
	Brown and gray moist very stiff SILTY CLAY with shale and limestone, trace bedding planes (residuum).		10		5	DS	5-6-11	18	100
				I	6	DS	16-18-14	18	100
810.4		14.5							
	Interbedded olive brown moist extremely weak weathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).		15		7	DS	24-25-25	12	67
807.9		17.0							
806.9	Interbedded gray slightly moist extremely weak unweathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).	18.0			8	DS	75/6"	6	100
	Bottom of test boring at 18.0 feet.		20						
			25						
			30						

Datum: NAVD 88 Hammer Weight: 140 lb. Hole Diameter: 8 in. Drill Rig: CME 550 BD-1  
 Surface Elevation: 824.9 ft. Hammer Drop: 30 in. Rock Core Diameter: -- Foreman: L. Wanstrath  
 Date Started: 11/25/2016 Pipe Size: 2 in. O.D. Boring Method: HSA-3.25 Engineer: Mark A. Hushebeck  
 Date Completed: 11/25/2016

BORING METHOD	SAMPLE TYPE	SAMPLE CONDITIONS	GROUNDWATER DEPTH
HSA = Hollow Stem Augers	PC = Pavement Core	D = Disintegrated	First Noted None
CFA = Continuous Flight Augers	CA = Continuous Flight Auger	I = Intact	At Completion Dry
DC = Driving Casing	DS = Driven Split Spoon	U = Undisturbed	After 24 hrs, 9.0 ft.
MD = Mud Drilling	PT = Pressed Shelby Tube	L = Lost	Backfilled 24 hrs.
	RC = Rock Core		

\* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals



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## LOG OF TEST BORING

CLIENT: American Campus Communities BORING #: 10  
 PROJECT: Geotechnical Exploration, NKU Phase 1 Residence Hall PROJECT #: J028765.01  
Highland Heights, Kentucky PAGE #: 1 of 1  
 LOCATION OF BORING: As shown on Boring Plan, Drawing 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6"	Recovery	
								Rock Core RQD (%)	
822.4	Ground Surface	0.0	0						
821.9	ASPHALT (6 inches)	0.5							
	Mixed brown, trace gray very moist medium stiff to stiff FILL, silty clay, some shale and limestone fragments, oxide stains (CL).			I	1	DS	2-3-3	18	100
				U	2	PT		18	75
816.4		6.0	5	I	3	DS	6-8-11	12	67
	Mixed brown, trace gray very moist stiff FILL, clay, some shale and limestone fragments.								
812.9		9.5		I	4	DS	3-5-5	18	100
	Mixed brown and gray moist stiff to very stiff FILL, silty clay, some limestone and shale fragments.		10	I	5	DS	4-5-6	18	100
				I	6	DS	5-7-10	18	100
			15	I	7	DS	5-7-7	18	100
805.4		17.0		I	8	DS	5-6-9	18	100
802.4	Mixed gray moist medium stiff to stiff FILL, silty clay and shale fragments, with limestone floaters, some nested zones.	20.0	20	U	9	PT		21	88
800.4	Mixed gray moist soft to medium stiff FILL, silty clay and shale fragments, with limestone floaters, some nested zones.	22.0		I	10	DS	2-2-3	18	100
	Dark gray moist to wet soft SILTY CLAY with silt seams (sediment).		25	I	11	DS	2-2-2	18	100
793.9		28.5							
	Brown and gray moist extremely weak highly weathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).		30	I	12	DS	8-75/3"	7	78
789.4		33.0							
	Auger refusal and bottom of test boring at 33.0 feet.		35						

Datum: NAVD 88 Hammer Weight: 140 lb. Hole Diameter: 8 in. Drill Rig: CME 550 BD-1  
 Surface Elevation: 822.4 ft. Hammer Drop: 30 in. Rock Core Diameter: -- Foreman: L. Wanstrath  
 Date Started: 11/25/2016 Pipe Size: 2 in. O.D. Boring Method: HSA-3.25 Engineer: Mark A. Hushebeck  
 Date Completed: 11/25/2016

<b>BORING METHOD</b>	<b>SAMPLE TYPE</b>	<b>SAMPLE CONDITIONS</b>	<b>GROUNDWATER DEPTH</b>
HSA = Hollow Stem Augers	PC = Pavement Core	D = Disintegrated	First Noted <u>None</u>
CFA = Continuous Flight Augers	CA = Continuous Flight Auger	I = Intact	At Completion <u>Dry</u>
DC = Driving Casing	DS = Driven Split Spoon	U = Undisturbed	After <u>24 hrs. 13.0 ft.</u>
MD = Mud Drilling	PT = Pressed Shelby Tube	L = Lost	Backfilled <u>24 hrs.</u>
	RC = Rock Core		

\* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals



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## LOG OF TEST BORING

CLIENT: American Campus Communities BORING #: 11  
 PROJECT: Geotechnical Exploration, NKU Phase 1 Residence Hall PROJECT #: J028765.01  
 Highland Heights, Kentucky PAGE #: 1 of 1  
 LOCATION OF BORING: As shown on Boring Plan, Drawing 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6"	Recovery	
								Rock Core RQD (%)	
825.7	Ground Surface	0.0	0						
825.5	TOPSOIL (3 inches)	0.2		I	1A	DS	4-4-5	18	100
	Mixed brown moist stiff to very stiff FILL, silty clay, limestone fragments, trace gravel (CL).				1B				
				I	2	DS	3-3-3	18	100
821.2		4.5	5						
	Mixed dark brown wet medium stiff FILL, topsoil and limestone fragments.			I	3	DS	17-4-3	3	17
818.7		7.0							
	Mixed brown and gray moist very stiff FILL, silty clay, trace limestone fragments.			I	4	DS	2-5-5	18	100
816.2		9.5	10						
	Mixed brown and gray very moist soft to medium stiff FILL, silty clay and clay, some shale and limestone fragments.			I	5	DS	4-5-6	18	100
813.7		12.0							
	Mixed brown and gray moist stiff FILL, silty clay and clay, trace shale and limestone fragments, trace gravel.			I	6	DS	6-5-3	18	100
811.2		14.5	15						
	Mixed brown, trace gray moist stiff FILL, silty clay, oxide stains, little shale and limestone fragments.			I	7	DS	6-6-7	18	100
808.7		17.0							
	Mixed brown and gray moist stiff FILL, silty clay with shale and limestone fragments (fill).			I	8	DS	3-4-6	6	33
806.2		19.5	20						
	Brown, trace gray very moist stiff SILTY CLAY, with oxide stains, trace shale fragments (possible colluvium).			I	9	DS	4-5-6	18	100
801.2		24.5	25						
	Interbedded brown very moist extremely weak highly weathered SHALE and gray medium strong to very strong LIMESTONE with clay layers (bedrock).			I	10	DS	12-38-40	18	100
796.2		29.5	30						
795.2	Interbedded gray moist to wet extremely weak unweathered SHALE and gray medium strong to very strong LIMESTONE (bedrock).	30.5		I	11	DS	75/6"	6	100
	Bottom of test boring at 30.5 feet.								

Datum: NAVD 88 Hammer Weight: 140 lb. Hole Diameter: 8 in. Drill Rig: CME 550 BD-1  
 Surface Elevation: 825.7 ft. Hammer Drop: 30 in. Rock Core Diameter: -- Foreman: L. Wanstrath  
 Date Started: 11/25/2016 Pipe Size: 2 in. O.D. Boring Method: HSA-3.25 Engineer: Mark A. Hushebeck  
 Date Completed: 11/25/2016

BORING METHOD	SAMPLE TYPE	SAMPLE CONDITIONS	GROUNDWATER DEPTH
HSA = Hollow Stem Augers	PC = Pavement Core	D = Disintegrated	First Noted 24.5 ft.
CFA = Continuous Flight Augers	CA = Continuous Flight Auger	I = Intact	At Completion 26.0 ft.
DC = Driving Casing	DS = Driven Split Spoon	U = Undisturbed	After 24 hrs, 7.0 ft.
MD = Mud Drilling	PT = Pressed Shelby Tube	L = Lost	Backfilled 24 hrs.
	RC = Rock Core		

\* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals



## SOIL CLASSIFICATION SHEET

### NON COHESIVE SOILS (Silt, Sand, Gravel and Combinations)

#### Density

Very Loose	- 5 blows/ft. or less
Loose	- 6 to 10 blows/ft.
Medium Dense	- 11 to 30 blows/ft.
Dense	- 31 to 50 blows/ft.
Very Dense	- 51 blows/ft. or more

#### Relative Properties

Descriptive Term	Percent
Trace	1 – 10
Little	11 – 20
Some	21 – 35
And	36 – 50

#### Particle Size Identification

Boulders	- 8 inch diameter or more
Cobbles	- 3 to 8 inch diameter
Gravel	- Coarse - 3/4 to 3 inches
	- Fine - 3/16 to 3/4 inches
Sand	- Coarse - 2mm to 5mm (dia. of pencil lead)
	- Medium - 0.45mm to 2mm (dia. of broom straw)
	- Fine - 0.075mm to 0.45mm (dia. of human hair)
Silt	- 0.005mm to 0.075mm (Cannot see particles)

### COHESIVE SOILS (Clay, Silt and Combinations)

#### Consistency

#### Field Identification

Very Soft	Easily penetrated several inches by fist
Soft	Easily penetrated several inches by thumb
Medium Stiff	Can be penetrated several inches by thumb with moderate effort
Stiff	Readily indented by thumb but penetrated only with great effort
Very Stiff	Readily indented by thumbnail
Hard	Indented with difficulty by thumbnail

#### Unconfined Compressive Strength (tons/sq. ft.)

Less than 0.25
0.25 – 0.5
0.5 – 1.0
1.0 – 2.0
2.0 – 4.0
Over 4.0

Classification on logs are made by visual inspection.

Standard Penetration Test – Driving a 2.0" O.D., 1 3/8" I.D., sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6 inches of penetration on the drill log (Example – 6/8/9). The standard penetration test results can be obtained by adding the last two figures (i.e. 8+9=17 blows/ft.). Refusal is defined as greater than 50 blows for 6 inches or less penetration.

Strata Changes – In the column "Soil Descriptions" on the drill log, the horizontal lines represent strata changes. A solid line (————) represents an actually observed change; a dashed line (— — — —) represents an estimated change.

Groundwater observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.



## ROCK CLASSIFICATION SHEET

### ROCK WEATHERING

<u>Descriptions</u>	<u>Field Identification</u>
Unweathered	No visible sign of rock material weathering, perhaps slight discoloration on major discontinuity surfaces.
Weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering and may be somewhat weaker externally than it its fresh condition.
Highly Weathered	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones.
Residual Soil	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact with bedding planes visible, and the soil has not been significantly transported.

### ROCK STRENGTH

<u>Descriptions</u>	<u>Field Identification</u>	<u>Uniaxial Compressive Strength (psi)</u>
Extremely Weak	Indented by thumbnail	40-150
Very Weak	Crumbles under firm blows with point of geological hammer, can be peeled by a pocket knife.	150-700
Weak	Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer.	700-4,000
Medium Strong	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with a single blow of a geological hammer.	4,000-7,000
Strong	Specimen requires more than one blow of a geological hammer to fracture.	7,000-15,000
Very Strong	Specimen requires many blows with a geological hammer to fracture.	15,000-36,000
Extremely Strong	Specimen can only be chipped with geological hammer.	>36,000

### BEDDING

<u>Descriptive Term</u>	<u>Bed Thickness</u>
Massive	> 4 ft.
Thick	2 to 4 ft.
Medium	2 in. to 2 ft.
Thin	< 2 in.



## **APPENDIX D – LABORATORY TEST DATA**

Tabulation of Laboratory Tests, Geotechnology Project No. J028765.01

Unconfined Compressive Strength Test Forms, Geotechnology Project No. J028765.01



GEOTECHNICAL EXPLORATION  
 NKU PHASE I RESIDENCE HALL  
 HIGHLAND HEIGHTS, KENTUCKY  
 J028765.01

**TABULATION OF LABORATORY TESTS**

Boring No.	Sample No.	Depth (ft.)		Moisture Content (%)	Natural Dry Density (pcf)	Atterberg Limits (%)			USCS Classification	Unconfined Compressive Strength (psf)
		From	To			LL	PL	PI		
B-1	1	0.5	2.0	18.5						
B-1	2	2.5	4.0	5.9						
B-1	3	5.0	6.5	5.6						
B-2	2	2.5	4.0	18.0						
B-2	3	5.0	6.5	38.7		73	29	44	CH	
B-3	3	5.0	6.5	17.9						
B-4	2	2.5	4.0	19.9						
B-4	PT-3A	4.5	5.0	27.0	97.9					3,610
B-4	PT-3B	5.0	5.5	22.1	111.8					4,650
B-4	5	7.5	9.0	15.3						
B-4	7	12.5	14.0	23.9						
B-4	PT-9	18.0	18.5	28.3	98.3	61	27	34	CH	3,030
B-4	11	25.0	26.5	17.7						
B-4	12	30.0	31.5	8.8						
B-7	1	0.5	2.0	25.9						
B-7	2	2.5	4.0	14.4						
B-7	3	5.0	6.5	15.1						
B-7	4	7.5	8.0	5.1						
B-8	1	0.0	1.5	13.3						
B-8	2	2.5	4.0	10.5						
B-8	3	5.0	6.5	4.5						
B-10	1	0.5	2.0	29.5						
B-10	2	2.5	4.5	21.5		39	21	18	CL	
B-10	4	7.5	9.0	32.0						
B-10	6	12.5	14.0	21.1						
B-10	8	17.5	19.0	14.3						
B-10	PT-9	21.0	22.0	23.1	98.8					
B-10	10	22.0	23.5	28.6						
B-10	11	25.0	26.5	34.3						
B-10	12	30.0	31.5	18.9						
B-11	2	2.5	4.0	26.1		46	23	23	CL	
B-11	3	5.0	6.5	19.8						
B-11	5	10.0	11.5	24.5						
B-11	7	15.0	16.5	26.6						
B-11	9	20.0	21.5	26.8						
B-11	11	30.0	30.5	13.5						





**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
ASTM D2166**

CLIENT : American Campus Communities  
PROJECT NO.: J028765.01  
PROJECT: NKU Phase 1 Residence Hall  
LOCATION: Highland Heights, KY

DATE: 12/1/2016

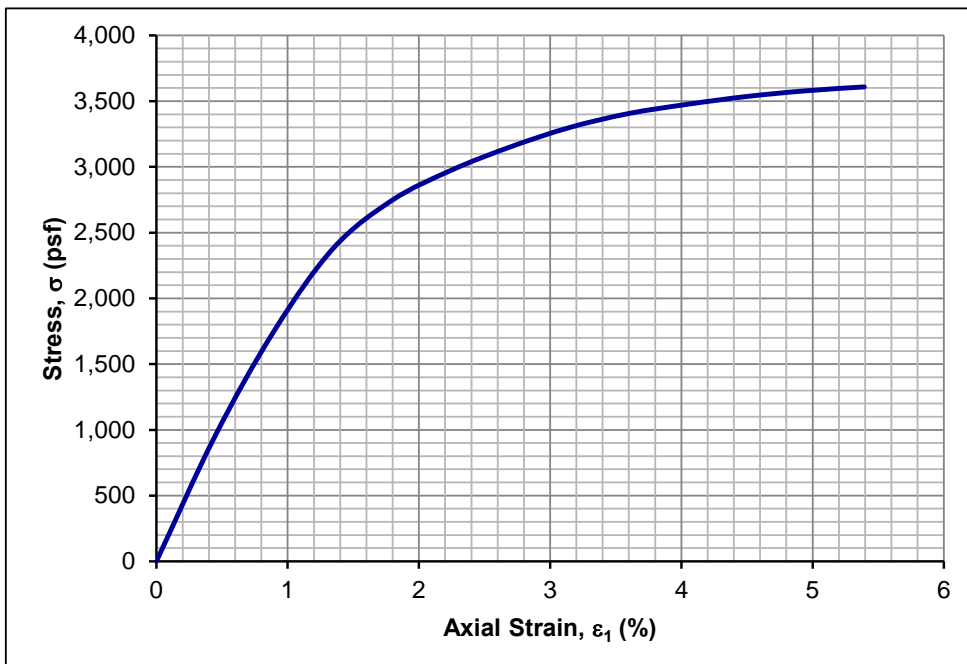
BORING NO.: B-4  
SAMPLE OBTAINED BY: Shelby Tube  
SAMPLE DESCRIPTION: Mixed brown very moist stiff FILL, silty clay, some shale and limestone fragments

SAMPLE NO.: PT-3A  
CONDITION: Undisturbed  
DEPTH (ft.): 4.5-5.0

LIQUID LIMIT (%):  
GRAVEL (%):  
SPECIFIC GRAVITY OF SOLIDS: 2.75 (Assumed)

PLASTIC LIMIT (%):  
SAND (%):  
PLASTICITY INDEX (%):  
SILT (%):  
USCS:  
CLAY (%):  
LOAD CELL NO.: 1059

SAMPLE DATA		FAILURE DATA	
DIAMETER (in.):	2.85	AVERAGE RATE OF AXIAL STRAIN TO FAILURE (%/min.):	<b>1.1</b>
HEIGHT (in.):	5.56	AXIAL STRAIN AT FAILURE (%):	<b>5.4</b>
HEIGHT TO DIAMETER RATIO:	1.95	TIME TO FAILURE (min.):	<b>5.8</b>
WET UNIT WEIGHT (pcf):	124.3	UNCONFINED COMPRESSIVE STRENGTH, $q_u$ (psf):	<b>3,610</b>
DRY UNIT WEIGHT (pcf):	97.9	UNDRAINED SHEAR STRENGTH, $s_u$ (psf):	<b>1,805</b>
VOID RATIO:	0.75	SENSITIVITY, $S_r$ :	-
MOISTURE CONTENT (%)*:	27.0	STRAIN AT 50% OF UCS, $\epsilon_{50}$ (%):	<b>0.93</b>
DEGREE OF SATURATION (%):	99		



**FAILURE SHAPES**



**FRONT VIEW**

**SIDE VIEW**

REMARKS :

\*Moisture content determined after shear from entire sample.



**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
ASTM D2166**

CLIENT : American Campus Communities  
PROJECT NO.: J028765.01  
PROJECT: NKU Phase 1 Residence Hall  
LOCATION: Highland Heights, KY

DATE: 12/1/2016

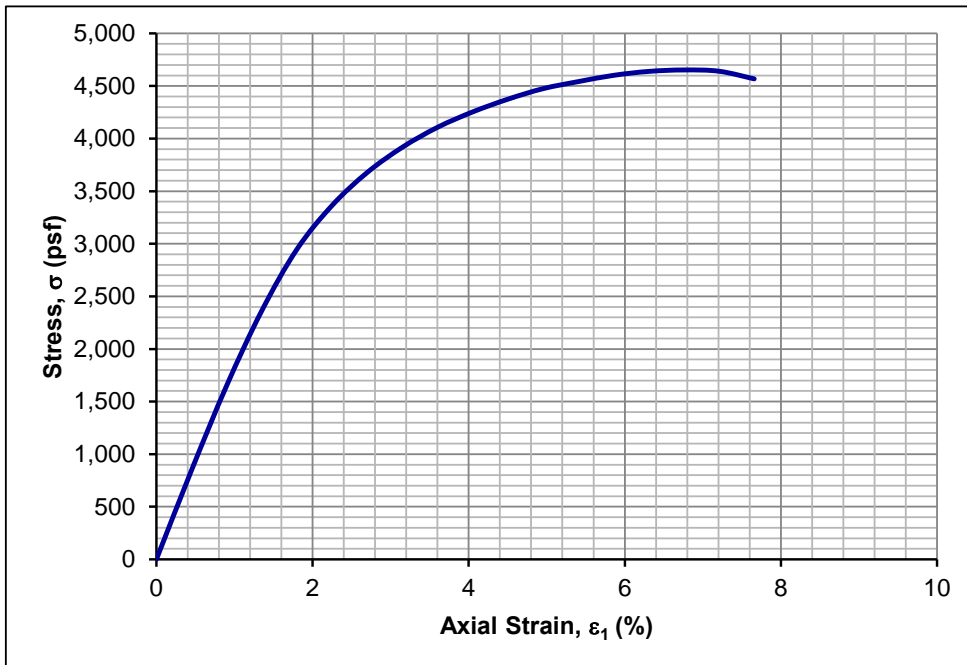
BORING NO.: B-4  
SAMPLE OBTAINED BY: Shelby Tube  
SAMPLE DESCRIPTION: Mixed brown moist very stiff FILL, silty clay, some shale and limestone fragments

SAMPLE NO.: PT-3B  
CONDITION: Undisturbed  
DEPTH (ft.): 5.0-5.5

LIQUID LIMIT (%):  
GRAVEL (%):  
SPECIFIC GRAVITY OF SOLIDS: 2.75 (Assumed)

PLASTIC LIMIT (%):  
SAND (%):  
PLASTICITY INDEX (%):  
SILT (%):  
USCS:  
CLAY (%):  
LOAD CELL NO.: 1059

SAMPLE DATA		FAILURE DATA	
DIAMETER (in.):	2.84	AVERAGE RATE OF AXIAL STRAIN TO FAILURE (%/min.):	1.1
HEIGHT (in.):	5.55	AXIAL STRAIN AT FAILURE (%):	6.8
HEIGHT TO DIAMETER RATIO:	1.95	TIME TO FAILURE (min.):	7.2
WET UNIT WEIGHT (pcf):	136.5	UNCONFINED COMPRESSIVE STRENGTH, $q_u$ (psf):	4,650
DRY UNIT WEIGHT (pcf):	111.8	UNDRAINED SHEAR STRENGTH, $s_u$ (psf):	2,325
VOID RATIO:	0.53	SENSITIVITY, $S_r$ :	-
MOISTURE CONTENT (%)*:	22.1	STRAIN AT 50% OF UCS, $\epsilon_{50}$ (%):	1.33
DEGREE OF SATURATION (%):	100		



FAILURE SHAPES



**FRONT VIEW**

**SIDE VIEW**

REMARKS :

\*Moisture content determined after shear from sample cuttings.



**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
ASTM D2166**

CLIENT : American Campus Communities  
PROJECT NO.: J028765.01  
PROJECT: NKU Phase 1 Residence Hall  
LOCATION: Highland Heights, KY

DATE: 11/30/2016

BORING NO.: B-4  
SAMPLE OBTAINED BY: Shelby Tube  
SAMPLE DESCRIPTION: Mixed brown and gray very moist stiff FILL, clay, trace limestone fragments

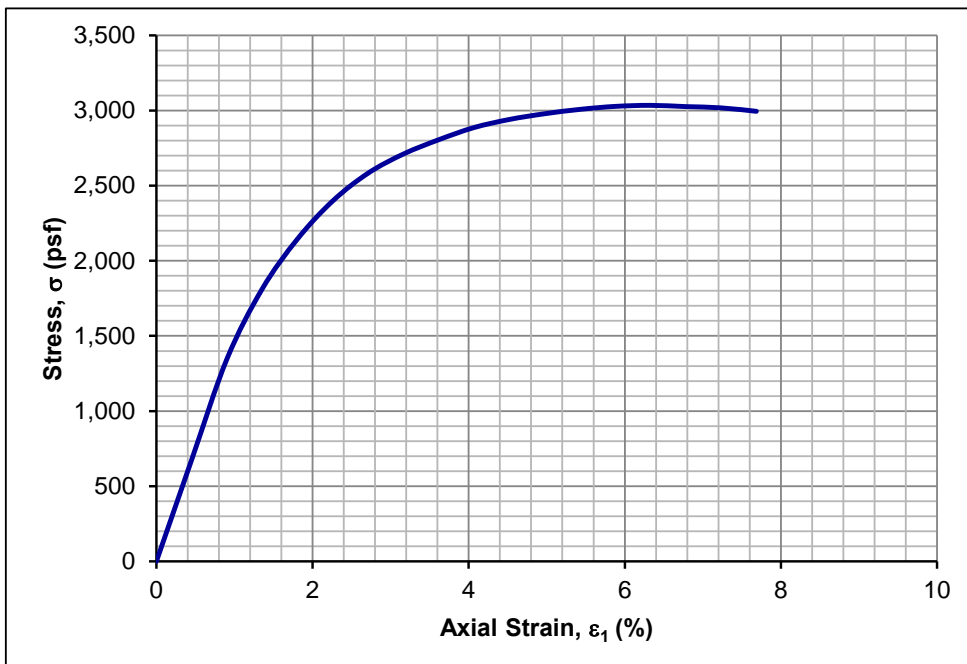
SAMPLE NO.: PT-9  
CONDITION: Undisturbed  
DEPTH (ft.): 18.0-18.5

LIQUID LIMIT (%): 61  
GRAVEL (%):  
SPECIFIC GRAVITY OF SOLIDS: 2.75 (Assumed)

PLASTIC LIMIT (%): 27  
SAND (%):  
PLASTICITY INDEX (%): 34

USCS: CH  
CLAY (%):  
LOAD CELL NO.: 1059

SAMPLE DATA		FAILURE DATA	
DIAMETER (in.):	2.84	AVERAGE RATE OF AXIAL STRAIN TO FAILURE (%/min.):	<b>1.1</b>
HEIGHT (in.):	5.53	AXIAL STRAIN AT FAILURE (%):	<b>6.3</b>
HEIGHT TO DIAMETER RATIO:	1.95	TIME TO FAILURE (min.):	<b>6.8</b>
WET UNIT WEIGHT (pcf):	126.1	UNCONFINED COMPRESSIVE STRENGTH, $q_u$ (psf):	<b>3,030</b>
DRY UNIT WEIGHT (pcf):	98.3	UNDRAINED SHEAR STRENGTH, $s_u$ (psf):	<b>1,515</b>
VOID RATIO:	0.75	SENSITIVITY, $S_r$ :	-
MOISTURE CONTENT (%)*:	28.3	STRAIN AT 50% OF UCS, $\epsilon_{50}$ (%):	<b>1.07</b>
DEGREE OF SATURATION (%):	100		



**FAILURE SHAPES**



**FRONT VIEW**



**SIDE VIEW**

REMARKS :

\*Moisture content determined after shear from entire sample.

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**SECTION 00 41 00 - BID FORMS**

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**All bids must be received at the following date, time and location (emailed or sealed bids accepted):**

Messer Construction Company

Date: **February 26, 2020****2495 Langdon Farm Rd.**Bids Received: **2:00 PM local time****Cincinnati, OH 45237**Fax: **-**Attn: **Brian Groneck**E-mail: **bgroneck@messer.com**

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If bidding multiple Bid Categories; provide separate bid forms for each category in addition to a form for the combined bid of (2) or more bid categories.

**BID****CATEGORY(S):** \_\_\_\_\_

In strict accordance with the Project Manual and the Drawings dated **1/30/2020** and Addenda numbered through \_\_\_\_\_, inclusive. Each Bidder, in submitting this proposal, agrees that the Bid will not be withdrawn for a period of 60 consecutive calendar days following the date of Bid Opening; further, that if a Notice to Proceed or if a prepared Agreement provided by the Contractor is received at the business address identified below, within the above named 60 day period, the undersigned will, within ten days of such receipt, acknowledge acceptance of the contract award and will execute and deliver the Agreement; and will proceed in accordance with requirements of the Contract Documents for this project and have the Project at substantial completion on or before dates described in the Preliminary Schedules, Section 00 31 13.

**NAME OF BIDDER** \_\_\_\_\_

Address \_\_\_\_\_

Telephone (\_\_\_\_) \_\_\_\_\_ Cell (\_\_\_\_) \_\_\_\_\_ E-mail \_\_\_\_\_

By (name) \_\_\_\_\_ Signature \_\_\_\_\_

Title \_\_\_\_\_ Date \_\_\_\_\_

State Whether a ☐ Corporation, ☐ Partnership, ☐ Sole Proprietorship, or ☐ ESOP

Federal ID Number \_\_\_\_\_ EMR \_\_\_\_\_



**BID CATEGORY (S):** \_\_\_\_\_

This bidder agrees to the provisions as set forth in the Bidding Documents, including Division 0 Procurement and Contracting Requirements and Division 1 General Requirements. The successful bidder will be required to enter into an agreement with Messer Construction Co. utilizing the standard Messer Subcontract Agreement without modification.

The bidder agrees to furnish all labor, materials, equipment, and supervision as required for the proper execution of the work as described in the **Bid Category Descriptions Section 00 24 13** for the Lump Sum amount of:

**BASE BID (include allowance):** \_\_\_\_\_ **DOLLARS \$** \_\_\_\_\_

Total for Labor: \_\_\_\_\_ **DOLLARS \$** \_\_\_\_\_

Total for Material: \_\_\_\_\_ **DOLLARS \$** \_\_\_\_\_

Allowance: \_\_\_\_\_ **DOLLARS \$** \_\_\_\_\_

**ALTERNATE 1:** Substitution for a 2-ply modified bitumen roof per Section 01 23 00

Add/Deduct: \_\_\_\_\_ **DOLLARS \$** \_\_\_\_\_

**ALTERNATE 2:** Electrified Hardware Changes per Section 01 23 00

Add/Deduct: \_\_\_\_\_ **DOLLARS \$** \_\_\_\_\_

**ALTERNATE 3:** Substitute hollow core doors for solid core per Section 01 23 00

Add/Deduct: \_\_\_\_\_ **DOLLARS \$** \_\_\_\_\_

**ALTERNATE 4:** Include waterproof membrane under tile floor in ADA unit Level 2-5 per Section 01 23 00

Add/Deduct: \_\_\_\_\_ **DOLLARS \$** \_\_\_\_\_

**ALTERNATE 5:** Provide pricing for waterproof membrane under the drying area and toilet room Level 2-5 per Section 01 23 00

Add/Deduct: \_\_\_\_\_ **DOLLARS \$** \_\_\_\_\_

**LABOR RATES:** Labor rates including burden, overhead, profit and incidental tools (attach as needed)

Add/Deduct: \_\_\_\_\_ **DOLLARS \$** \_\_\_\_\_



Add/Deduct: \_\_\_\_\_ DOLLARS \$ \_\_\_\_\_

Add/Deduct: \_\_\_\_\_ DOLLARS \$ \_\_\_\_\_

Add/Deduct: \_\_\_\_\_ DOLLARS \$ \_\_\_\_\_

Add/Deduct: \_\_\_\_\_ DOLLARS \$ \_\_\_\_\_

**AFFIDAVIT OF BUSINESS DIVERSITY UTILIZATION PLAN FORM (SD-0001)****PROJECT NAME:** NKU New Residence Hall**BID CATEGORY:** \_\_\_\_\_**BIDDER NAME:** \_\_\_\_\_

The Bidder agrees to expend a minimum of \_\_\_\_\_% of their total Subcontract dollar amount with certified Minority - and/or Women - owned Business Enterprises (M/WBEs).

Subcontractor Name Federal ID# Address Telephone	Business Type Certified MBE/WBE (Indicate all that apply)	Description of Work for this Project	Subcontract Amount	Subcontract Percentage
			\$	%
			\$	%
			\$	%
			\$	%
			\$	%
<b>TOTAL MBE:</b>			\$	%
<b>TOTAL WBE:</b>			\$	%

The Bidder agrees to enter into a formal agreement with MBEs and WBEs for work listed in this schedule upon execution of a Subcontract with the Contractor.

**END OF SECTION 00 41 00**



## **SECTION 00 45 13 - BIDDER'S QUALIFICATIONS**

### **PART 1 - GENERAL**

- 1.1 The Bidder shall provide the Contractor with requested financial and prequalification information in accordance with Contractor's prequalification form. Contractor's collection of and review of such prequalification information does not and shall not be interpreted to accept the credit obligations of the Bidder and is solely for the benefit of Contractor's ability to understand the suitability of the Bidder to perform the scope of work as required by the Contract Documents. The contents of Bidder's prequalification form are confidential and will be used solely to determine the Bidder's qualifications. Only Contractor's CFO and designated Risk Management personnel will have access to financial data and financial statements.
- 1.2 Inquiries
  - A. The Contractor shall have the right to make any inquiry deemed necessary to determine the ability of the Bidder to perform the work in a prompt and efficient manner and in accordance with the contract Documents. The failure of a Bidder to promptly supply information in connection with the Contractor's inquiry may be grounds for a determination that such Bidder is nonresponsive.
- 1.3 Rejection
  - A. The right is reserved to reject any Bid where an investigation and evaluation of the Bidder's qualifications would give reasonable doubt that the Bidder could perform and efficiently complete the work in accordance with the requirements of the Contract Documents.

**END OF SECTION 00 45 13**

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**SECTION 00 52 00 - AGREEMENT FORMS**

**PART 1 - PRIME AGREEMENT**

- 1.1 The form of agreement between Contractor and Owner is:
- A. AIA A133
  - B. The terms and conditions of the Prime Agreement shall be incorporated by reference into the subcontractor's scope.
  - C. A copy of the prime contract will be available upon request.

**PART 2 - SUBCONTRACT AGREEMENT**

- 2.1 The form of agreement between Contractor and Subcontractor shall be: AIA A201-2007
- A. Messer Subcontract Agreement.
  - B. A copy of this document is included at the end of this section.
- 2.2 Modifications to the terms of this agreement shall not be considered.

**END OF SECTION 00 52 00**

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BID/PERMIT 1/30/2020

WeAreBuilding.

## SUBCONTRACT AGREEMENT

THIS SUBCONTRACT AGREEMENT (the "Subcontract") is entered into as of \_\_\_\_\_ (the "Effective Date") by and between

CONTRACTOR, with an office located at \_\_\_\_\_ ("Contractor") and \_\_\_\_\_, with an office located at \_\_\_\_\_ ("Subcontractor").

Contractor and Subcontractor agree as follows:

Contractor Project No.: \_\_\_\_\_

Subcontract No.: \_\_\_\_\_

Owner: \_\_\_\_\_

Project Name: \_\_\_\_\_

Project Location: \_\_\_\_\_

Date of Prime Contract: \_\_\_\_\_

Payment and Performance Bonds Required: \_\_\_\_\_ Initial Retainage Percentage (see Section 18(c)): \_\_\_\_\_

### 1. SCOPE OF WORK AND CONTRACT PRICE.

The scope of Work covered by this Subcontract is set forth below (but also includes all labor and materials reasonably inferable therefrom or necessary to produce complete and usable Work, except for any items expressly stated to be outside the scope of this contract):

Complete Spec Section(s): \_\_\_\_\_

Partial Spec Section(s): \_\_\_\_\_

Scope:

The Subcontract Documents include, without limitation, the following Contractor documents (all available from Contractor on request if not attached):

Insurance Addendum

Safety4Site program terms.

CCIP Documents.

Scope Review Meeting Minutes Dated \_\_\_\_\_

MES Contract Documents.

Last Planner scheduling

requirements. Quality Leadership

System requirements.

Other Contractor-standard project management procedures such as those related to cost, coordination, commissioning and payment.

For the proper performance of the above Work, Contractor agrees to pay Subcontractor the sum of \_\_\_\_\_ (\$###,###.##) (the "Contract Price").

### 2. GENERAL SCOPE OF WORK.

2(a) Subcontractor shall furnish all plant, materials and labor and perform all work and services required by the Subcontract Documents, including but not limited to, the specific scope described in Section 1 (the "Work") in accordance with the requirements of this Subcontract and of the Prime Contract, in a manner completely acceptable to Contractor and Owner (including, without limitation, whether or not specified in the Prime Contract, the furnishing at the Construction Site or elsewhere, as required, of all tools, equipment, scaffolding, supplies, molds, patterns, drawings, measurements, and incidental labor, and doing all cutting, blocking, patching and cleaning as needed in order to make Subcontractor's performance complete and acceptable), for the Contract Price stated in Section 1 as it may be adjusted by signed change orders.

2(b) Subcontractor assumes and shall perform all of Contractor's obligations to Owner and others under the Prime Contract relating to the Work to be performed by Subcontractor.

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2(c) If any of the Work under this Subcontract is designated in the Subcontract Documents as being "design-build", "performance specification", or any words of similar import indicating that the Subcontractor is responsible for designing any part of such Work, then with respect to all Work for which Subcontractor has design responsibility ("Design-Build Work"), the following provisions shall apply:

- (i) The design ("Subcontractor Design") of the Design-Build Work shall be performed in a timely manner so as to cause no delay to Contractor, by qualified architects and/or engineers having all applicable licensure and registrations, who shall affix their professional stamps or seals to all resulting drawings and specifications.
- (ii) The Subcontractor Design shall reflect good professional practices and shall comply with all applicable legal requirements and other requirements of the Subcontract Documents. The Subcontractor Design shall include all architectural and/or engineering work specified in the Subcontract Documents or reasonably inferable therefrom in order to produce a complete and usable result. The Subcontractor Design is subject to the approval of contractor and of the project Architect, but such approvals shall not relieve the Subcontractor of sole responsibility for the Subcontractor Design.
- (iii) If so directed by Contractor, the Subcontractor shall coordinate the Subcontractor Design with the project Architect or applicable consultant, with copies of all correspondence to Contractor. Whether or not the Subcontractor is authorized to communicate directly with the project Architect, the Subcontractor shall promptly revise all drawings and specifications to remedy any objections thereto by the project Architect.
- (iv) Unless otherwise specified, the Subcontractor is responsible for obtaining all necessary permits for the Design-Build Work.
- (v) The Subcontractor shall maintain, or cause the design professional(s) performing the Subcontractor Design to maintain, professional liability insurance applicable to the Design-Build Work in accordance with the Insurance Addendum or such greater amounts as may be required elsewhere in the Subcontract Documents.
- (vi) The Subcontractor shall be responsible for any delays or other losses or damages incurred by Contractor due to any errors, omissions or delays in the Subcontractor Design

2(d) The terms "Work", "Subcontractor's Work" or "Work to be performed by Subcontractor" as used in this Subcontract mean all of the foregoing set forth in this Section 2.

### 3. INCORPORATION BY REFERENCE OF PRIME CONTRACT DOCUMENTS.

3(a) The Owner and Contractor have entered into a prime contract dated as set forth above for the performance of the Project (the "Prime Contract"), which is incorporated herein by reference and is available for inspection by Subcontractor (exclusive of the provisions thereof defining Contractor's contract price or other compensation). The Prime Contract includes the agreement between Contractor and the Owner and all other contract documents referenced therein including, to the extent included in the Owner-Contractor contract and without implied limitation, the invitation to bid, pre-contract bulletins, general and special conditions, drawings, plans and specifications and all addenda thereto. If the Owner and the Contractor have not entered into the Prime Contract when this Subcontract is executed, then the term "Prime Contract" shall refer to the then-current proposed version of the Prime Contract as identified by the Contractor which version shall be furnished to the Subcontractor upon request and may be supplemented by change order to reflect the final version (Subcontractor agrees to execute any such change order upon request of Contractor without additional compensation if there is no material adverse change in the obligations flowing down to Subcontractor). This Subcontract and all other documents together with the Prime Contract and all other exhibits and other documents referenced in this Subcontract are referred to as the "Subcontract Documents".

3(b) Subcontractor acknowledges that it has had full opportunity to examine a copy of the Prime Contract (other than provisions relating to the contract price or fee payable to Contractor).

3(c) Subcontractor shall be bound by all interpretations of the Prime Contract by Owner or its representatives furnished to it by Contractor which are binding upon Contractor.

3(d) Subcontractor, prior to beginning work, shall notify Contractor of any claimed deficiencies, discrepancies, ambiguities or errors in the Prime Contract affecting its Work, but shall not deviate from such Prime Contract or substitute materials (including "or equal" materials) without Contractor's prior consent.

3(e) Plan deviations and material substitutions desired by Subcontractor shall be submitted to Contractor for approval by Contractor and Owner in accordance with any procedures set forth in the Prime Contract, and if approved, shall be Subcontractor's sole responsibility. Subcontractor shall be liable for any additional cost to Contractor or others resulting from such deviations or substitutions.

#### 4. INVESTIGATION OF SITE

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Subcontractor warrants that it has made such investigation and inspections as to the nature and location of the Work and the general and local conditions at the Construction Site (including, if relevant, the character of the surface and subsurface conditions, and any other obstacles to be encountered on, under and around the Site) as are necessary to determine the difficulty and cost to Subcontractor of properly performing the Work (including but not limited to any investigation and inspections required by the Subcontract Documents ). Contractor is not responsible for any interpretations or conclusions made by Subcontractor on the basis of information made available to Subcontractor by Contractor.

#### 5. PERMITS, LICENSES AND COMPLIANCE WITH LAW.

5(a) Except for the general building permit and any other permits to be obtained by others under terms of the Subcontract Documents, Subcontractor, at its expense, shall secure and keep in effect and good standing all licenses, permits and inspection certificates pertaining to the Work, and shall pay all installation, connection and use fees applicable to its Work. Subcontractor shall comply and require its sub-subcontractors to comply with all laws, ordinances, rules and regulations of governmental bodies and recommendations of insurance underwriters with respect to the Construction Site and the Work, and Subcontractor shall defend and indemnify Contractor against any loss or claim arising from breach of this covenant.

5(b) Without limiting Subcontractor's other obligations under this Section, Subcontractor shall comply with the Immigration Reform and Control Act of 1986 and regulations thereunder by establishing and diligently implementing, and requiring each of its sub -subcontractors of any tier to establish and diligently implement, a policy of hiring only individuals who are lawfully authorized to work in the United States . Subcontractor shall defend and indemnify Contractor and Owner against any claim or liability arising from the failure of Subcontractor or a sub-subcontractor of any tier to comply with the foregoing requirements.

5(c) If Owner is an agency of the federal government, then Subcontractor agrees to comply with the additional requirements set forth in the attached Federal Subcontract Rider.

5(d) Without limiting Subcontractor's other obligations to comply with applicable laws, Subcontractor acknowledges the domestic steel requirements of Section 153.011, Ohio Revised Code, in connection with certain Ohio construction projects supported by State funds. The following notice is provided in compliance with that statute, and shall apply **only** if this Subcontract relates to a covered project:

**DOMESTIC STEEL USE REQUIREMENTS AS SPECIFIED IN SECTION 153.011 OF THE REVISED CODE APPLY TO THIS PROJECT. COPIES OF SECTION 153.011 OF THE REVISED CODE CAN BE OBTAINED FROM ANY OF THE OFFICES OF THE DEPARTMENT OF ADMINISTRATIVE SERVICES.**

Subcontractor shall defend and indemnify Contractor against any claim or liability, including but not limited to civil penalties under O .R.C Section 153.99(B), related to actual or alleged violation by Subcontractor (or any lower tier under Subcontractor) of Section 153.011.

#### 6. TAXES.

Subcontractor shall timely file all required tax returns with, and pay when due all taxes owing to, each governmental body applicable to the Work hereunder and to the wages of its employees for services in connection herewith (including, without limitation, sales, use, gross receipts, commercial activity, excise, unemployment and FICA taxes), including but not limited to sales or use taxes based on purchases of materials, use of temporary services, or any other taxable purchase of goods or services by Subcontractor or anyone under it. Subcontractor shall not assume that any of its purchases of taxable goods or services are exempt from sales or use taxes unless so directed by Contractor and any required exemption certificate under applicable state law has been received.

#### 7. WORKERS' COMPENSATION.

7(a) Without limiting Section 5 hereof, Subcontractor, at its expense, shall fully comply with the workers' compensation laws of each state in which Work is performed by its employees in connection herewith, and the safety and other regulations of the governmental authorities which administer such laws, and shall deliver to Contractor certificates evidencing such compliance with respect to each such applicable state which issues compliance certificates. No work shall be commenced until Subcontractor is in compliance with such laws and such certificates have been received by Contractor.

7(b) Contractor, without notice to Subcontractor, may pay any workers' compensation premiums or workers' compensation claim charged against Contractor based on Subcontractor's Work and bill such amounts to Subcontractor.

#### 8. INSURANCE

8(a) Subcontractor, at its expense, shall keep in effect (and furnish Contractor certificates that it has in effect) until the final acceptance of its Work, and thereafter as applicable, with insurance carriers acceptable to Contractor, all coverages set forth in the attached Insurance Addendum and shall fully comply with the requirements of all such policies. Contractor makes no representation or warranty to Subcontractor or any third party that the insurance or coverage required is sufficient in kind or quantity to meet any legal requirement or to cover any loss . Subcontractor is not restricted from carrying higher limits or additional coverages beyond those required in the Insurance Addendum.

8(b) Contractor recommends that Subcontractor carry adequate insurance on its equipment, on and off of the Construction Site, even if not required by the Insurance Addendum; Contractor is not liable for any loss or damage to Subcontractor's equipment even if caused by negligence of Contractor or Contractor's other subcontractor and Subcontractor waives all rights of subrogation against Contractor with respect to any property insurance coverage of any kind maintained by Subcontractor.

8(c) When requested in writing, Contractor shall provide the Subcontractor with copies or certificates of the property insurance (builder's risk) policies if any is in effect for the Project. Subcontractor acknowledges that builder's risk coverage, even if written on a so-called "all risk" basis, does not cover all potential causes of loss or damage. The Contractor shall notify the Subcontractor if builder's risk insurance policies are not in effect for the value of the Subcontractor's Work (other than deductibles reflected in the Prime Contract); in that case, the Subcontractor may purchase builder's risk insurance for the value of the Subcontractor's Work, and the Subcontractor shall be reimbursed for the reasonable cost of the insurance by an adjustment in the Subcontract Price. Subcontractor acknowledges that waiver of subrogation in favor of Subcontractor only applies to the extent, if any, that losses or damages are covered by property insurance applicable to the Work and to the extent that interests of Contractor and Subcontractor are covered by such insurance; thus, if Subcontractor causes a loss, Subcontractor will be responsible for any uninsured or underinsured amounts such as the policy deductible, unless otherwise specifically provided in the Subcontract Documents. If the builder's risk policy is provided by Contractor, the following additional terms apply: (i) Subcontractor is hereby designated as an additional named insured under the policy and the policy shall protect Subcontractor's interest in the Work (subject to policy limits, excluded causes of loss, deductibles, and other policy terms); (ii) Contractor, as the first named insured, shall adjust any insured loss and take any other actions under the policy on behalf of itself, Subcontractor and any other affected insureds and its reasonable decisions in doing so shall be final; (iii) policy proceeds are payable only to Contractor and shall be distributed to or expended for the benefit of all affected insureds in such manner as Contractor reasonably determines, which decisions shall be final; and (iv) Contractor waives all claims against Subcontractor to the extent of builder's risk insurance proceeds actually received by Contractor to the maximum degree permitted by such policy and any exceptions allowing the insurer to retain subrogation rights against Subcontractor which, under policy terms, may be waived by Contractor without impairing Contractor's coverage are hereby waived.

#### 9. INDEMNITY.

To the fullest extent permitted by law, Subcontractor shall indemnify Contractor, Owner and any other persons required by the Prime Contract (collectively the "Indemnitees") from any and all (A) losses, costs, expenses, damages and claims (collectively "claims and losses") (including, without limitation, attorneys' fees) arising from or related to injury to or death of, or damage to the property of, any person and (B) contractual obligations, if any, assumed by Contractor in the Prime Contract to defend and indemnify Owner or other persons from liability arising from or related to injury to or death of, or damage to or destruction of the property, of any person, including but not limited to employees of Subcontractor; but in either case, only to the extent caused by the negligent acts or omissions of the Subcontractor, the Subcontractor's Sub-subcontractors, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Subcontractor shall also have an independent obligation to defend the Indemnitees against any claim described in (A) or (B) above which is made by a third party where an allegation of negligence is made against the Subcontractor, Subcontractor's Sub-subcontractors, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of the merits of the claim and regardless of whether negligence of an Indemnitee is also alleged. The foregoing indemnity is not limited by any immunity that would otherwise apply under any workers' compensation law, other employee benefit law, or constitutional provision, and such immunity is waived by Subcontractor but only for purposes of this indemnity and not as between Subcontractor and its employees.

#### 10. ACCIDENT REPORTS.

Subcontractor, by the next working day after the occurrence of each accident related in any way to the Work involving personal injury or death or damage to property, shall deliver to Contractor a report thereof, which may be a copy of any accident report delivered to its insurance carrier.

#### 11. BONDS.

Unless specified as inapplicable above, Subcontractor, at its expense, shall deliver to Contractor and keep in effect until final acceptance of its Work and expiration of all warranties, performance and payment bonds in the principal amount of 100% of the Contract Price (including any increases by change order) or such greater amount as is required by the Prime Contract, which bonds shall be on a form provided by or otherwise acceptable to Contractor. Bonds must have a corporate surety approved by Contractor which is authorized to provide these coverages in the state in which the Work is being performed and which (i) is listed in the current Department of the Treasury's Listing of Approved Sureties (Department Circular 570) with a per-bond limitation not less than the bond amount required hereunder, and (ii) unless otherwise required by law or Prime Contract terms, has an A.M. Best rating of not less than A- VI. Contractor may, in its discretion, approve a lower A.M. Best rating in a particular case upon request by Subcontractor. If Section 1 provides for the cost of bonds to be reimbursed in addition to a stated Contract Price, the amount payable to Subcontractor for the bonds shall be the actual charge to Subcontractor from its bonding company without markup, but not in excess of the bond cost (if any) specified in Subcontractor's bid or proposal (or calculated from the bid or proposal if a formula is specified) and any increased bond costs due to change orders increasing the Contract Sum. Subcontractor shall submit to Contractor a copy of the bond invoice from its bonding company or agent upon request. If at any time during the term of the Subcontract, Subcontractor's surety does not meet the foregoing Treasury Listing or A.M. Best rating requirements, then Subcontractor shall promptly deliver replacement bonds to Contractor meeting those requirements without additional cost to Contractor.

#### 12. ACCEPTANCE OF PRECEDING WORK.

Subcontractor, before beginning work, shall examine the preceding work of others which may affect its Work, and shall notify Contractor in detail of any



claimed defects or deficiencies therein which may affect Subcontractor's Work. If such notice is not given, all such prior work shall be deemed acceptable to Subcontractor. In case of dispute as to whether such other work is defective or deficient, Subcontractor nevertheless shall proceed immediately with its Work if notified by Contractor to proceed.

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### 13. TIME OF PERFORMANCE AND TIME SCHEDULE.

13(a) Time is of the essence of this Subcontract, and Subcontractor shall keep itself informed as to the progress of the work of others and shall be prepared to, and shall commence, its Work promptly upon notice from Contractor, and shall perform its Work thereafter promptly and in such manner as not to delay Contractor, any other prime contractor, or other persons performing work at the Construction Site.

13(b) Subcontractor shall begin and complete the various parts of its Work in accordance with (i) the time schedule (and subsequent modifications thereof) delivered by Contractor to Subcontractor as it may be modified from time to time, or (ii) if none is delivered, the directions from time to time delivered by Contractor to Subcontractor. Any claim that Subcontractor may have based on any change in the Work schedule by Contractor shall be waived unless submitted to Contractor within 10 days after the change is directed and in any event, no such claim shall be valid unless Contractor's schedule change is unreasonable nor for an amount greater than Subcontractor's documented incremental payroll and benefit costs of using overtime as a direct result of the schedule change. If Subcontractor fails to perform any phase of its Work in accordance with such time schedule or directions, upon notice from Contractor, Subcontractor, at its expense shall schedule such overtime work or make such increase in its working forces, or both, as required by Contractor, in order to promptly cure its failure to comply with the time schedule or such directions; or Contractor, at its option and at Subcontractor's expense, may supplement Subcontractor's forces with Contractor personnel or others as determined by Contractor proceeding under Section 26.

13(c) If Contractor directs Subcontractor to schedule overtime work not otherwise required by this Subcontract and not pursuant to Section 13(d), Subcontractor will be given an increase in the Contract Price equal to the premium time portion of wages paid to its employees, plus taxes and benefits payable thereon, but excluding (unless specifically authorized by Contractor) any allowance for overhead and profit, consequential damages or other costs.

13(d) If the Prime Contract provides for liquidated damages for delay, or if Contractor is otherwise liable to Owner for delay damages, Subcontractor is liable to Contractor for any liquidated or other damages which may be assessed by Owner which arise from delay which is the fault of Subcontractor or anyone under it. In case of delay which is only partly the fault of Subcontractor or those for whom Subcontractor is responsible, Contractor shall make a reasonable allocation of liquidated damages or other delay damages among the parties responsible and such allocation shall be final unless Subcontractor demonstrates that there is no reasonable basis for the allocation.

### 14. EXTENSIONS OF TIME.

14(a) If Subcontractor is delayed in the performance of its work by (i) an unreasonable act or omission to act of Contractor or Contractor's other subcontractors ("Contractor delay") or (ii) any other cause beyond Subcontractor's reasonable control which would entitle Contractor, if it were the party delayed, to an extension of time under the Prime Contract (herein referred to as a "delay from other causes"), and if Subcontractor claims an extension of time within two working days after commencement of such delay, Contractor, subject to such approval as may be required from Owner, will grant to Subcontractor an equitable extension of time for the completion of the Work so delayed (which shall be limited to the amount, if any, by which the critical path of the Work is unavoidably impacted by such delay). If such delay is a delay from other causes, Subcontractor, as a condition precedent to being granted an extension of time, shall give such further notices with respect to such delay as are required by the Prime Contract and as may be necessary in order that Contractor shall have reasonable time to comply with the requirements of the Prime Contract with respect thereto.

14(b) Any extension of time granted by Contractor, or the refusal by Contractor to grant an extension of time, shall be final and binding upon Subcontractor unless Subcontractor, within two business days after the date on which Contractor notifies it granting or refusing to grant an extension of time, notifies Contractor that it requires its right to such extension of time to be determined as provided in Section 31, Disputes.

14(c) Subcontractor shall not be entitled to any increase in the Contract Price or damages by reason of any such delay from other causes unless Owner is liable for and pays the same to Contractor. Contractor shall not be obligated to apply to Owner for an increase in the Contract Price or for damages on behalf of Subcontractor unless such application is provided for by the Prime Contract and Subcontractor, at its expense, does all things necessary in order to process such claim. Contractor, upon receipt of any payment by Owner based upon any such claim for Subcontractor, will pay the same to Subcontractor less its expenses. In case of Contractor delay, Contractor's liability shall be limited to the additional out-of-pocket costs incurred by Subcontractor in performing the Work due to such delay, excluding consequential damages.

### 15. WORK CHANGES.

15(a) Within 10 days after written request from Contractor (or within such other time as is specified in such request), Subcontractor shall submit to Contractor its proposal (with computations and supporting data in such detail as Contractor requires) for eliminations of, changes in, or additions to the Work thereby requested, stating:

- (i) a proposed lump sum amount for such Work, which shall be based on a justified estimate of the direct cost of the change plus the applicable markup percentage for overhead and profit specified in the Prime Contract (or if no such percentage is specified, 10% for change Work performed by Subcontractor's own forces and 5% on any such Work performed by a sub-subcontractor;

(ii) unit prices therefor, in addition to any unit prices applicable thereto already specified herein, including estimated quantities and computations, **BID/PERMIT 1/30/2020**

- (iii) Subcontractor's documented estimate of the direct cost of labor and material required to perform the change. If Subcontractor is authorized by Contractor to proceed on this basis, Subcontractor shall be reimbursed for the justified and documented direct cost of labor and materials incurred to perform the change plus the applicable markup percentage for overhead and profit specified in the Prime Contract (or if no such percentage is specified, 10% for change Work performed by Subcontractor's own forces and 5% on any such Work performed by a sub-subcontractor);
- (iv) deductions to be allowed from the Contract Price for Work, if any, eliminated; and
- (v) additional time, if any, requested for the completion of such additional or changed Work.

15(b) On receipt of such proposal, Contractor may issue a change order directing Subcontractor to proceed with the changed work, and either (A) authorizing an adjustment in the Contract Price therefor on anyone of the bases set forth in clauses (i) to (iv), inclusive, of Section 15(a) (or partly on a unit price and partly on a fee basis), or (B) directing that the work be done at Subcontractor's cost of direct labor and of materials plus a total of 10% (unless otherwise stated in Section 1) for overhead and profit. Such change order shall also specify the deductions, if any, from the Contract Price for eliminations and additional time, if any, allowed.

15(c) Subcontractor, within two business days after such change order is issued, by written notice to Contractor, may object to any determinations of price adjustment and additional time which are not in accordance with its proposal (or any revised proposal submitted at Contractor's request), in which event the matter so objected to shall be finally determined under Section 31, Disputes. Otherwise, the change order shall be final and binding on Subcontractor.

15(d) If Subcontractor does not submit the proposal within the time specified in Section 15(a), Contractor may issue such change order, directing the work to be done on the cost plus percentage basis, specified in clause (B) of Section 15(b), and specifying the amount of any deduction from the Contract Price for eliminations and any additional time allowed for such work, and such change order shall be final and binding upon Subcontractor.

15(e) Unless Contractor otherwise directs, Subcontractor shall proceed immediately with the work in accordance with each such change order, regardless of whether it is objecting to the Contract Price adjustments or time allowance, if any, specified therein.

15(f) If the change order requires the work to be done on a cost plus either percentage or fixed fee basis, such cost shall include only the net cost of material and equipment and the net cost of direct labor physically performing the work at the Construction Site at the lowest applicable hourly rate, including taxes and benefit costs, and workers' compensation and liability insurance premiums thereon, and Subcontractor shall deliver daily a statement of such net costs charged to the work, performed during the preceding day, to Contractor's Site-Based Project Leader for his or her approval or correction. Such statement as approved or corrected will be used as the basis for progress payments to Subcontractor for such work. If Subcontractor notifies Contractor within two business days objecting to Contractor's correction thereof and the parties do not agree upon an adjustment within seven days thereafter, Subcontractor may apply to have the matter settled under Section 31, Disputes; otherwise, the Contractor determination shall be final and binding upon Subcontractor.

#### 16. DIRECT BENEFIT WORK.

Any work performed by Subcontractor at the request of and for the direct benefit of Contractor (other than the Work) or work performed by Contractor at the request of and for the direct benefit of Subcontractor shall be performed at the reasonable and customary actual cost of labor and materials (actual cost does not include the cost of a non-working foreman), plus a total of 10% for overhead and profit. If the Prime Contract or the other Subcontract Documents include specified hourly charges for labor, then those rates shall be used instead of actual cost. Charges for direct benefit work shall be submitted by invoice and payment shall be made within thirty days after invoice is received. Without limiting any other right or remedy, Contractor may offset and deduct any such charges against the Contract Price and any amount then or thereafter becoming due to Subcontractor. This Section 16 does not apply to work performed by Contractor without Subcontractor's authorization as a result of Subcontractor's breach of duty.

#### 17. SUBCONTRACTOR'S PAYMENT BREAKDOWN SCHEDULE.

Subcontractor, prior to delivering its first progress payment application, shall deliver to Contractor a payment breakdown schedule (schedule of values), allocating the total Contract Price to the separate phases of its Work in a standard manner acceptable to Contractor, stating separately amounts for labor and materials and prorating overhead and profit among such separate phases, which schedule shall be subject to such adjustments as Contractor or the Owner may require. This schedule of values shall be submitted via appropriate submission method as designated by Contractor for approval. Subcontractor shall deliver to Contractor for similar approval such supplements thereto as Contractor requires in order to reflect approved changes in the Contract Price.

#### 18. PROGRESS PAYMENTS.

18(a) Subcontractor, on or before five days prior to the end of each calendar month, or as scheduled by Contractor shall deliver to Contractor a progress payment application, together with an accurate estimate (based upon approved payment breakdown schedule) of the value of the material furnished and Work properly completed during the calendar month or other applicable period specified therein via such website or other submission method as is designated by Contractor from time to time. Such application shall reflect any bills then due Contractor and include such detailed statements of payments made by Subcontractor as Contractor may require, together with sworn statements of Subcontractor and its sub-subcontractors who have performed any

part of the Work, certificates of material suppliers who have furnished machinery, materials or fuel to the Construction Site, and appropriate mechanics' lien waivers of the Subcontractor and of its sub-subcontractors and suppliers for work and material paid for by Subcontractor. No amount shall be included in such application

- (i) for cost of material delivered to the Construction Site but not incorporated into the Work if the Prime Contract requires incorporation before payment to Contractor; or
- (ii) for additional or changed Work unless authorized by a change order issued by Contractor.

18(b) Contractor will include in its next progress payment application to Owner the amount claimed due by the Subcontractor in its last progress payment application as approved by Contractor, before deduction of any bill owed to Contractor as reflected therein, and on or before 10 days (or such other time as is required by the Prime Contract or by law) after payment by Owner will pay to the Subcontractor the amount owed to Subcontractor, less retained percentage thereof, if any, provided by Section 18(c) or the Prime Contract and less any bills owed to Contractor, except as otherwise provided in Section 18(d). Contractor shall not be obligated to make any payment to Subcontractor in the absence of receipt of the corresponding payment from the Owner; however, if Contractor has not received the corresponding payment from the Owner when payment to the Subcontractor becomes 90 days past due, Contractor agrees to make payment at that time from its own funds unless otherwise stated in Section 1. Contractor may withhold payment if Subcontractor has not submitted certified payroll reports, other reports as required by the Subcontract Documents, or other Contractor Subcontract compliance requirements (current insurance certificate, executed Subcontract, Subcontract bonds if required, etc.).

18(c) The retained percentage to be deducted by Contractor from each progress payment shall be as specified above (but not in excess of any maximum amount permitted by the Prime Contract or by law). If the Prime Contract provides that the percentage retained by Owner shall be reduced or eliminated after Contractor has completed a specified proportion of the work, and if the Prime Contract so requires, Contractor will similarly reduce or eliminate the retained percentage from Subcontractor after Contractor has completed such percentage of its work and Subcontractor has completed a similar percentage of its Work as long as the Work remains timely and otherwise satisfactory to Contractor.

18(d) Contractor may withhold all or any portion of each progress payment to Subcontractor as reasonably necessary to protect Contractor against loss until

- (iii) payment therefor has been received by Contractor from Owner except as otherwise provided in Section 18(b),
- (iv) Subcontractor has corrected any rejected Work,
- (v) all claims by others against Subcontractor, including but not limited to those described in Section 22(b), have been settled;
- (vi) any obligation owed by Subcontractor to Contractor related to this Project or any other project has been settled,
- (vii) any reasonable doubt that the Subcontractor's Work can be completed for the unpaid balance of the Subcontract Price has been resolved,
- (viii) any failure by Subcontractor to maintain progress satisfactory to Contractor in the prosecution of its Work has been resolved, and
- (ix) any other failure to comply with the Subcontract Documents has been corrected. Subcontractor shall deliver to Contractor a receipt on Contractor's standard form acknowledging such payment to be full satisfaction (except for retained percentage, if any) for all amounts owed or claims to be owed as a part of the Subcontract Price and under any change order for labor and material included in such application and Subcontractor's lien waiver with respect thereto.

18(e) Contractor may also deduct from each progress payment any amount, including interest due thereon, then owed by Subcontractor to Contractor and not otherwise set forth as a bill in Subcontractor's progress payment application. Any amount owing at any time from Subcontractor or its sub-subcontractors to Contractor or Owner may be set-off against amounts due and payable by Contractor to Subcontractor. The interest rate shall be eight percent per annum unless otherwise required by law.

18(f) No payment of the Contract Price or any part thereof shall be deemed an acceptance of the Work covered thereby.

## 19. FINAL PAYMENT.

19(a) Subcontractor, promptly upon completion of its Work, shall deliver to Contractor its final payment application, which shall include a schedule of all materials furnished and Work properly completed but not paid for in prior progress payments, and of all amounts owed to Contractor not theretofore paid or deducted from prior progress payments, together with such sworn statements, material supplier's certificates and mechanic's lien waivers as Contractor deems necessary to protect Owner and Contractor against liens filed by Subcontractor's laborers, suppliers and sub-subcontractors in connection with the Work hereunder, and such evidence of payments by Subcontractor as Contractor may require.

19(b) Upon approval of such final application with such corrections therein as Contractor may require in order to reflect settlement of (i) all Subcontractor's claims for additional and changed work and for delays and damages, if any, with respect to which Subcontractor has complied with the requirements hereof, (ii) deductions from the Contract Price for eliminations from this Subcontract, and (iii) deductions or claims against Subcontractor by Contractor, Owner and other subcontractors, Contractor will make application to Owner for payment thereof as a part of the amount then owed to Contractor, and upon acceptance of the work by Owner and payment by Owner to Contractor of the balance so owed to Subcontractor (including any retained percentage theretofore withheld by Owner and paid to Contractor), Contractor will pay to Subcontractor the remaining net balance owed to it

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(including any retained percentage withheld by Contractor from progress payments) against receipt of Subcontractor's acknowledgment that said payment is in full satisfaction of all sums owed to it under this Subcontract, together with mechanic's lien waivers with respect thereto. If Contractor has not received the final payment from the Owner when payment to the Subcontractor becomes 90 days past due, Contractor agrees to make payment at that time from its own funds, unless otherwise stated in Section 1.

19(c) Subcontractor, upon demand, shall pay to Contractor any amount Contractor is required to pay (whether before or after final payment) to settle sums claimed to be owed by Subcontractor in connection with Work performed by it hereunder and to discharge any lien filed in connection therewith.

## 20. PAYMENTS BY SUBCONTRACTOR FOR LABOR AND MATERIAL.

20(a) Subcontractor shall pay promptly when due its labor, material, equipment and transportation costs and its sub -subcontractors. If Subcontractor does not pay the same as hereby required, then Contractor, with or without notice to Subcontractor, at its sole option, may pay the same and bill the cost to Subcontractor including any related costs such as attorneys' fees and an allowance for overhead and profit not to exceed 15% of the amount advanced.

20(b) If any liens are filed against the Construction Site or any amount payable to Contractor by the Owner or a claim is made against any bond posted by Contractor, arising from the Work of Subcontractor, Subcontractor promptly shall cause the same to be removed, and if it does not do so Contractor may take such action and make such payments as it may determine to be necessary or appropriate in order to remove such lien or claim, and bill the cost thereof to Subcontractor including any related costs such as attorneys' fees and an allowance for overhead and profit not to exceed 15% of the amount advanced. The preceding sentence shall be inapplicable to the extent that any lien or other claim results from Contractor's default in its payment obligations to Subcontractor, but Subcontractor must still comply with any restrictions concerning liens contained in the Prime Contract.

20(c) Even in the absence of claims being made against either of them or their bonds or property, if Contractor or Owner becomes involved in any dispute between Subcontractor and its sub-subcontractors or suppliers, including but not limited to being required to provide witnesses or to respond to subpoenas, whether or not Subcontractor is at fault in any such dispute and regardless of any court rules that would allocate costs differently, then Subcontractor shall be responsible for all resulting costs incurred by Contractor or Owner such as time expended by Contractor or Owner personnel (at reasonable billing rates) and all out-of-pocket costs. Subcontractor, upon Contractor's request, shall promptly furnish to Contractor satisfactory evidence as to the status of its accounts, including the names of all its sub -subcontractors and material suppliers, the original amounts of its contracts and the amounts paid and due thereon. Contractor's costs under this Section, including reasonable attorneys' fees and 15% markup for overhead and profit, may be billed to Subcontractor.

20(d) Subcontractor, upon Contractor's request; shall promptly furnish to Contractor satisfactory evidence as to the status of its accounts, including the names of all its sub-subcontractors, the original amounts of its subcontracts and the amounts paid and due thereon. Contractor shall have the right to audit the records and storage areas of Subcontractor and its sub -subcontractors at any time for the purpose of determining compliance with Subcontractor's obligations, such as, but not limited to, the status of work in process and the status of payments to sub-subcontractors and suppliers. Contractor, at its option and without assuming any responsibility to anyone to do so, may issue joint checks payable to Subcontractor and its sub-subcontractors and suppliers for that portion of any payment to Subcontractor which Contractor determines, in good faith, to be due to parties of a lower tier.

## 21. USE OF CONTRACTOR EQUIPMENT AND FACILITIES.

Subcontractor may, with Contractor's consent, use Contractor's equipment, public utility facilities, facilities for employees, and supplies, on an "as is" basis with Subcontractor assuming all risks and costs of such usage. Subcontractor agrees that Contractor may charge for such use in accordance with Section 16. Unless otherwise specifically provided in Section 29 or elsewhere in the Subcontract Documents, Contractor is not required to allow its equipment to be available to Subcontractor for any purpose.

## 22. CLEAN-UP AND PROTECTION OF WORK OF OTHERS.

22(a) Subcontractor shall keep the Construction Site and all streets, roadways and properties free from mud, rubbish, debris and obstructions caused by its operations (including surplus materials, crates and packing, etc. brought to the site by Subcontractor or by others for the benefit of Subcontractor), and shall complete its Work in such manner as to permit the next succeeding work to start without further cleaning.

22(b) Subcontractor shall not damage the work of others by its operations, and shall repair or pay the cost of repairing any such damage done by it or its sub-subcontractors, without waiving any right that Subcontractor may have to collect from any applicable builder's risk insurance. If builder's risk coverage is applicable to any loss caused by Subcontractor, Subcontractor shall remain responsible for the deductible and in case of multiple parties contributing to a loss or uncertain causes, Contractor shall make a reasonable allocation of the deductible among affected parties which shall be final.

22(c) Contractor may perform any such clean-up or repair work which Subcontractor fails to do promptly, and Subcontractor shall pay Contractor's cost thereof including any related costs such as attorneys' fees and an allowance for overhead and profit not to exceed 15% of the amount advanced.

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22(d) On certain projects, Contractor provides dumpsters for use by all subcontractors. In that case, Subcontractor shall, on a daily basis, remove its trash from the construction area, deposit it in the dumpster, and break down all boxes, containers, etc. to maximize the space available in the dumpster. Only ordinary construction debris, excluding any hazardous waste, decommissioned Subcontractor equipment, etc., may be placed in the dumpsters.

## 23. SUBCONTRACTOR'S RESPONSIBILITY FOR ITS WORK AND MATERIALS.

23(a) Subcontractor promptly shall check all materials delivered at the Construction Site for its use, and shall immediately report all damages and shortages to Contractor. Subcontractor shall specifically alert Contractor to any conditions which could result in delays or claims as soon as such conditions are known to Subcontractor.

23(b) Subcontractor shall cover and at all times adequately protect its Work and materials from damage until final acceptance by Owner, and shall properly store and protect materials furnished to it by others.

23(c) Subcontractor shall be responsible for any damage to or destruction of its equipment and materials at the Construction Site and to its Work and materials incorporated in the structure, and at its expense shall replace, repair or restore any thereof which are destroyed or damaged. This provision shall not be deemed to restrict the right of Subcontractor to insurance proceeds payable by reason of any loss or damage insured against or to collect from any third party which is responsible for any such loss or damage, subject to any applicable waiver of claims or waiver of subrogation.

23(d) Unless otherwise provided in the Subcontract Documents, Contractor shall provide reasonable storage areas for Subcontractor on or adjacent to the Project site. If such storage areas are provided, Subcontractor shall relocate its materials and equipment as required by Contractor from time to time. Additional costs to the Subcontractor for relocation shall be reimbursable by Contractor only if Contractor's orders are unreasonable and the Subcontractor gives Contractor written notice of intent to make a claim before beginning any relocation for which the Subcontractor intends to claim compensation.

## 24. REJECTED WORK.

If Owner or Contractor, by notice to Subcontractor, rejects or orders to be removed and replaced any Work performed or materials furnished by Subcontractor which Owner or Contractor determine do not comply with the requirements of the Subcontract Documents, Subcontractor, within no later than the next working day, shall proceed to take down the rejected Work, remove the rejected materials from the Construction Site, repair (or pay the cost of repairing) damage to the work of others caused thereby, and replace the same with Work and materials complying with the Prime Contract. If Subcontractor does not commence such replacement work within the time required or does not diligently complete such removal and replacement, Contractor, by written notice, may take over the completion of such removal and replacement, and in such event, Contractor's costs, including reasonable attorneys' fees and a 15% markup for overhead and profit, shall be billed to Subcontractor.

## 25. SAFETY AND WORKING REGULATIONS.

25(a) Without limiting Section 5 hereof, Subcontractor shall comply with all requirements of the Williams-Steiger Occupational Safety and Health Act of 1970 as amended and shall require its employees to work in harmony with others working at the Construction Site and to comply with all governmental, Owner's and Contractor's regulations covering working conditions, and shall cease to employ at the Construction Site any employee upon notice from Contractor requesting Subcontractor to discontinue the employee's employment at the site.

25(b) Whether or not required by law or by other provisions of the Subcontract Documents, (i) Subcontractor shall require hard hats, safety glasses and shoes and high visibility clothing (unless not permitted by the Owner) to be worn at all times on the Project site by anyone working for or under or visiting Subcontractor, (ii) Subcontractor shall assure that fall protection measures (such as but not limited to personal fall arrest systems, safety net systems or guardrails meeting OSHA requirements) are in use whenever a fall hazard exceeding 6 feet exists for any worker under this Subcontract (including but not limited to workers involved in steel erection and roofing work); (iii) Subcontractor is required to comply with Contractor's Safety, Health and Environmental Requirements for Employees, Contractors, Suppliers (including but not limited to the Contractor Safety 4 Site Program, which forms part of the Subcontract Documents); and (iv) Subcontractor shall take special care to avoid damage to utility lines, whether indicated on the Drawings or not, and shall be responsible for contacting all applicable utility location services. If the Subcontract Documents state that any such safety measures are to be provided by Contractor or others, Subcontractor shall notify Contractor] if such measures are not in place when needed and shall not proceed with affected Work until all required safety measures are in use.

25(c) Any barricade or safety device removed by Subcontractor shall be replaced any time the safety hazard is left unattended by Subcontractor. Without assuming any responsibility to do so, Contractor may, without notice to Subcontractor, correct any safety hazard created or permitted by Subcontractor and bill Subcontractor for the costs of this work including any related costs such as attorneys' fees and an allowance for overhead and profit not to exceed 15% of the amount advanced.

25(d) If, during the progress of the Work, Subcontractor encounters what Subcontractor suspects to be, or should reasonably recognize as, hazardous materials (including, but not limited to, asbestos) at the Construction Site which are not anticipated by the terms of the Subcontract Documents, Subcontractor shall immediately stop Work in the affected area and notify Contractor of the existence and location of such materials.

25(e) Subcontractor shall defend and indemnify Contractor and the Owner against any cost or liability as a result of any failure to comply with this Section.

~~BID/PERMIT 1/30/2020~~**26. LABOR AND MATERIAL SUPPLY.**

Subcontractor, within two working days after written notice from Contractor that it is not

- (i) employing such adequate number of properly skilled workmen and supervisors or
- (ii) using such adequate amount of equipment, or
- (iii) delivering to the Construction Site adequate amount of materials of the required quality as are necessary to enable Subcontractor to meet the time schedule or Contractor's directions,

shall increase its forces and take other effective measures, acceptable to Contractor, to rectify such failures. If Subcontractor does not comply with Contractor's directions in such notice, Contractor may provide such additional workers and supervisors, equipment and materials of the required quality (being Contractor personnel or through a separate provider engaged by Contractor) as it deems necessary for such purpose, and all costs incurred by Contractor for such purpose shall be billed to Subcontractor including any related costs such as attorneys' fees and an allowance for overhead and profit not to exceed 15% of the amount advanced. This Section does not limit Contractor's right to proceed under other provisions of this Subcontract (including Section 32) in any of such events.

**27. LABOR AGREEMENTS.**

27(a) If the Prime Contract includes a prevailing wage payment provision, then Subcontractor shall comply with all such requirements.

27(b) If Subcontractor's workers are involved in a jurisdictional dispute with other crafts, or Subcontractor's workers refuse to work at the Construction Site due to any other type of labor dispute or a picket line for any reason, Subcontractor shall immediately adopt all feasible measures (including but not limited to a separate gate) to avoid delay or disruption in Subcontractor's Work. If, in Contractor's judgment, Subcontractor's Work is adversely affected by such a dispute, Contractor may, if the issue is not resolved within three days after notice, terminate Subcontractor's right to proceed with the Work, in whole or in part, and invoke the provisions of Sections 32(c) and 32(d).

**28. TERMINATION OF SUBCONTRACT OTHER THAN FOR DEFAULT .**

28(a) If Contractor or Owner terminates the contract between them for any cause permitted thereby (except a default by Contractor), Contractor, by notice to Subcontractor, may terminate this Subcontract. Contractor may also terminate this Subcontract for convenience at any time by giving three days notice to Subcontractor. In either of such events, Subcontractor, as directed by Contractor, shall discontinue the Work, remove its equipment, materials and employees from the Construction Site and take such action as may be possible to terminate its agreements with its sub-subcontractors and to minimize its losses resulting from such termination.

28(b) Following termination under Section 28(a), Subcontractor shall promptly deliver to Contractor a statement covering the balance owed under this Subcontract for Work properly completed prior to the termination, unavoidable additional out-of-pocket costs for which it is liable by reason of such termination, and the reasonable profit to which it is entitled for completed Work only (no overhead or profit on unperformed work being payable), and Contractor, subject to its approval thereof, will pay it or, if applicable, include the same in its claim against Owner by reason of such termination. Subcontractor shall be responsible for proving the losses suffered by it and the profits to which it is entitled, and shall be responsible for any costs incurred by Contractor in presenting such claim. Upon settlement with Owner as to the amount to which Subcontractor is entitled by reason of the termination of the contract between Contractor and Owner and payment to Contractor of such amount, Contractor will pay to Subcontractor the balance, if any, to which it is entitled, less any bill or other sums owed by Subcontractor to Contractor, against the delivery by Subcontractor to Contractor of documents required by Section 19 to be filed before final payment, or Subcontractor shall pay to Contractor any net balance owed Contractor.

28(c) Subcontractor shall include a similar right of termination in its agreements with its own sub-subcontractors and require sub-subcontractors and material suppliers of every tier to include similar provisions in their agreements with others.

**29. CORRECTION OF WORK AFTER FINAL PAYMENT.**

Subcontractor shall correct any defects in its Work due to faulty workmanship by it or its sub-subcontractors or faulty materials and pay for all damage to other work resulting therefrom of which it is given notice not later than one year from the date of final payment by Owner or Contractor (or such other period as is required by the Subcontract Documents or by law), or in accordance with the terms of any warranty delivered or agreed to by Subcontractor as required by the Prime Contract. Subcontractor's warranty obligations shall continue after the foregoing correction period for the duration provided by the Prime Contract or by law.

**30. CLAIMS FOR DAMAGES**

30(a) Subcontractor hereby waives and releases Contractor from any claims which it has or claims to have at any time for damages or additional costs claimed to have been caused by an act or omission to act by Contractor unless Subcontractor delivers to Contractor:

- (i) notice with respect thereto not later than five days after the commencement of the alleged cause of such damage or additional costs,

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- (ii) at intervals of not more than 15 days during the continuance of such cause, statements of the amount of such continuing damage or additional costs being suffered, and
- (iii) within five days after the cause thereof shall have ceased, a full accounting of the amount of such damage and additional costs claimed. If such notices are given and the parties do not agree to the amount to which Subcontractor is entitled by reason thereof within the period of 10 days after the making of such full accounting, either party may require that the claim be resolved as provided in Section 31.

30(b) Subcontractor shall file with Contractor similar notices with respect to any claims which it may have for damages or additional costs claimed to have been caused by Contractor's other subcontractors. Contractor shall have the right to require Subcontractor to settle the same directly with party claimed to be liable.

30(c) Subcontractor shall file with Contractor such notices as are required by the Prime Contract with respect to claims for damages and additional costs against Owner, Owner's representatives or Owner's other contractors and their subcontractors, and Contractor, to the extent provided by the Prime Contract, will deliver the same to Owner, but the prosecution of such claims shall be at Subcontractor's sole expense and Contractor shall not have any liability with respect thereto. Contractor, at Subcontractor's request, if permitted by the Prime Contract, will submit any such claim to arbitration.

30(d) Subcontractor waives all claims against Contractor and its personnel for consequential, incidental and other indirect damages arising from or related to the Subcontract or its termination (collectively "Consequential Damages"). If the Owner waives Consequential Damages against Contractor in whole or in part, then Contractor waives Consequential Damages against Subcontractor to the same extent.

### 31. DISPUTES.

31(a) Subcontractor, in connection with any disagreement involving interpretation of the Prime Contract; claimed inaccuracies, deficiencies or errors in the plans and specifications; deductions from and additions to the Contract Price and claims for additional time by reason of change orders or delays caused by others; or for additional costs or damages by reason of any act or omission of Owner or Owner's other contractors (other than Contractor and Contractor's other subcontractors), shall proceed strictly in accordance with any administrative remedies provided with respect thereto in the Prime Contract, and shall be bound by the administrative determinations, arbitration awards or judgments which are binding upon Contractor with respect to any such claims.

31(b) Subcontractor shall give Contractor adequate and timely notification with respect to any action which it desires Contractor to take on its behalf against Owner in connection with any such dispute, including, if provided by the Prime Contract, the submission of the same to arbitration, and shall be responsible for all expenses in connection with the presentation of any such claim. Contractor, at its election, may require Subcontractor to deposit with it a reasonable sum of money to protect it against any such costs. If any matter to be submitted to arbitration does not also involve Contractor, Contractor will designate such arbitrator(s) as Subcontractor requests. If the matter in dispute is required to be submitted to arbitration under the Prime Contract, Subcontractor shall be bound by the decision of the arbitrators as therein provided.

31(c) Any dispute between Subcontractor and Contractor which is not subject to the provisions of Sections 31(a) and 31(b) shall be resolved solely by recourse to the courts, unless the Prime Contract requires otherwise or Contractor determines to require prior mediation or to resolve the dispute by arbitration or both (any such arbitration or mediation shall be under administration of the American Arbitration Association or such other administrator named in the Prime Contract). Venue of any such litigation or arbitration shall be in a judicial district in which the Project is located, except that if any third-party litigation related to the Work is pending in another location, Contractor may require any related claims between Contractor and Subcontractor to be resolved in such other forum, unless otherwise required by law.

31(d) No dispute shall justify any cessation or delay in Subcontractor's Work, which Subcontractor shall continue to pursue diligently and Contractor shall continue to make all undisputed payments when due.

### 32. EFFECT OF DEFAULT BY SUBCONTRACTOR.

32(a) If Subcontractor fails

- (i) to maintain at the Construction Site a sufficient skilled work force, including supervisors, and sufficient equipment in good working order to meet the requirements of the Work, or
- (ii) to cause to be delivered to it at the Construction Site sufficient materials of the required quality to enable it to comply with its time schedule, or
- (iii) to meet the requirements of such time schedule, or
- (iv) to pay when due its laborers and sub-subcontractors, or
- (v) to comply with its obligations under any of its other agreements herein contained,

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for the period of three days after written notice by Contractor specifying the failure complained of, Contractor, at any time while such failure continues, by notice to Subcontractor, or if Contractor elects termination for cause when it is an available remedy under terms of Contractor's Safety 4 Site Program, Contractor may terminate Subcontractor's right to proceed with the Work, in whole or in part. If Contractor gives notice of termination under this Section and it is subsequently determined that sufficient grounds do not exist for termination under this Section, then the termination shall be automatically converted, retroactively, to a termination for convenience, and Subcontractor shall have no claim against Contractor for the unjustified default termination except to recover the amounts, if any, that would have been payable to Subcontractor based on termination for convenience.

32(b) If Subcontractor seeks relief under Federal or state laws for the relief or protection of debtors, including the Federal Bankruptcy Code, or such proceedings are commenced against Subcontractor and not dismissed within thirty (30) days, or if Subcontractor makes an assignment for the benefit of creditors, has any of its property attached or seized under court order, or Contractor otherwise has reasonable grounds to believe that Subcontractor's performance may be substantially impaired, then Contractor, to the extent permitted by law, by notice to Subcontractor, may terminate Subcontractor's right to proceed with the Work, in whole or in part.

32(c) In the event of any such termination, Contractor shall have the right to finish the Work by whatever method it may deem expedient, including, without limitation, the taking over of Subcontractor's outstanding subcontracts and taking possession of and using in completing the Work Subcontractor's tools, equipment, scaffolding, materials and supplies at the Construction Site or in transit to or in connection with the Work.

32(d) In the event of any such termination, Subcontractor shall not be entitled to any further payment until the entire Work shall have been accepted by Owner, at which time Contractor shall pay to Subcontractor the excess, if any, of the balance of the Contract Price as adjusted over Contractor's cost of completion and all damages of Contractor and others resulting from such default, including but is not limited to reasonable attorneys' fees and related expenses incurred by Contractor as a result of Subcontractor's default and 15% markup for overhead and profit on all additional costs incurred by Contractor, against the delivery of release and other documents required hereunder for final payment, or Subcontractor shall pay to Contractor the excess of Contractor's costs of completion and any damages incurred by Contractor and others by reason of Subcontractor's default over the balance otherwise owed on the Contract Price, promptly upon submission of bill for the same.

**33. ASSIGNMENT.**

Subcontractor shall not assign this Subcontract or sublet any part of the Work without prior written consent of Contractor. If Subcontractor does, with approval, assign this Subcontract or sublet any part of the Work, Subcontractor shall require that its assignee or sub-subcontractor be bound to it and to assume toward it all of the applicable obligations and responsibilities that it has assumed toward Contractor.

**34. PATENTS AND ROYALTIES.**

Subcontractor is responsible for all royalties and similar fees applicable to the Work. Subcontractor shall defend and indemnify Contractor and Owner against all claims for infringement of patents and other intellectual rights resulting from the products or methods used in the Work, unless Owner is responsible therefor under the terms of the Prime Contract. If Subcontractor believes that any design, process or product specified would be an infringement of a patent, Subcontractor shall immediately notify Contractor.

**35. SOLE AGREEMENT.**

The Subcontract Documents constitute the entire agreement between Subcontractor and Contractor and any modification thereof must be in writing. No course of dealing or industry practice shall be considered to excuse Subcontractor's performance or entitle Subcontractor to any additional compensation unless set forth in the Subcontract Documents as they may be amended.

**36. EQUAL EMPLOYMENT OPPORTUNITY.**

Without limiting Section 5 hereof, Subcontractor agrees to abide by and comply with all laws, procedures, rules and regulations with regard to non-discrimination issued or to be issued by any lawful authority insofar as they may apply to the Work covered by this Subcontract. This includes but is not limited to any utilization of disadvantaged business entities of any type or DBE -related reporting that may be required by the Prime Contract.

**37. NOTICES.**

Except as otherwise specifically provided, all notices, requests, demands and proposals given hereunder by either party shall be in writing and mailed by first class mail or delivered, if to Contractor, at its general or regional office stated at the beginning hereof, and if to Subcontractor to the address stated at the beginning hereof, or in either case, to such other address as may be furnished for such purposes.

**38. DEFINITIONS.**

Unless the context otherwise clearly requires, the following words and phrases shall have the following meanings: 38(a) "person" means and includes an individual, partnership, limited liability company, corporation or other entity;



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38(b) "Contractor's other subcontractor" means any person who furnishes labor, materials, supplies or equipment for the performance or use in performance of any of the work to be performed by Contractor, pursuant to its contract with Owner, other than the Work to be performed by Subcontractor pursuant to this Subcontract;

38(c) "bills" are invoices, other than invoices for direct benefit work under Section 16, submitted by Contractor to Subcontractor. When used as a verb, "bill" means submit a bill. Bills shall be due and payable to Contractor upon presentation thereof to Subcontractor. Without limiting any other right or remedy, Contractor may offset and deduct any bills from the Contract Price and any amount then or thereafter becoming due to Subcontractor on this or any other project where Subcontractor has contracted with Messer Construction Co. or any of its joint ventures or other affiliated entities.

IN WITNESS WHEREOF, the parties hereto have caused this Subcontract to be executed by their authorized representatives as of the Effective Date.

SUBCONTRACTOR:

By:

Title:

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

CONTRACTOR:

By:

Title:

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## INSURANCE ADDENDUM

This Insurance Addendum (hereinafter, the “Addendum”) is deemed to be, and is hereby made a part of, the Subcontract. To the extent that this Addendum conflicts with the Subcontract, the terms of the Addendum supersede the terms of the Subcontract and the terms of the Addendum control.

### **IMPORTANT NOTICE FOR OCIP AND CCIP PROJECTS:**

If this Project involves an Owner-Controlled Insurance Program (OCIP) or Contractor-Controlled Insurance Program (CCIP) then Subcontractor, if eligible, must enroll, follow the other OCIP or CCIP Manual requirements, exclude from its billings to Contractor the costs of Subcontractor’s usual coverages for Work on the Project site that are supplanted by the OCIP or CCIP, and provide evidence of the amount of such savings to Contractor or its program administrator upon request. In addition, if the OCIP or CCIP covers Sub-subcontractors, Subcontractor must require its eligible lower-tier participants to enroll and to comply with the Manual requirements.

Even if Subcontractor is an enrolled OCIP or CCIP participant, Subcontractor must comply with all of the following terms for any Work performed off of the Project site, and for on-site Work for the types of coverage not provided by the OCIP or CCIP.

- I. INSURANCE COVERAGES.** Prior to the commencement of any of the Work, Subcontractor shall purchase and maintain, and shall ensure all subcontractors of every tier purchase and maintain, insurance of the following types of coverage and limits of liability, to be maintained until completion of the Work or its final acceptance, and for such longer period of time as specified herein.

#### **A. AUTOMOBILE LIABILITY**

1. Subcontractor shall purchase and maintain automobile liability insurance provided on the current ISO form or equivalent with limits of at least \$1,000,000.00.
2. Coverage shall apply on an “any auto” basis (owned, non-owned, leased, hired, and borrowed) and include uninsured and underinsured motorist coverage; loading and unloading; and medical copays.
3. If the Work requires the removal and transportation of hazardous materials from the Project site, coverage must be amended to include pollution liability coverage applicable to bodily injury and property damage arising from all hazardous waste hauling, and include the CA 9948 and MCS90 endorsements.

#### **B. COMMERCIAL GENERAL LIABILITY**

1. Subcontractor shall purchase and maintain commercial general liability insurance provided on the current ISO occurrence form, including coverage for damages because of bodily injury, property damage, personal and advertising injury, and for the products-completed operations hazard, with limits of at least \$1,000,000.00 each occurrence for bodily injury and property damage; \$2,000,000.00 general aggregate on a per project basis, and \$2,000,000.00 products-completed operations aggregate.
2. Without limiting the foregoing, coverage shall: (a) contain no professional liability exclusion broader than ISO form 22 79 07 98 or equivalent; (b) include no narrowing modification to or deletion of the standard definition of “insured contract”; and (c) contain no exclusion applicable to Subcontractor’s scope of Work for the Project.
3. Coverage shall be maintained from commencement of the Work until not less than 10 years after substantial completion and acceptance of the Project, or to the expiration of any applicable Statute of Repose in the jurisdiction where the Project is located, whichever is shorter.

#### **C. UMBRELLA/EXCESS LIABILITY**

1. Subcontractor shall purchase and maintain umbrella/excess insurance in the amount of \$3,000,000-\$3,000,000 providing coverage excess to, and at least as broad as, the Commercial General Liability, Employer’s Liability, and Automobile Liability insurance coverages detailed above, with limits pursuant to the amount above:
2. Coverage shall be maintained from commencement of the Work until not less than 10 years after substantial completion and acceptance of the Project, or to the applicable Statute of Repose in the jurisdiction where the Project is located, whichever is shorter.

#### **D. CONTRACTOR'S TOOLS AND EQUIPMENT**

1. Subcontractor shall purchase and maintain “all risk” property insurance on a replacement cost basis up to the full insurable value of the Equipment against all perils for its tools, personal property, and mobile equipment, scaffolding and forms, whether owned, or rented/leased (from Contractor or otherwise), and whether such property is located at the Project or in transit.

## **II. ADDITIONAL INSURANCE COVERAGES REQUIRED, IF ANY.**

Prior to the commencement of the Work, Subcontractor shall purchase and maintain the insurance below if specified as applicable in the Subcontract, to be maintained until completion of the Work or its final acceptance, and for such longer period of time as specified herein.

### **A. CONTRACTOR'S POLLUTION LIABILITY**

1. The Subcontractor shall provide an occurrence-based Contractor's Pollution Liability insurance with the following limits:
  - \$1,000,000 per occurrence, claim or event, and \$1,000,000 annual aggregate.
  - This insurance shall include, without limitation, coverage for:
    - Liability to third parties for bodily injury, property damage, remediation, and clean-up costs arising from pollution events or conditions on, at, under, or migrating from the Project site and from transportation and disposal of pollutants and/or anything contaminated by pollution.
    - Defense costs arising from third-party claims due to pollution conditions or events;
    - Fines or penalties assessed by a government entity and costs of responding to a government entity investigation.
    - Emergency Costs.
2. This insurance must include coverage for each of the following if excluded from coverage by Subcontractor's Commercial General Liability insurance: mold; silica; asbestos; lead; chromate; sulfates; vapor, smoke, soot, dust, and fumes.
  - This insurance must be maintained for at least 10 years after substantial completion and acceptance of the Project.

### **B. PROFESSIONAL OR DESIGN LIABILITY**

1. The Subcontractor shall provide professional liability insurance coverage with the following limits:
  - \$1,000,000 per claim, and \$1,000,000 annual aggregate. Alternatively, fire protection subcontractors may provide design liability insurance coverage via endorsement to Subcontractor's commercial general liability policy.
  - This insurance shall include a retroactive date prior to the commencement of Work under the Contract.
  - This insurance must be maintained for at least 10 years after substantial completion and acceptance of the Project, or to the expiration of any applicable State of Repose in the jurisdiction where the Project is located, whichever is shorter.

### **C. WATERCRAFT AND AIRCRAFT LIABILITY**

1. The Subcontractor shall provide watercraft and/or aircraft liability insurance, as applicable, providing coverage which includes, but is not limited to, drones and helicopters, with limits of not less than \$1,000,000 per occurrence, including liability for bodily injury and property damage.
2. If watercraft liability insurance is applicable, such policy shall include pollution coverage, including coverage for clean-up costs, third-party property damage, assessment of and damage to natural resources, loss of revenues and profits by third parties, defense, investigation, and civil penalties, criminal fines and defense and interest.

### **D. RAILROAD PROTECTIVE.**

1. The Subcontractor shall provide Railroad Protective Insurance with limits of not less than \$1,000,000 per occurrence and \$1,000,000 annual aggregate.

### **E. MARINE CARGO AND GOODS-IN TRANSIT INSURANCE.**

1. The Subcontractor shall provide Marine Cargo and Goods-in-Transit insurance, providing coverage for property being shipped from a foreign point-of-origin overseas to the Project, with limits sufficient to cover the full replacement value of any delivery lost or damaged plus the shipping, and other transit and insurance costs of re-shipping or re-transporting the delivery to the extent that the Subcontractor is responsible for the transit of the same.

### **F. STORED PROPERTY AND DOMESTIC TRANSPORTATION INSURANCE**

1. The Subcontractor shall provide Stored Property and Domestic Transportation insurance, providing coverage for property in transit (domestically) to the Project, with limits sufficient to cover the full replacement value of any delivery lost or damaged plus the shipping and other transit and insurance costs of re-shipping or re-transporting the delivery to the extent that the Subcontractor is responsible for the transit of the same. In addition, if Subcontractor is storing

property off of the Project site before delivery to the Project, Subcontractor must provide "all risk" replacement cost coverage for that property while in storage.

**G. CRANE LIABILITY AND RIGGERS LEGAL LIABILITY INSURANCE**

1. The Subcontractor shall provide Crane Liability and Riggers Legal Liability insurance, insuring against physical loss or damage to the property and/or equipment in the care, custody, or control of the rigger, with limits sufficient for replacements of such property and/or equipment.

**III. GENERAL INSURANCE REQUIREMENTS.** The following requirements are applicable to all of the insurance coverages required under this Addendum, except to the extent otherwise indicated.

- A. INSURER REQUIREMENTS.** Except for any state workers' compensation funds, each insurer providing insurance coverage as required in this Addendum shall be licensed, admitted insurer authorized to issue such coverage in the state in which the Project is located, and shall an A.M. Best rating of "A- X" or better. Contractor shall have the right to reject any insurance company selected by Subcontractor for reasonable cause.
- B. ADDITIONAL INSURED.** All insurance required by this Addendum (excluding workers' Compensation and Professional Liability insurance, where required) shall name the following parties as additional insureds: Owner, Contractor, Messer Construction Co. (if it is not the prime contractor), Related Entities, and each of their respective parents, members, affiliates, lenders, directors, officers, representatives, agents, and employees, all parties required to be indemnified by the Subcontract or Prime Contract, and all other parties reasonably requested by Contractor (hereinafter, collectively the "Additional Insureds"). All policies (including primary, excess, and/or umbrella) shall state that the insurance provided to the additional insureds. With respect to the Commercial General Liability policy required under this Addendum, additional insured status must be provided on ISO forms CG 20 10 11 85, or CG 20 10 04 13 and CG 20 37 04 13, or their equivalent.
- C. SCOPE OF COVERAGES AND LIMITS OF INSURANCE.** The coverage provided to the Additional Insureds must be at least as broad as that provided to the first named insured on each policy. In the event that any policy provided in compliance with this Addendum states that the coverage provided to an additional insured shall be no broader than that required by contract, or words of similar meaning, the parties agree that nothing in this Addendum is intended to restrict or limit the breadth of such coverage. The limits of insurance stated above for each type of insurance are minimum limits only. If Subcontractor 's policy provides greater limits, then the Additional Insureds shall be entitled to, or to share in, the full limits of such policy, and this Addendum shall be deemed to require such full limits.
- D. SEVERABILITY OF INTERESTS (CROSS LIABILITY)** No cross liability exclusions are permitted that apply to the Additional Insureds, and there may not be any restrictions in any policy that limits coverage for a claim brought by an additional insured against another named insured.
- E. WAIVER OF SUBROGATION.** To the fullest extent permitted by law, all insurance Subcontractor furnishes in compliance with this Addendum shall include a waiver of subrogation in favor of the Additional Insureds.
- F. NOTICE OF CANCELLATION.** All policies required under this Addendum shall contain endorsements that confirm that said insurance policies shall not be cancelled, not renewed, or materially changed except upon thirty (30) days prior written notice to Contractor. If information concerning cancellation, non-renewal, or material change is not furnished by the insurer, Subcontractor shall, with reasonable promptness, provide Contractor with such information.
- G. DEDUCTIBLES & SELF-INSURED RETENTIONS.** Subcontractor shall be responsible for any deductible under any insurance it provides, and the coverage afforded to the Additional Insureds shall not be conditioned on the payment of any deductible.
- H. CONTRACTOR'S RIGHT TO PROCURE INSURANCE.** In the event of a failure of Subcontractor to furnish and maintain any of the insurance required under this Addendum or to furnish satisfactory evidence thereof, Contractor shall have the right, but not the obligation, to procure such insurance on the Subcontractor 's behalf, and Subcontractor shall furnish all necessary information in connection with Contractor's procurement and either pay the costs thereof to Contractor immediately upon presentation of a bill, therefore, or have the cost thereof deducted from any payment otherwise due to Subcontractor under the Subcontract at Contractor's option.
- I. NO LIMITATION.** The insurance coverages maintained by Subcontractor shall not limit any Subcontractor's indemnity

obligations or other liabilities under the Subcontract or the Prime Contract.

#### **IV. CERTIFICATES OF INSURANCE.**

- A. Prior to the Commencement of the Work, Subcontractor shall furnish the following to Contractor:
  - 1. A current Certificate of Insurance ("COI"), indicating the Project, including project number, and evidencing the requiring limits of insurance (including where applicable, per project limits). The certificate holder shall be identified as Contractor (as the entity indicated on the first page of the Subcontract). In addition, if requested by Contractor, additional COI 's listing the Owner or other Additional Insureds as certificate holders shall be provided.
  - 2. A copy of the provisions(s) in the policies or endorsement adding the parties required by this Addendum to be added as additional insureds.
  - 3. A copy of the provision(s) in the policies or endorsement providing that the insurance provided to the Additional Insureds include a per project aggregate limit.
- B. Such documents shall be e-mailed to the following address: [riskmanagement@messer.com](mailto:riskmanagement@messer.com) [<mailto:riskmanagement@messer.com>](mailto:riskmanagement@messer.com).
- C. Any renewals, changes in coverage, or replacements in coverage shall be similarly documented and forwarded at least ten (10) days prior to such renewal, change, or replacement. A COI evidencing continuation of coverages required to remain in force after final payment shall be submitted with the final application for payment as required in the Subcontract.
- D. Upon request, Subcontractor shall also provide Contractor with a certified copy of any policy providing coverage required by this Addendum.
- E. Failure to provide the COI and other required documentation will result in delayed payment to Subcontractor. Failure to provide the COI will not relieve Subcontractor of its responsibility to carry and maintain such insurance. Contractor is not obligated to review the COI and/or other documentation to ascertain compliance with this Addendum. Contractor's failure to inspect such COIs and/or documentation, and/or failure to identify, object to, or otherwise notify Subcontractor of any discrepancy therein, is not a waiver of any requirements contained in the Subcontract or this Addendum, and will not waive Contractor's right to require strict compliance with the terms of Contractor or this Addendum.

#### **V. NO WAIVER.**

Any waiver or modification of the insurance requirements stated in this Addendum must be agreed to in writing by Contractor.

#### **VI. CONFORMANCE TO LAW.**

If applicable law limits the enforceability of any of the foregoing requirements, then Subcontractor shall be required to comply with the foregoing requirements to the fullest extent of coverage and limits allowed by applicable law and this Addendum shall be limited only to the extent required to conform to applicable law.

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**SECTION 00 61 13 - PERFORMANCE & PAYMENT BOND FORMS**

1.1 SECTION NOT APPLICABLE

**END OF SECTION 00 61 13**

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**SECTION 00 72 00 - GENERAL CONDITIONS**

**PART 1 - GENERAL**

- 1.1 The general conditions to be used for this project are:
- A. AIA A201-2007
  - B. Addition terms and conditions issued by the owner are included in the instruction to bidders. All other terms and conditions are available upon request.
  - C. These terms and conditions shall apply to every subcontract.

**END OF SECTION 00 72 00**

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## **SECTION 00 73 00 - SUPPLEMENTARY CONDITIONS**

### **PART 1 - GENERAL**

- 1.1 The following supplements change, delete from or add to the General Conditions.
- 1.2 Where any article, paragraph, subparagraph or clause of the General Conditions is modified or deleted by the Supplementary Conditions, the unaltered provisions of the article, paragraph, subparagraph or clause shall remain in effect.
- 1.3 Where Supplementary Conditions conflict with General Conditions, provisions of the Supplementary Conditions take precedence.
- 1.4 All references to "Contractor" in the General Conditions shall be considered the same as "Subcontractor".
- 1.5 "Subcontractor" is defined as a prime bidder who enters into a Subcontract Agreement with the Contractor.

### **PART 2 - ITEMS**

- 2.1 Not Applicable

**END OF SECTION 00 73 00**

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**SECTION 00 73 16 – INSURANCE REQUIREMENTS**

**PART 1 - GENERAL**

- 1.1 Each Subcontractor shall provide and maintain insurance in accordance with the Messer Subcontract Agreement and Insurance Addendum included in Section 00 52 00 – Agreement Forms.
- 1.2 The required Insurance Classifications are included in this section.

**END OF SECTION 00 73 16**

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## Insurance Classifications

All Work Classifications will be required to carry General Liability of \$1 million single occurrence and \$2 million aggregate coverage and Excess/Umbrella insurance requirements according to the chart below. Additional details of insurance requirements are listed in the Insurance Addendum which is included in the Messer Sample Subcontract Agreement in Section 00 52 00.

<b>Excess/Umbrella Insurance Limits: These scopes of work should be \$3 million unless the subcontract exceeds \$3 million in which case the Excess/Umbrella Liability should be increased to \$5 million.</b>	<b>Excess/Umbrella Insurance Limits: These scopes of work should be \$5 million unless the subcontract exceeds \$3 million in which case the Excess/Umbrella Liability should be increased to \$10 million.</b>
* Architects & Engineers - Prof. Liability	Brick and Block Masonry
Asphalt Paving	Caissons and Piles
Acoustical Work	Cast in Place Concrete Work
Carpentry and Millwork	Curtain Wall
Caulking	Demolition
Ceramic and Terrazzo	Electrical
Concrete Work – General (Sidewalk, Curbs, etc.)	Elevator Work
Dampproofing / Waterproofing	Excavation/Utility Work
Drywall	Longshoreman's Exposure
Exterior Insulation Finish Systems	Precast Concrete
Glass and Glazing	Plumbing and H.V.A.C.
Insulation	Roofing and Sheet Metal
Landscaping	Sheeting, Shoring and Underpinning
Marble and Granite	* Sprinkler and Fire Protection - Prof. Liability
Miscellaneous Metals	Structural Steel and Metal Deck
Paint, Vinyl Wall Covering and Finishing	Window Washing Equipment
Resilient Flooring and Carpet	
Doors/Frames/Hardware	
Scaffolding	
Spray-on-Fireproofing	
Structural Wood Framing	
Toilet Accessories and Partitions	

**\* Special requirements on as-needed basis depending on the type of job and/or scope of work:**

**Professional Liability** – professional services/activities, including construction management, design-build, architectural, engineering, surveying, site preparation services, any stamped drawings or Fire Protection design services.

**Pollution Liability**- abatement work; remediation, removal/replacement, encapsulation, enclosure of hazardous materials or substances; disposal/transport of any hazardous materials or substances, any EIFS-related work.

**Riggers or Crane**- When this is required of our Subcontractors by the Owner Contract / Agreement.

**Watercraft and Aircraft (UAV)**- Use of any aircraft (UAV or Drone included) or watercraft of any kind in the performance of its work, whether such aircraft or watercraft is owned, leased, chartered or hired by them

**Railroad Protective**- Usually called out as required by Owner Agreement or if work is done adjacent to railroad property.

**Domestic Transportation**- Most Project BR policies provide coverage for project values in transit. However, if this is excluded from the Owner-provided BR or if the values in transit exceeds \$1m the sub must insure the property while it is in transit to the Project.

**Marine Cargo – Goods In Transit Insurance**- If Subcontractor is transporting cargo, goods, materials, etc. for incorporation into the Project from outside the US.

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## **SECTION 00 73 19 - HEALTH & SAFETY REQUIREMENTS**

### **PART 1 - GENERAL**

- 1.1 The following provides a summary of Contractor's Safety Program requirements regarding worker safety and/or campus safety.
- 1.2 This summary should in no way be construed as being all-inclusive. It is issued as a guide to aid each Subcontractor in their understanding of the safety expectations on this project.

### **PART 2 - PRE-CONSTRUCTION SAFETY MEETING**

- A. A project specific safety plan will be developed by the Contractor and provided to Subcontractors that will reference more directly site safety requirements and provide the Emergency Action Plan, Site Requirements and General Requirements.
  - B. All Subcontractors will be required to provide, to Contractor, a site specific safety plan for review and approval before any work is to begin on site. This plan must describe the means and methods that the Subcontractor will be using to safely perform all work on site, and comply with all federal, state and local safety requirements. This site specific plan will be provide to the Contractor for review and approval before any work activities are to begin onsite.
  - C. Subcontractors must abide by the Messer Safety, Health and Environmental Requirements.
  - D. As a component of the Messer Safety, Health and Environmental Requirements, all Subcontractors will provide all SDS sheets (safety data sheets) for any and all chemicals that will be used on site, to be stored at the project operations office in a predetermined place, to ensure access for all.
  - E. Weekly Safety Meetings with all employees of this Subcontractor, documented by attendance sheets, typed safety topics (Tool Box Talks), a copy of the agenda, and minutes. This documentation is to be filed with Contractor on a weekly basis.
  - F. Weekly Safety Walk-Through of the jobsite by each Subcontractor's Superintendent and Contractor's onsite personnel documented by a listing of deficient items found, methods of correction, and date of correction. This documentation is to be filed with Contractor on a weekly basis.
- 2.2 Any updates made to this binder are to be issued by addendum by the Subcontractor.
  - 2.3 Subcontractors will also be required to fill out a job safety analysis for each work activity that they will perform. The formwork and process for filling this JSA out will be reviewed in this meeting.

### **PART 3 - NEW WORKER SAFETY ORIENTATION**

- 3.1 All workers (craft, management, etc.) are required to attend a jobsite safety orientation prior to the start of work. This orientation will address safety, risk analysis, and infection control requirements on this project. It is anticipated that this orientation will take approximately one hour to complete.

### **PART 4 - PROJECT SPECIFIC REQUIREMENTS**

- 4.1 Hard hats are required to be worn at all times.
- 4.2 Every Subcontractor, including lower tier subcontractors, shall provide, and require its employees to utilize, eye protection at all times on this project. This requirement applies to all employees at all times while on site except during scheduled breaks away from potential eye hazards or while in a trailer performing office functions.
- 4.3 Gloves are required for anyone entering or working on the jobsite. Every Subcontractor, including lower tier subcontractors, is required to provide appropriate hand protection for their employees with glove selection based on task hazards presented for work performed.
- 4.4 High-visibility vests or clothing is required at all times. In addition, any persons directing traffic along roadways are to have reflective signage to direct traffic in addition to the other PPE requirements.
- 4.5 100% fall protection at or above 6' for all personnel is required.
- 4.6 Guardrails are required on the perimeter all rooftops until final finish components need to be install at the perimeter. Warning lines will not be permitted.
- 4.7 Any barricade or safety device removed by a Subcontractor's employee(s) in order to perform the work shall be immediately re-erected as soon as that work activity is complete. Temporary barricades and controlled access zones must be established while the barricade is down. If the Subcontractor does not perform this in a timely manner, Contractor or designee will perform and back charge the Subcontractor.
- 4.8 Use of platform style step ladders are required on this project. Regular step ladders will not be permitted.
- 4.9 100% tie-off is required while using all forms of lifts, including scissors lifts.

- 4.10 All Subcontractors performing any hot work (grinding, welding, burning, etc.) are required to provide a fire watch person. Fire blankets are also required where necessary.
- 4.11 All Subcontractors performing any overhead work will have approved plan to protect entire site from overhead hazards or falling objects before work is to begin.
- 4.12 Every Subcontractor, including lower tier subcontractors, will be required to conduct a “huddle” meeting prior to every work shift to discuss the activities of the shift and to establish a safe plan of action to accomplish the work. This meeting shall be conducted with all employees working on site by the onsite leader for each Subcontractor. It is to be an interactive meeting for all participants. Any potentially unsafe situations shall be assessed and dealt with prior to starting a particular activity. If the work intended to be performed changes over the course of the shift, it is the responsibility of the Subcontractor’s onsite leader to assure that the persons involved review and amend their safety plan accordingly before commencing the revised work. No activity shall proceed without a plan and the necessary equipment and processes to address any safety concerns.
- 4.13 Subcontractors will be required to address any site safety issues noted through Latista within 24 hours after the issue has been noted.

#### **PART 5 - MESSER SAFETY 4-SITE PROGRAM**

- 5.1 Each Subcontractor and their lower tier subcontractors shall be subject to the Accountability Program as described herein. This Accountability Program provides for special attention to the OSHA Focus 4 Hazards (falls, electrical, struck by, caught in/between). For offenses (either actions or omissions) related to the OSHA Focus 4 Hazards, the following process shall apply:
  - A. First Violation by an Employee
    1. Upon notification by Messer of the violation, Subcontractor shall remove the employee or Messer shall remove its employee from the site for the remainder of that working day (and for the next working day also if removal occurs in the second half of the employee’s shift). If the employee is a supervisor or if Subcontractor’s supervisor is not readily available, Messer may direct the employee to leave the site and the incident shall be reported to Subcontractor’s management.
    2. Upon return, the Subcontractor (or Messer if a Messer employee is involved) shall give the employee a one-page handout on the Focus 4 Hazards. Employee must read, sign and date. Subcontractor must discuss the violation at the next huddle meeting.
  - B. Second Violation by the same Employee
    1. This section applies in the case of violation by an employee (of a Subcontractor or of Messer) of the same Focus 4 Hazard within one year, or a different Focus 4 hazard within three months; otherwise a subsequent violation by the same employee is treated as a first violation by that individual.
    2. A Subcontractor employee will not be permitted to work on any Messer project for one year. Prior to return to work on Messer projects, the Subcontractor must propose remediation/training for that employee and the training must be acceptable to Messer.

3. A Messer employee will not be eligible for re-hire for 30 days and the completion of a 10-Hour OSHA training program.
- C. Second Violation for a Subcontractor
1. This section applies in case of a second violation by a Subcontractor's employees on this project (whether the same or different employees are involved in the two incidents).
  2. Subcontractor is required to provide a dedicated, competent safety person to the project to supervise the daily huddle meetings and the work of the Subcontractor, at no additional cost to the Owner or to Messer. This safety person must be on site whenever the Contractor is performing work on the project, until such time that Subcontractor has demonstrated to Messer's satisfaction that a significant improvement with the Subcontractor's safety performance has occurred.
- D. Multiple Violations
1. This section applies if Subcontractor fails to have a dedicated safety person on site at all times while its work is being performed after being cited for a Second Violation for a Subcontractor, or if a Subcontractor incurs a total of three or more covered violations on this and any other Messer projects collectively, during any 12-month period.
  2. If the Subcontractor has a direct contract with Messer, Messer may terminate those contracts for cause without further notice or opportunity to cure, and thereafter pursue all other available remedies for such default. If the Subcontractor does not have a direct contract with Messer, Messer may direct the Subcontractor under which the violating Subcontractor is working to remove the violating Subcontractor permanently from the project; in that event, the higher-tier Subcontractor has the responsibility of fulfilling the violating Subcontractor's work by other means at no additional cost to the Owner or Messer. If Messer elects not to terminate, Messer may impose other reasonable sanctions including fines and additional safety assurance requirements.
- E. Additional Terms
1. This Program is subject to change by Messer from time to time with notice to Subcontractor; however, Subcontractor is not required to accept material increases in its obligations or liability under the Program without its consent.
  2. It is the intention of the Program to cover violations related to Focus 4 Hazards which are of a significant nature; however, it is NOT necessary to have an accident in order to find a violation. The attached summary outlines several examples of violations for each Focus 4 Hazard that are deemed to be covered; for any situation not listed on the attached summary, Messer's good faith determination as to whether it is a covered violation or not shall be final. Every identified violation will be reviewed by the supervisor of the site manager to ensure consistency of interpretation of a violation of the Focus Four Non-negotiables (see chart below).
  3. In Messer's discretion, a group of related individual violations may be treated as a single violation at the Subcontractor level. For example, if several Subcontractor employees engaged in related work are failing to use required fall protection, each such employee will be charged with an individual violation when the situation is discovered by Messer but if Subcontractor has no previous violations on this project, Messer may treat the incident as a single violation for Subcontractor and not impose Second Violation or Multiple Violation sanctions on Subcontractor.
  4. For purposes of Multiple Sanctions, "Messer projects" include all projects in which Subcontractor is a subcontractor or material supplier of any tier under Messer, and all projects in which Messer provides construction management services covering Subcontractor pursuant to an agreement with the Owner.

5. It is not Messer's intention to interfere in Subcontractor's relationship with its employees. When feasible, significant actions under the Program such as excluding an employee from the project site will be notified by Messer to a supervisory employee of the Subcontractor for the Subcontractor to put into effect immediately, but Messer reserves the right to take immediate action to rectify unsafe situations, and to direct a Subcontractor employee to leave the site if Subcontractor management personnel are not on site. If Subcontractor is directed to remove an employee from the site, the disposition of the employee after leaving the site and any resulting compensation issues for the employee are solely between the Subcontractor and the employee, and the Program does not require that the Subcontractor withhold pay from the employee for the time that the employee is barred from the site, but there shall be no additional cost to the Owner or Messer for the Work as a result of exclusion of an employee or any other action taken pursuant to the Program.
6. Messer and the Owner do not assume any responsibility whatsoever to Subcontractor, to its employees, or to third parties, for supervising or monitoring the safety precautions or compliance of the Subcontractor and its employees; Subcontractor remains solely responsible for these matters and shall defend and fully indemnify the Owner and Messer, as provided in the Subcontract Documents, against any claims or damages resulting from safety violations or other negligence of Subcontractor employees. Messer assumes no duty to anyone to detect and require correction of violations. Messer may, but is not required to, make periodic inspections of the project site. By establishing the Program and conducting other safety-related activities on the project, Messer is not undertaking any duty to Subcontractor, to Subcontractor's employees, or to third parties concerning safety on the project and any such duty is expressly disclaimed.
7. Sanctions provided under the Program for individuals and the Subcontractor are not exclusive and Messer reserves all other remedies provided under the Subcontract Documents or by law.
8. The Owner and Messer shall have no liability whatsoever to any Subcontractor or Subcontractor's employee or any third party for actions taken by Messer pursuant to the Program in good faith, even if it is later determined that such action was factually or legally unjustified.
9. A Subcontractor is not charged with a violation under the Program for any violation committed by an employee of a sub-subcontractor or material supplier to that Subcontractor, as long as the Subcontractor's supervisory personnel did not know about or condone the violation prior to the violation being observed by Messer. However, each Subcontractor must take all necessary actions to make the Program binding on its lower tiers and to cooperate with Messer in implementing any applicable sanctions against its lower tiers. Sub-subcontractors shall be entities with written agreements that include similar terms and conditions as those of Subcontractors with direct contracts with Messer. In the absence of such written agreements, Sub-subcontractor employees and representatives shall be treated as employees of the Subcontractor.

**END OF SECTION 00 73 19**

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# **Messer Construction Company**

## **Environmental, Health and Safety**

### **Requirements**

**Revised 1/2018**

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## 1.0 INTRODUCTION, PURPOSE AND SCOPE

### 1.1 CEO Statement

Messer's safety goal is zero injuries on our projects.

Our core safety values are:

- We believe no job, task or schedule is more important than the health and safety of people on or near our jobsites
- We are responsible for and take action to ensure our own safety and the safety of those around us
- We will return every person home to their families safely each day

When our decisions and actions are guided by these core values, accidents will be nonexistent.

We are a company of builders who respect not only each other but our business partners. We have a strong passion to keep everyone safe and are committed to building a zero injury culture.

Creating and maintaining a culture of zero injuries takes every person working together to positively influence safety and health decisions, processes and policies. The continued growth of that safety culture will be greatly influenced by example. So, it is expected that Messer leaders, senior managers and our business partner's leadership model the safety behavior expected. However, it is imperative that all employees and workers on our sites make solid safety decisions, as well as hold all levels of management accountable for making safety a component of their leadership and supervision.

This commitment will keep our construction sites and all of our work environments accident free.

### 1.2 Purpose

The purpose of this Safety, Health and Environmental Requirements is to define minimum safety requirements for all Messer projects, Employees, Subcontractors, and other companies engaged in services on a Messer project. The requirements identify key points of Messer's Safety, Health and Environmental Management Plan to be undertaken during all construction activities.

These requirements are built upon Messer's philosophy that every incident is preventable. This forms the basis for our safety processes, procedures, and requirements that will be implemented on all Messer projects. The aim of this program is to provide personnel with the required information and knowledge to do the right things, the right way, every time to achieve our goal of Zero Injuries on our projects.

### 1.3 Scope

This plan applies to all personnel associated with any Messer project and any other location or task associated with a Messer project, including corporate headquarters and the Rental Division.

All Messer employees, sub-contractors and visitors shall comply with the requirements specified in this document as part of the contract conditions during execution of the service. Exceptions are only allowed upon approval by Messer via formal requests. If any conflicts are found the more stringent requirement shall apply. This document sets out the requirements to verify that safe work practices are established, appropriately supervised, with proper training and management so as to help prevent incidents such as personal injury, injury to others, environmental damage/impacts, or property damage.

## 2.0 GENERAL REQUIREMENTS

### 2.1 Safety & Health Program

- 2.1.1 Each contractor (and supplier when applicable) shall submit a copy of its site-specific safety program to Messer before its work begins. This plan must include the criteria and topics outlined in the Messer Subcontractor Site-Specific Safety Plan template. The contractor/supplier shall ensure that their plan meets or exceeds the safety requirements for the project.
- 2.1.2 The contractor/supplier is required to submit its fall protection plan (if applicable), any applicable training certification such as crane operator training, and any other site-specific paperwork associated with the project, before work begins.
- 2.1.3 Prior to beginning work onsite, the site-specific safety plan and associated documentation must be reviewed and discussed with Messer project management and/or safety personnel in a Pre-Construction Safety Meeting.
- 2.1.4 Each contractor/supplier shall maintain an effective Company safety and health program, which will provide systematic policies, procedures and practices that are adequate to identify and protect their employees from occupational safety and health hazards. The contractor/supplier safety and health program shall, at a minimum, include:
  - 2.1.4.1 Management commitment and employee involvement;
  - 2.1.4.2 Documented work site analysis and hazard assessment;
  - 2.1.4.3 Hazard prevention and control procedures; and
  - 2.1.4.4 Safety and health training.

### 2.2 Reporting

- 2.2.1 The contractor/supplier shall notify the Messer representative immediately in the event of an injury, first aid case, near miss, property damage, or environmental incident, such as a spill or release of hazardous material.
- 2.2.2 The contractor/supplier shall submit a completed Messer accident/incident report to the Messer representative within 24 hours of the occurrence of the injury, incident, etc.
  - 2.2.2.1 The report shall include, as a minimum, the nature and extent of the injury, first aid case, near miss or incident, causes of the injury etc., and corrective actions needed to prevent a recurrence.
  - 2.2.2.2 Any follow-up information on personal injuries (doctor's reports, insurance or worker's compensation reports etc.) shall be forwarded to the Messer representative as soon as it becomes available.
- 2.2.3 As required by federal, state, or local laws or ordinances, the contractor/supplier shall report certain injuries, illnesses, or environmental incidents to the appropriate agencies.

The contractor/supplier shall be knowledgeable of these reporting requirements, and shall inform and copy Messer when any such report is necessary or is made.

## 2.3 Potential Hazards and Emergencies

- 2.3.1 The contractor/supplier shall inform its employees of potential hazards, take appropriate steps to reduce exposure to potential hazards, and be prepared to respond to emergency situations.
- 2.3.2 The contractor/supplier shall provide emergency response procedures for the job site, and shall communicate such procedures to its employees. Emergency response procedures shall include the identification of any emergency alarms and warning systems, a list of emergency phone numbers, identification of emergency evacuation assembly areas, placement and use of emergency equipment and procedures for notification of local authorities, agencies, and the Messer representative.
- 2.3.3 Each contractor/supplier shall have at least one certified person trained in first aid and CPR available on site. The contractor/supplier shall have readily available the names and locations of off-site medical personnel to handle major occurrences. Adequate first aid and emergency medical equipment shall be provided as necessary. The name(s), contact number(s) and copies of the first aid & CPR cards must be submitted upon request.
- 2.3.4 The contractor/supplier shall obtain Safety Data Sheets (SDS) and other appropriate information, and shall inform its employees and Messer of any potentially hazardous materials they may be exposed to while in performance of the work. At the contractor's/supplier's request, Messer shall provide this information for products or materials that are supplied by Messer or are under the control of Messer.
- 2.3.5 The contractor/supplier shall immediately rectify any situation or condition occurring as a result of the work, that could result in injury or illness to personnel at the site, or that could cause an environmental hazard. If such a condition cannot be corrected immediately, the contractor/supplier shall provide temporary barricades and appropriate warning signs and devices necessary for the protection of people, equipment, and property.

## 2.4 Employee Qualifications and Conduct

- 2.4.1 The contractor/supplier shall employ or cause to be employed only persons who are fit, qualified, and skilled in the work to be performed. They shall also ensure that employees receive and successfully complete the necessary safety training, and are capable of performing work activities in a safe manner. Documentation of such training shall be available upon request. Additional training may be required when individuals are considered competent personnel on the job site. It is the responsibility of the employer to ensure that these individuals receive this training.
- 2.4.2 Contractor/supplier personnel shall confine their activities to the assigned work areas.
- 2.4.3 Contractor/supplier personnel shall use only facilities designated by Messer for non-work activities such as smoking, eating, or using the restroom.

- 2.4.4 Prior to commencing work, the contractor/supplier shall designate a competent person or persons who is capable of identifying existing and potential hazards in the surroundings or working conditions and have the authority to correct any deficiencies. Upon request, the contractor shall provide documented training identifying why this person has been deemed competent. The competent person must be on the job site at all times. The Messer representative must be notified of any changes in the competent person status.
- 2.4.5 If employees are not proficient in English, the Contractor must, at all times provide an interpreter to effectively communicate safety requirements including, but not limited to verbal commands, written notices, signage, alarms and loudspeaker announcements. The interpreter, when necessary, shall ensure that employees understand rules, regulations, and procedures issued by Messer for the jobsite. If it is determined that any Contractor employees are in violation of these requirements, Contractor and its employees may be removed from the jobsite.
- 2.4.6 The contractor/supplier shall ensure that no firearms, weapons, controlled or illegal substances, or alcoholic beverages are brought onto the job site by contractor employees, except as specifically authorized by the Messer representative.
- 2.4.7 No contractor/supplier employee shall report to work or shall work impaired by any substance, drug, or alcohol, lawful or unlawful. "Impaired" means under the influence of a substance such that the employee's motor senses (i.e., sight, hearing, balance, reaction, reflex), or judgment either are or may be reasonably assumed to be affected. Any violation of this policy may result in removal from the job site.
- 2.4.8 Contractor/supplier employees taking prescription medication that warns against driving or operating machinery shall inform their foremen or safety representative of such.
- 2.4.9 When vehicles of contractor/supplier employees are on the client's premises or any area associated with the job site, the contractor/supplier shall enforce the rules for safe vehicle operation. Drivers shall obey all signs and posted speed limits. Drivers and passengers in vehicles shall wear seat belts.
- 2.4.10 Threatening, intimidating, coercive, or other unsafe or disruptive behavior such as fighting and horseplay is prohibited.
- 2.4.11 Sleeping and gambling on Messer job sites are prohibited.
- 2.4.12 Contractor/Supplier employees shall confine their activities to areas expressly authorized to them for such use. Activities include: entering the work site premises, parking vehicles, taking breaks, eating, drinking, smoking, and using lavatory facilities. Under no circumstances shall contractor/supplier personnel be allowed to enter, walk through, or loiter in occupied areas or other areas not authorized for their use or entry.

## 2.5 Safety Processes

- 2.5.1 The contractor/supplier shall not permit visitors on the job site unless they have checked in at the Messer project office and have been given express permission to be present. They are to be accompanied at all times by an authorized contractor/supplier representative.
- 2.5.2 The contractor/supplier shall orient all authorized visitors to the job site concerning safety rules and site hazards. Requirements associated with personal protective equipment and all rules of conduct shall pertain to all visitors.
- 2.5.3 Site safety inspections shall be conducted by the Messer representative on a regular basis and deficiencies will be logged in Latista. Immediate on-the-spot corrections of safety deficiencies shall be performed as necessary. The contractor shall be responsible for conducting their own daily safety inspections of its work activities.
- 2.5.4 The contractor/supplier shall complete a documented Job Safety Analysis (JSA) for each activity. The JSA's shall be submitted to Messer as required.
- 2.5.5 Each contractor shall conduct a huddle meeting prior to every work shift to discuss the activities of the shift, review JSA(s) and to establish a safe plan of action to accomplish the work. This meeting shall be conducted with all employees working on site by the on-site leader for each contractor. Any changes to the established plan shall be communicated throughout the shift to affected employees.
- 2.5.6 The contractor/supplier (if on site more than sporadically) shall conduct weekly "tool box" safety meetings with its personnel. The topics for the meeting shall be relevant to the work activity and/or job site conditions. It shall provide copies of all such documentation to the Messer representative immediately after the meeting. Everyone on site must attend any scheduled project-wide safety meetings.
- 2.5.7 The contractor/supplier shall attend a scheduled Pre-Construction Safety Meeting before the contractor's/supplier's work begins on the job site. Messer reserves the right to require sub-tier contractors/suppliers to participate in this orientation activity. This program will review all anticipated and existing hazards that are associated with or will affect the contractor's/supplier's employees. At this time, the contractor/supplier shall inform the Messer representative of its competent person(s). The meeting shall also include a review of safety protocol and requirements for the project.
- 2.5.8 The contractor/supplier shall contact the Messer representative immediately when an OSHA compliance officer arrives at the job site. The contractor/supplier shall inform the Messer representative of any employee complaint, incident, etc. that results in or may result in an OSHA inspection.

- 2.5.9 The contractor/supplier and its employees shall direct all public media inquiries to the Messer representative. At no time shall the contractor/supplier or its sub-tier contractors/suppliers allow or permit media to enter the job site without expressed authorization from the Messer representative.

## 2.6 Housekeeping and Sanitation

- 2.6.1 Any round/tubular materials shall be chocked or otherwise secured as necessary to prevent rolling. Stacked material shall be stable and secured from tipping.
- 2.6.2 Food/lunch debris shall be discarded into trash receptacles only. No food debris shall be located in any part of a building not designated as a break area. Receptacles containing food debris shall be removed from the site on regular intervals.
- 2.6.3 Urination or defecation anywhere on site other than the designated chemical toilets is grounds for immediate removal from the project.
- 2.6.4 Contractors must provide daily clean-up of their designated work areas. This shall include maintaining an orderly arrangement of operations, tools, equipment, storage facilities, and supplies during the entire course of the project. If daily housekeeping is not maintained, work can be stopped until the area is deemed clean and safe to proceed by Messer management.

## 3.0 SAFETY REQUIREMENTS

### 3.1 Personal Protective Equipment

- 3.1.1 Hardhats meeting American National Standards Institute (ANSI) Z89.1 specifications shall be worn at all times by all personnel at the work site. Hard hats shall be worn with the brim facing forward, unless a welding shield (or other device, which prevents such) is in use. This requirement specifically includes all work completed during the finish stages of the project.
- 3.1.2 Safety glasses (including safety prescription eyewear) with attached side shields meeting the American National Standards Institute (ANSI) Standard Z87.1, latest issue, shall be worn at all times on Messer projects through the finish stages. The only exceptions will be during scheduled breaks away from potential eye hazards, while in a trailer performing office functions or in a fully enclosed cab of a truck/equipment.
- 3.1.2.1 Appropriate shaded/filter lenses shall be required to protect against radiant energy such as during welding. Suitable laser safety glasses shall be used as required, to protect against the specific wavelength of the laser and be of optical density adequate for the energy being used.
- 3.1.2.2 Tinted safety glasses are not permitted for general use indoors.
- 3.1.2.3 Safety goggles and/or tight fitting safety glasses should be worn for work activities where hazards dictate (e.g. dusty environments, overhead demolition work, etc.)

- 3.1.3 Face protection is required in addition to safety glasses when potential exposure exists to particulate matter generated by hammering; chipping; welding; grinding; cutting; heating; burning; insulation handling; or where there is possible exposure to hazardous chemicals. Examples include, but are not limited to:
  - 3.1.3.1 Any time one is cutting or grinding with an abrasive wheel. This includes, but is not limited to target saws, chop saws, angle grinders, etc.
  - 3.1.3.2 When pouring concrete; the workers located at the hopper, operating the hose and using the vibrator.
- 3.1.4 When handling acids, caustics, and chemicals with corrosive or toxic properties, suitable protection, such as acid suits or chemical resistant aprons and gloves, shall be worn to prevent accidental contact with the substance.
- 3.1.5 Personnel shall wear personal clothing and footwear that is safe and proper for the work and any job site exposures. At a minimum, full-length trousers and shirts with a minimum 4-inch sleeve are required.
- 3.1.6 High visibility clothing (shirt, vest, or jacket) shall be worn at all times on the project and must be the outer-most garment. Acceptable colors include fluorescent yellow/green and fluorescent orange/red. Messer will provide notification if and/or when this requirement does not apply to a particular project.
- 3.1.7 High-visibility clothing with retro-reflective striping shall be utilized when working in or around roadways and if lighting conditions are poor. Clothing must meet the ANSI Class applicable to the work being performed.
- 3.1.8 Work boots (covering over the ankle) are required for all contractor personnel on site. They are also required for suppliers when they are exposed to hazards affecting the feet. Tennis shoes or work shoes are not acceptable, regardless of steel/composite toe or other safety ratings. Contractor/supplier personnel shall wear boots that are commensurate with the hazards of the work and the work site area. This includes rubber boots when working in or near damaging liquids or concrete, safety-toe boots when moving or rigging heavy objects and metatarsal protection when jackhammering or tamping activities.
- 3.1.9 100% hand protection is required on all Messer projects. Gloves shall be worn by all personnel on the project site at all times, including supervisory personnel. Gloves must be task appropriate and meet ANSI/ISEA 105-2016 American National Standard for Hand Protection Classification.
  - 3.1.9.1 If hand protection is considered infeasible or creates a greater hazard for a particular task, a written safe plan of action outlining the reason for the variance must be approved through Messer prior to beginning the activity.
- 3.1.10 Cut resistant sleeves shall be worn during demolition activities where puncture, laceration and/or burn hazards to the arms are present.



- 3.1.11 The contractor/supplier shall familiarize itself with and comply with more rigorous personal protective equipment standards as required on specific projects.

## 3.2 Elevated Work and Fall Protection

- 3.2.1 100% fall protection is required on Messer job sites, for activities, which involve work at elevations of 6 feet or higher. 100% fall protection is also required at lower heights if the individuals are working above dangerous equipment. 100% fall protection is required for all crafts, trades, including steel erection and activities associated with these types of elevations. The use of ladders and the construction of scaffolding may not be applicable in section 3.2, and are addressed in section 3.3 and 3.4 in this program.
- 3.2.2 Prior to the start of work, contractor/supplier representatives involved with elevated work shall meet with Messer representatives to review the scope of work, especially as it pertains to fall protection requirements and needs. As part of the Contractor Pre-Construction Safety Meeting, an evaluation should be made of the possible fall hazards and effective safety responses to such.
- 3.2.3 The following conventional fall protection systems shall be the preferred choice for elevated work activities:
  - 3.2.3.1 Guardrail systems
    - 3.2.3.1.1 Cable guardrail systems shall be a minimum 3/8" cable and shall be equipped with turnbuckles for tightening where necessary.
  - 3.2.3.2 Safety net systems
  - 3.2.3.3 Personal fall arrest systems
- 3.2.4 Open vertical studs/faming shall not be considered adequate fall protection at exterior walls or interior openings. Where openings between vertical members are less than 18" wide, a top rail and toe board, at a minimum, must be installed. Where openings are 18" wide or greater, a full guardrail system (top-rail, mid-rail, and toe board) must be in place. Guardrail systems shall remain in place until wall sheeting and/or windows are installed to provide equivalent protection.
- 3.2.5 A recognized manufacturer of fall protection equipment, such as Miller, DBI/SALA, MSA, etc., may manufacture a horizontal lifeline system. Alternately, a qualified person may design a horizontal lifeline system. A qualified person is defined as; one who has the technical capability to determine applied loads during a fall event and calculate the resultant forces on the system, as well as calculate the resultant elongation in the system due to the forces encountered during a fall event. In either case, the system must be installed by a competent person, and used by trained individuals according to the manufacturer or designer's instructions.
  - 3.2.5.1 Horizontal systems must be attached to a fixed anchorage and may not be linked together.

- 3.2.6 If the contractor/supplier can prove that more common fall protection is infeasible or creates a greater hazard, as defined in Subpart M of the OSHA Construction Standards, it may, where permitted by a Messer Safety Representative, implement the following non-conventional systems in response to the fall hazards:
  - 3.2.6.1 Warning lines;
    - 3.2.6.1.1 Required to be a minimum of 15 feet back from leading edges for all trades, excluding roofers.
  - 3.2.6.2 Controlled access zones.
  - 3.2.6.3 Safety monitoring systems will not be permitted.
- 3.2.7 Non-conventional systems may be utilized in controlled work environments provided the following is established:
  - 3.2.7.1 Explanation in writing is submitted to the Messer Safety Department as to why the use of one of the three conventional fall protection systems is infeasible or creates a greater hazard/harm to the individuals involved.
  - 3.2.7.2 Development of a written fall protection plan, which outlines all elements involved with the usage of warning lines, controlled access zones, or safety monitoring systems; and
  - 3.2.7.3 Orientation process, which communicates this information to the individuals involved with the work activity, prior to beginning work.
- 3.2.8 The purpose of this extensive pre-planning is to ensure that the most effective and appropriate fall protection systems are used whenever possible. It is also designed to ensure that those individuals involved with the usage of warning lines and controlled access zones truly understand the detail and organization required. Finally, the pre-planning will also highlight who is permitted (due in part to thorough training and communication) to work with these systems.
- 3.2.9 The procedures developed in response to the identified fall hazards shall be reviewed with all individuals exposed to the hazards. Feedback should be encouraged so as to ensure that the most effective systems are utilized.
- 3.2.10 Contractors/suppliers shall be responsible for ensuring that their employees using fall protection systems have been adequately trained. Communication on the following shall be included in the training:
  - 3.2.10.1 Fall hazards associated with the elevated work;
  - 3.2.10.2 Elements of the fall protection systems utilized;
  - 3.2.10.3 Fall protection equipment used;
  - 3.2.10.4 Elements of a fall protection plan, if applicable; and
  - 3.2.10.5 Proper inspection techniques of fall protection equipment.

- 3.2.11 An inspection process of fall protection systems shall be established. Individuals shall visually inspect the fall protection equipment before each use. Some equipment requires documented inspections by its manufacturer on a routine basis. This equipment shall have evidence of the inspection and re-certification process on it. This information shall be reviewed before the equipment is used.
- 3.2.12 Any fall protection equipment that is defective, damaged, or has been subjected to an impact shall be identified and removed from service immediately.
- 3.2.13 The contractor/supplier retains all responsibility for the effective implementation of fall protection programs as well as all other safety programs, regardless of any review by Messer.

### 3.3 Scaffolding and Aerial Lifts

- 3.3.1 Each part of supported scaffolding shall be capable of supporting at least 4 times its intended load. All work platforms shall be fully decked between guardrails. All scaffold planks shall be overlapped to a minimum of 12 inches or secured as with cleats to prevent movement.
- 3.3.2 Footings shall be sound and rigid. Concrete blocks, bricks, barrels or similar items shall not be used for supports. Supported scaffold poles, legs, posts, frames, and uprights shall bear on base plates. Base plates shall bear on mudsills or other adequate firm foundation.
- 3.3.3 Supported scaffold towers with a height-to-base width ratio greater than 4:1 shall be restrained from tipping by tying, guying or other equivalent bracing. Ties shall be rigid and designed to prevent the scaffold system from tipping into or away from the structure. Supported scaffold more than 3 feet wide shall be secured against displacement every 26 feet vertically and every 30 feet horizontally.
- 3.3.4 All manufacturers' bracings, couplings, or stacking and vertical locking pins shall be installed.
- 3.3.5 Guardrails and toe boards must be provided on all sides and ends of scaffolds 6 feet or more in height. Open-sided ends shall be guarded.
- 3.3.6 If the scaffold platform is less than 45 inches wide, as with Perry and Baker type utility scaffolds, guardrails shall be installed at heights of 4 feet or higher. Additionally, these scaffold systems shall have appropriately installed outriggers or otherwise be restrained from tipping if the working platform is at a height-to-base width ratio greater than 3:1.
- 3.3.7 Scaffolds shall be provided with an access ladder or another equally safe access method. Vertical ladders or ladder frames shall not be used where the total length of a climb equals or exceeds 24 feet, unless an approved fall protection device is installed and used while climbing.
- 3.3.8 Rolling scaffolds shall have their wheels locked when in use. No scaffold shall be moved while occupied, or while tools or equipment is on it.

- 3.3.9 Contractors/suppliers must have a competent person involved with the erection, dismantling, and inspection of scaffolding. Anyone erecting or dismantling scaffolding must be trained and be able to provide proof of training.
- 3.3.10 The contractor/supplier shall inspect all elevated work platforms each day. Inspections shall be documented on an inspection log or through a tagging system. Scaffolding that is incomplete or unsuitable for use shall be tagged as such at or near the access point. Defects shall be corrected prior to use.
- 3.3.11 Appropriate protection shall be provided for individuals working in the area of scaffolding, or for those who are exposed to overhead hazards while working on scaffolding.
- 3.3.12 Notwithstanding the specific requirements listed herein, all scaffolds and scaffold installation processes must meet or exceed all manufacturers' requirements.
- 3.3.13 Contractor/supplier shall have a competent person determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. Employers are required to provide fall protection for employees erecting or dismantling supported scaffolds where the installation and use of such protection is feasible and does not create a greater hazard.
- 3.3.14 Aerial work platforms shall be inspected and controls tested daily to verify that the equipment and all its components are in a safe operating condition. Do not operate any aerial lift if any components are defective until it is repaired by a qualified person.
- 3.3.15 Only properly trained and authorized persons shall operate an aerial lift.
- 3.3.16 All aerial work platforms, including scissors lifts, require the use of a full body harnesses and appropriate lanyard or retractable in any elevated position.
- 3.3.17 Employees shall always stand firmly on the floor of the basket, and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.
- 3.3.18 Work areas and travel paths shall be inspected to ensure that any hazards that may cause the aerial lift to become unstable or roll over are eliminated.

### 3.4 Ladders

- 3.4.1 All contractors/suppliers shall use ladders which are Type 1 or better; approved for industrial usage.
- 3.4.2 Metal stepladders and step stools are prohibited. Metal straight ladders and extension ladders must not be used where possible exposure to electrical hazards exists.

- 3.4.3 Job-made ladders shall be built for their intended use. Double cleats shall be used if more than 25 workers are using the ladder, or 2-way traffic is expected.
  - 3.4.3.1 Single cleat ladders shall not be more than 30 feet between the base and the top landing; double cleat ladders shall not be more than 24 feet.
- 3.4.4 Ladders shall not be used as platforms or scaffold planks.
- 3.4.5 Ladders shall be kept free of grease and oil. Personnel going up or down shall face toward the ladder and grip the side rails with both hands. Tools or other objects shall be hoisted up as necessary, or carried in a tool pouch and not carried by hand up or down the ladder.
- 3.4.6 Extension and straight ladders must be set at an angle of 1 foot horizontal for every 4 feet of working ladder length.  
Extension and straight ladders shall be tied off at the top and/or bottom when in use. Until secured, a second person shall be used to keep the ladder from slipping. Only one person shall be allowed on a ladder at a time.
- 3.4.7 Ladders shall not block doorways, passages, high traffic areas, etc. unless the area is barricaded. Warning signs shall be posted, or a spotter shall be involved.
- 3.4.8 Platform type stepladders shall be used in lieu of traditional stepladders. They must be fully open with spreaders locked when in use. Traditional stepladders shall not to be used.
- 3.4.9 Damaged ladders shall be taken out of service. Ladders shall not be painted, except for stenciling for identification purposes. Ladders shall be inspected daily prior to use.

### 3.5 Electrical Safety

- 3.5.1 All electrical equipment, including main feeder lines, branch circuits, and grounding systems shall be installed in accordance with the National Electrical Code as a minimum requirement.
- 3.5.2 A minimum of 3 feet of clearance shall be maintained around energized electrical parts.
- 3.5.3 Cabinets, boxes, fittings, or other forms of enclosures shall be used when energized parts of 50 volts or greater are exposed. Entrances to rooms containing energized electrical parts shall be marked with warning signs and access shall be controlled by the exposing contractor. Covers shall be approved. Cardboard and magnetic covers are not approved as temporary covers. All electrical equipment shall be labeled in accordance with the requirements of NFPA 70e.
- 3.5.4 The metal parts of portable and/or plug connected equipment shall be protected through 3 wire cords and plugs or shall be double insulated.

- 3.5.5 All power tools and equipment connected by cord and plug, and all extension cords must be visually inspected. GFCI devices must be inspected and tested prior to each use.
- 3.5.6 Extension cords must be of the three-wire grounded type S, SE, SO, ST and rated for hard service and a minimum 14 gauge in size. No flat cords are allowed. Cords shall not be spliced or taped. Damaged cords shall be removed from service and tagged as defective, or rendered unusable by removing the male plug end. All cords should be checked for proper polarity.
- 3.5.7 Cords shall be protected from traffic, sharp edges and corners. Extension cords and cables passing through high traffic areas shall be elevated or covered for protection. Extension cords shall not be fastened with staples, hung from nails or suspended with wire. Extension cords shall be arranged to eliminate any tripping hazards.
- 3.5.8 All electrically powered equipment, including motors, transformers, generators, welders, and other machinery, shall be properly grounded, and insulated.
- 3.5.9 All 120 volt, single phase, 15 and 20 amp receptacle outlets on construction sites, which are not part of the permanent wiring (otherwise known as temporary power circuits) shall have GFCI protection. GFCI protection is required when extension cords, cord sets, power tools, equipment, etc. are connected to permanent wiring during the construction project.
- 3.5.10 Secondary external GFCI protection (pigtales) are required on all generator power including, welding machines, mobile light towers, etc. This is in addition to any GFCI protection built into the outlet.
- 3.5.11 Electrical equipment shall be periodically inspected and repaired as necessary. The electrical contractor shall inspect the temporary power, including the GFCI devices and lights, on a weekly basis. All temporary power receptacles shall be numbered and labeled to confirm a weekly inspection has been completed.. Results of these inspections will be documented, and provided to Site Management.
- 3.5.12 Work on live or energized systems is generally not permitted. If such work is unavoidable, an energized work plan in compliance with NFPA 70e must be developed, reviewed and accepted by Messer prior to commencement of work.
- 3.5.13 When energized parts are exposed barriers, ,guards and signage shall be used to prevent the area involved in electrical work from becoming an access point.
- 3.5.14 All contractor/supplier personnel trained and authorized to work on, or around energized electrical systems shall be required to have all required PPE and arch flash protection required by NFPA 70e.

- 3.5.15 Construction/temporary lighting shall meet NEC and OSHA requirements as well as maintaining a minimum of 5-foot candles and/or more where the standards require it. Each room shall have at least one active temporary lamp until such times that the permanent lighting systems are activated.
- 3.5.16 Temporary lighting bulbs shall be protected from breakage. Metal case sockets shall be grounded. Do not suspend temporary lights by their electrical cords unless it has been designed for this use. GFCI protection is required when lighting is located in wet or conductive locations. Temporary lighting must be on a dedicated circuit.
- 3.5.17 Temporary task lighting shall be mounted to a stand or secured to a base. Temporary task lighting shall meet all other applicable standards associated with temporary lighting as indicated in NEC and OSHA.

### 3.6 Lockout, Isolation, and Tag out of Equipment

- 3.6.1 Equipment that could present a hazard to personnel if accidentally activated during the performance of installation, repair, alteration, cleaning, or inspection work shall be made inoperable and free of stored energy and/or materials prior to the start of work. Such equipment shall be secured where possible by locking and tagging methods.
- 3.6.2 Where equipment is subject to unexpected movement such as rotating, turning, dropping, falling, rolling, sliding, etc., mechanical and/or structural constraints shall be applied to prevent such movement.
- 3.6.3 The use of tags without locks shall be permitted only when the use of locks is physically impossible. Strict controls and supplemental protective measures such as physical separation, blocking, removing fuses, or positioning an attendant by the tagged equipment shall also be utilized.
- 3.6.4 Where safety locks are used for locking out or isolating equipment, the lock shall be specially identified and easily recognized as a safety lock. All such locks shall be individually keyed with the key(s) in the control of the authorized individual. The use of a master key to open any safety locks is prohibited.
- 3.6.5 Where more than one person is assigned to work on a piece of equipment or system, each person shall be responsible for applying their own individually keyed lock to each lockout device. When this is not possible, a group/complex lockout/tag out procedure is acceptable, provided that a plan is developed and communicated to the Messer representative before lockout takes place.

- 3.6.6 Controls that must be de-energized during the course of work shall be locked and tagged accordingly. De-energized equipment and circuits shall be rendered inoperative, and tagged at points where the equipment can be energized. The contractor/supplier shall provide a written lockout/tag out program.

### 3.7 Tools

- 3.7.1 All tools shall be used in accordance with the manufacturer requirements and recommendations. Guards must remain in place and operational at all times.

#### 3.7.2 General/Hand Tools

- 3.7.2.1 Impact tools, such as drift pins, wedges, and chisels, shall be kept free of mushroomed heads.
- 3.7.2.2 Any tool found not in proper working order, or that develops a defect during use, shall be immediately removed from service and not used until properly repaired.
- 3.7.2.3 Personal protective equipment shall be in accordance with section 3.1 of these requirements and manufacturer recommendations.
- 3.7.2.4 All tools shall be used with the correct shield, guard, or attachment recommended by the manufacturer.

#### 3.7.3 Electric Tools

- 3.7.3.1 Electric power operated tools shall either be double-insulated type or grounded.
- 3.7.3.2 The use of electric cords for hoisting or lowering tools shall not be permitted.

#### 3.7.4 Pneumatic Tools

- 3.7.4.1 Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected.
- 3.7.4.2 Safety clips or retainers shall be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.
- 3.7.4.3 All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than 100 psi pressure at the tool, shall have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.

#### 3.7.5 Powder Actuated Tools

- 3.7.5.1 Only employees who have proof of training, in the operation of the particular tool in use shall be allowed to operate a powder-actuated tool.
- 3.7.5.2 The tool shall be tested each day before loading to see that safety devices are in proper working condition. The method of testing shall be in accordance with the manufacturer's recommended procedure.
- 3.7.5.3 Warning signs shall be posted at access points to areas where powder-actuated tools are being used. This signage shall include at minimum "CAUTION POWDER-ACTUATED TOOL IN USE".
- 3.7.5.4 Loaded tools shall not be left unattended.



- 3.7.5.5 Storage of powder cartridges and disposal of expended or unexpended cartridges shall comply with the manufacturer's recommendations.

### 3.8 Confined Space Entry

- 3.8.1 All confined space activities must be reviewed with the project management team prior to commencement of the related work activities. Confined space entry permits are required as part of the entry process.
- 3.8.2 Confined spaces, including tanks, manholes, vessels, containers, pits, bins, vaults, tunnels, shafts, trenches, ventilation ducts, or other enclosures where known or potential hazards may exist, shall not be entered without strictly adhering to a confined space entry policy, which meets the requirements of 29 CFR 1926 Subpart AA.
- 3.8.3 Prior to entering the confined space, the area shall be completely isolated to prevent the entry of any unauthorized individuals, hazardous substances, or materials, which threaten the safety of the entrants and the stability of the space. All energy sources, including stored or residual energy, shall be isolated and/or blanked, and locked out.
- 3.8.4 The atmosphere shall be tested before entry and monitored to determine if it is safe. Acceptable limits are:
  - 3.8.4.1 Oxygen: 19.5% lower – 23.5% upper;
  - 3.8.4.2 Flammable Gas: Not to exceed 10% of Lower Flammable Limit (LFL);
  - 3.8.4.3 Toxic Contaminants: Not to exceed the Permissible Exposure Level (PEL).
  - 3.8.4.4 Airborne Combustible Dust: Not to exceed its Lower Flammable Limit (LFL)
- 3.8.5 Continuous atmospheric monitoring shall take place throughout the entry. Monitoring results shall be documented on the entry permit, with the initials of the individual conducting the testing.
- 3.8.6 Contractors/suppliers shall complete a confined space entry permit before permitting workers to enter the space. This document shall be reviewed and approved via a signature by the entry supervisor. The contents of the completed permit shall be reviewed with the entrants before entering the space.
- 3.8.7 The confined space shall have an attendant monitoring the activities within the space. This individual shall be in constant communication with the entrants inside the space. At all times, the attendant shall know who is inside the space. The attendant shall not have any other responsibilities than monitoring the space. He/she may not enter the space to perform rescue unless relieved of his/her duties as an attendant.
- 3.8.8 Adequate ventilation shall be provided to establish and maintain a stable atmospheric environment. Ventilation systems shall be designed for use in confined spaces.
- 3.8.9 Non-entry rescue systems shall be designed for the retrieval of humans, and shall not be used for equipment purposes. Entrants inside the space shall wear full body harnesses, and shall be connected to the retrieval system.

- 3.8.10 Rescue procedures for all confined spaces shall be established prior to entry. If a space is classified as permit-required, contractors/suppliers shall ensure proper rescue provisions are provided, including a trained entry/rescue team when required.
- 3.8.11 All individuals involved in confined space activities shall have extensive training, including hands-on experience with the safety equipment involved. Documentation of required training shall be submitted to Messer prior to the start of any confined space work activities.
- 3.8.12 Once the confined space work has been completed, the entry permit shall be cancelled. A copy of the cancelled permit shall be given to the Messer representative.

### 3.9 Excavation and Trenching

- 3.9.1 Excavating shall not be performed until the location of underground utilities or other installations that reasonably may be expected to be encountered are determined. Utility marking services, owner representatives, and reference drawings, which have been prepared and identified for the specific job, shall be used to review and/or identify any potential hazards. Hydro-excavation, potholing and/or hand digging shall be used within tolerance zones and to confirm locations of existing utilities to be crossed.
- 3.9.2 A competent person shall perform daily documented inspections of excavations and shall be responsible for soil classification. All excavation documents shall be maintained on site and shall be available for review by Messer. Inspections shall occur before the work begins, and as needed throughout the shift. Inspections shall also occur after rain, snow, thaw or other hazardous conditions affect the excavation. If evidence of a hazardous condition is apparent, all work in the excavation shall cease until necessary corrections have been made by the competent person.
- 3.9.3 Benching, sloping, shielding or shoring shall be used in all excavations 5 feet or more in depth except when excavating in stable rock. Shoring of excavations less than 5 feet deep may be required if examination by a competent person reveals ground movement or evidence of a possible cave in.
- 3.9.4 Excavations below the footings of foundations, retaining walls, or structures themselves shall not be permitted, except in stable rock or if the wall is underpinned and steps have been taken to ensure stability of the structure. Support systems shall be planned and designed by a qualified person – usually a professional engineer.
- 3.9.5 If forms or other structures are installed or constructed in an excavation so as to reduce the dimension (measured from the forms/structure to the sides of the excavation) to 15 feet or less (measured at the bottom of the excavation), a trench inside of an excavation has been created. This may affect the access and egress associated with the excavation, as well as with the trench.
- 3.9.6 Water shall not be permitted to accumulate in an occupied excavation. Existing or flowing water shall be removed prior to and during entry into the excavation.

- 3.9.7 Support systems shall be planned and designed by a qualified person (generally a professional engineer) when the excavation is in excess of 20 feet deep, adjacent to structures, or subject to water or vibration. All shoring systems shall be designed by a qualified person, or built in accordance with OSHA Subpart P.
- 3.9.8 Excavations 4 feet or more in depth and occupied by personnel shall be provided with ladders or other effective means of exit. In trenches, these access points must be located within 25 feet of the area in which the individuals are working.
- 3.9.9 Adequate barrier protection for excavations shall be provided when not readily visible or when located adjacent to vehicular or foot traffic. Barriers or warning systems shall be easily visible, day or night. Barriers/warning systems must be located at least 6 feet from the edge of the excavation.
- 3.9.10 When an atmospheric condition may exist and/or develop in an excavation, atmospheric monitoring of the excavation shall take place before and during entry. Ventilation shall be provided when the monitoring indicates the necessity of such.
- 3.9.11 Excavated earth or other materials shall be placed at least 2 feet from the edge of the excavation.
- 3.9.12 At no time shall equipment (not directly associated with the excavation work) be operated within 2 feet of any excavation. If it is necessary to operate heavy equipment on a level above and near an excavation, the sides of the excavation shall be sheet-piled, shored, and braced as necessary to resist additional pressure. Barricades or stop logs shall be used around an excavation when mobile equipment is used near an excavation.
- 3.9.13 Backfilling and removal of trench supports shall progress from the bottom of the trench. Ropes shall be used to pull out the jacks after all workers have cleared the trench.
- 3.9.14 Caisson entry shall be performed in accordance with Associated Drilled Shaft Contractors' (ADSC) Recommended Procedures for Entry of Drilled Shaft Foundation Excavations. Where access and egress is restricted and/or atmospheric conditions could be expected to present a hazard, this work activity should be performed following the permit-required confined space process.

### 3.10 Mobile/Heavy Equipment

- 3.10.1 The design capacity of any piece of equipment shall not be exceeded, nor shall the equipment be modified in any manner that alters the original safety or capacity factor.
- 3.10.2 Mobile equipment shall be fitted with suitable alarms and motion sensing devices. If no backup alarm is present, a designated spotter shall be provided whenever the equipment is backing.

- 3.10.3 A safety observer shall be assigned to watch the movement of heavy mobile equipment where such movement may cause a hazard to other personnel, or where equipment could hit overhead lines or structures. The observer shall also ensure that people are kept out of the way or path of suspended loads, and clear of the mobile equipment.
- 3.10.4 Equipment shall be inspected by the contractor/supplier using and/or controlling such equipment prior to its use on the job, and periodically thereafter to ensure that it is in safe working order. Defective equipment shall be removed from service immediately, and a warning tag attached. Equipment with exposed gears, belts, couplings, etc. must be provided with proper guards.
- 3.10.5 Under no circumstances shall any piece of equipment or a load come within 10 feet of any energized overhead power line or other critical structure.
- 3.10.6 Only trained, qualified, and authorized personnel shall operate mobile equipment. Documentation of training shall be available upon request. Contractor personnel shall not operate Messer equipment unless written authorization is provided by the Messer representative.
- 3.10.7 Loads shall not be suspended from the forks of a forklift or other material handling equipment. An appropriate, manufacturer approved attachment including a locking latch or shackle shall be used to handle suspended loads.
- 3.10.8 Equipment with an elevated load or left running shall not be left unattended for any period of time. Loads must be grounded, the machine must be turned off, and parking brake set when machine is unattended. Equipment is considered unattended when the operator is more than 25' away from the equipment or any time the operator is not in view of the equipment. This does not include road vehicles such as: trucks, cars or tractor trailers.
- 3.10.9 Only trained and qualified persons shall perform maintenance on mobile/heavy equipment. A safe plan of action must be written and communicated anytime the equipment must be serviced while left running.

### 3.11 Cranes and Rigging

- 3.11.1 All crane operations must be in accordance with the requirements in 1926 Subpart CC – Cranes and Derricks in Construction.
- 3.11.2 The contractor/supplier shall be required to attend any scheduled pre-construction meetings focusing on crane signaling and/or other specific safety issues whenever its work involves or is associated with cranes or whenever the Messer representative deems is necessary.
- 3.11.3 A qualified signal person shall be used whenever the operator's view of the area of operation or direction of travel is obstructed, or whenever it is deemed necessary in response to a specific safety concern.

- 3.11.4 A qualified rigger shall be used for all hoisting operations associated with assembly and disassembly work. Additionally, qualified riggers are required whenever workers are located within the fall zone.
- 3.11.5 If any part of the equipment, load line or load (if operated up to the equipment's maximum working radius in the work zone) could get closer than 20 feet to a power line the requirements of Option 1, 2, or 3 of 1926.1408 shall be met.
- 3.11.6 Contractors/suppliers shall ensure that all crane operators are qualified to operate the equipment safely and are trained and evaluated before operating the equipment. The contractor shall provide Messer with documentation of all qualified operator training at the time the individual arrives on the jobsite.
- 3.11.7 Operators shall not be engaged in activities that distract their attention while operating.
- 3.11.8 Generally, cranes shall not be left unattended while running. However, when crane operation is frequently interrupted during a shift and the operator must leave the crane, the engine may remain running and the following conditions shall apply:
  - 3.11.8.1 Land any load, bucket, lifting magnet, or other device;
  - 3.11.8.2 Disengage the master clutch;
  - 3.11.8.3 Set travel, swing, boom brakes, and other locking devices;
  - 3.11.8.4 Put controls in the off or neutral position
  - 3.11.8.5 Secure the crane against accidental travel;
  - 3.11.8.6 The operator shall be situated where unauthorized entry of the crane can be observed; and
  - 3.11.8.7 The crane shall be located within an area protected from unauthorized entry.
- 3.11.9 Contractors/suppliers shall ensure that crane inspections are performed as required by an appropriate inspector. Special attention shall be given to such items as cables, hoses, guards, booms, blocks, hooks, and safety devices. Prior to operation, current, annual and monthly inspection documentation must be provided to Messer and made available on the piece of equipment. Additionally, shift inspection documentation must be recorded and submitted to Messer at a minimum weekly and/or upon request.
- 3.11.10 The swing radius of the crane counter weights must be barricaded.
- 3.11.11 Working or riding on crane loads suspended, lowered, or hoisted is prohibited except as permitted by, 1926.1431, focusing on crane suspended personnel platforms.
- 3.11.12 Winch trucks shall not have a load suspended from the hook while traveling. The load shall be secured on the bed of the truck. The hook of a winch truck must be tied down or secured in some manner, and not allowed to dangle freely when traveling.
- 3.11.13 Natural and synthetic fiber rope made of materials such as manila, nylon, polyester, or polypropylene shall not be used as slings on mobile equipment.

### 3.12 Welding and Cutting

- 3.12.1 In areas where welding or other hot work is conducted. In addition to any permanently placed units, a minimum of one 10 lb. ABC dry chemical extinguisher shall be immediately available in the work area. A fire watch and/or hot work permit may also be necessary.
- 3.12.2 Adequate ventilation shall be provided to maintain acceptable atmospheric conditions when welding, cutting, grinding, or heating. Where adequate ventilation cannot be maintained, respirators or air hoods shall be used.
- 3.12.3 Compressed gas cylinders shall be secured in an upright position at all times. Cylinder valves shall be closed when work is interrupted or finished, and when cylinders are empty or being moved.
- 3.12.4 When cylinders are lifted by hoisting equipment, a basket, cradle, or a similar handling device shall be used. Electromagnet, hooks, ropes, or slings shall not be used to lift cylinders, and cylinders shall not be lifted by their caps.
- 3.12.5 Oxygen cylinders shall not be stored close to cylinders of acetylene or other fuel gases, and they must be kept clear of fuel oils, grease, etc. Cylinders stored in the open shall be protected from accumulation of ice and snow, and shielded from direct sun when temperatures are high. Compressed gas cylinders shall be stored so as to avoid possible destruction or obliteration of labels or other means of identifying the contents. Oil or other hydrocarbon contamination shall be avoided on all cylinder gauge connections and regulator devices.
- 3.12.6 Electric arc welding machines shall be disconnected when moved, and turned off when not in use. They shall be disconnected from the primary supply at the end of the workday.
- 3.12.7 Welding cables shall be positioned so they will not be damaged or present a trip hazard.
- 3.12.8 The ground return electrode shall be attached directly to the work to prevent current flow through structures and equipment. All welding cables and connections shall be first quality industrial material, and shall be in good repair.
- 3.12.9 Welding equipment powered by hydrocarbon fuels shall not be used unless proper exhaust venting is provided.
- 3.12.10 All arc welding and cutting operations shall be shielded by non-combustible or flameproof screen, which will protect employees and other persons working in the vicinity from the direct rays of the arc.

### 3.13 Lasers

- 3.13.1 Only employees who are trained and qualified for laser use shall be allowed to use laser equipment. Those employees who are authorized to operate laser equipment shall have proof of such training/authorization in their possession at all times while equipment is in use.
- 3.13.2 Standard laser warning signs shall be posted at access points to areas where lasers are being used.

### 3.14 Fire Protection and Prevention

- 3.14.1 The contractor's/supplier's emergency response procedures shall contain provisions for fires or explosions. Contractor/supplier employees shall know the location of and shall be familiar with the fire control equipment. The phone number of the nearest local fire department shall be readily accessible.
- 3.14.2 An adequate number of fire extinguishers of the proper type for the materials exposed and the work performed shall be placed in accessible locations based on the work taking place. Individuals who may use these devices shall be trained in their use. Contractors/suppliers should provide their own extinguishers, especially for activities that require them in the direct vicinity of their work.
- 3.14.3 Extinguishers shall be checked monthly for usage and service condition, and shall be in good operating conditions at all times. Owner extinguishers should only be used in an emergency. Messer representatives shall be notified if an individual discharges an extinguisher other than their own.
- 3.14.4 Equipment and materials shall be stored so as not to block access to fire control and emergency equipment such as fire hydrants, extinguishers, hose racks, alarm boxes, safety showers, self-contained breathing apparatus, etc. A minimum of 15 feet of clearance shall be maintained around fire hydrants.
- 3.14.5 Likewise, materials and equipment shall not block or compromise the integrity of smoke/fire walls and doors. Messer representatives must approve any activity affecting the operation of these devices. The same is true when fire exits may be blocked.
- 3.14.6 Only approved containers shall be used for the storage, transport, and use of flammable substances. Portable containers used for transporting and transferring gasoline or other flammable liquids shall be approved (metal) safety cans equipped with flash arrestors and self-closing lids. All such containers shall be clearly labeled as to its contents. When transferring flammable liquids from one container to another, a bonding wire shall connect the containers.
- 3.14.7 Secondary containment is required for all above ground fuel storage tanks. Double wall storage tanks are also acceptable. In addition, such tanks must be protected from collision damage. Drip pan must be used to prevent any spillage from the dispense nozzle.

- 3.14.8 Areas around welding or flame cutting operations shall be kept free of flammable or combustible materials. Welding, cutting, or any ignition source is not permitted within 50 feet of any refueling, spray painting, or storage of flammable liquids.
- 3.14.9 For mixing and spray application of flammable and combustible materials, only equipment which is approved for that specific use shall be employed.
- 3.14.10 Adequate ventilation to prevent an accumulation of flammable vapors shall be provided where solvents or volatile cleaning agents are used. Extra precaution is needed when solvents are used in the presence of hot surfaces, or where high heat and ultra-violet rays from welding may present an additional hazard from toxic vapors.
- 3.14.11 Fuel fired heating devices shall not be used in confined or unventilated spaces.
- 3.14.12 Open flame heating sources shall not be used in areas where combustibles are stored.
- 3.14.13 No more than 25 gallons of flammable or combustible liquid shall be stored in a room outside of an approved storage cabinet. A maximum of 60 gallons of flammable liquid or 120 gallons of combustible liquid shall be stored in a storage cabinet. Quantities in excess shall be stored in a storage room.
- 3.14.14 Warning signs shall be posted where flammable or combustible materials (solid, liquid, and gas) are stored. “No Smoking” signs shall be posted in areas of possible fire hazards. Contractors/suppliers shall abide by no smoking policies required on specific sites.
- 3.14.15 Liquid Petroleum Gas shall never be stored in a building.
- 3.14.16 An individual designated as a “fire watch” shall be provided by the contractor/supplier when required for hot work activities and shall be trained in the proper operation of fire extinguishers and understand general “fire” protocol.
- 3.14.17 It is the responsibility of each individual to become familiar with the location of the exits that could be used in case of a fire or other evacuation emergencies.
- 3.14.18 Hot Work Permits maybe required as per jobsite specific rules. Work activities which produce: spark, slag or open flame may be required to have a Hot Work Permit.

### 3.15 Demolition

- 3.15.1 Prior to permitting employees to start demolition operations, an engineering survey shall be made, by a competent person, of the structure to determine the condition of the framing, floors, and walls, and possibility of unplanned collapse of any portion of the structure. Any adjacent structure where employees may be exposed shall also be similarly checked. Employer shall document the survey.
- 3.15.2 When employees are required to work within a structure to be demolished which has been damaged by fire, flood, explosion, or other cause, the walls or floor shall be shored or braced as directed by a PE.



- 3.15.3 No material shall be dropped to any point lying outside the exterior walls of the structure unless the area is effectively protected. Whenever materials are dropped more than 20 feet to any point lying outside the exterior walls of the building, an enclosed chute shall be used.
- 3.15.4 When debris is dropped through holes in the floor without the use of chutes, the area onto which the material is dropped shall be completely enclosed with barricades not less than 42 inches high and not less than 6 feet back from the projected edge of the opening above. Signs, warning of the hazard of falling materials, shall be posted at each level. Removal shall not be permitted in this lower area until debris handling ceases above.
- 3.15.5 All material chutes, or sections thereof, at any angle of more than 45 degrees from the horizontal, shall be entirely enclosed, except for openings equipped with closures at or about floor level for the insertion of materials. The openings shall not exceed 48 inches in height measured along the wall of the chute. At all stories below the top floor, such openings shall be kept closed when not in use.

### 3.16 Use of Vehicles

- 3.16.1 Access to the job site shall be according to local regulations. Adequate traffic control signs shall be enforced. Access roadways shall be clearly marked, and shall be used.
- 3.16.2 Contractor/supplier vehicles shall be kept in safe operating condition, and contractor/supplier personnel shall comply with local and site regulations regarding the operation of such vehicles.
- 3.16.3 Contractors/suppliers shall not use or operate Messer vehicles, mobile equipment, or employee vehicles without the specific authorization from the Messer representative.
- 3.16.4 Contractor/supplier employees shall park in designated areas. They shall not park on roadways or service drives, or near doorways, loading bays, dumpster boxes, or access to fire hydrants or hoses. Contractor/supplier personnel shall always check carefully before backing up.
- 3.16.5 Fuel tanks on vehicles shall not be filled while the engine is running. The driver shall stay with the vehicle. Smoking is prohibited during refueling.
- 3.16.6 Vehicle accidents on Messer job sites shall be reported to the Messer representative immediately.
- 3.16.7 All cargo shall be secured. Material hanging over the sides or ends of a truck shall be flagged.
- 3.16.8 Transporting employees on equipment not designed for that specific purpose is prohibited. This includes riding while hanging onto the exterior of a vehicle or mobile equipment. Seatbelt use is mandatory for drivers/operators and passengers in all vehicles and equipment. No one is permitted to ride in the beds of trucks.

### 3.17 Construction Signage Use

- 3.17.1 Contractors shall install appropriate and effective warning and/or caution signs identifying hazards associated with work being completed.
- 3.17.2 Signs warning of high voltage shall be posted where unauthorized workers might come into contact with live parts such as overhead power lines and electrical closets.
- 3.17.3 Contractors shall ensure Caution-Overhead Work placards/signs are posted where other work activities are taking place near elevated work areas.

### 3.18 Concrete and Masonry

- 3.18.1 All protruding reinforcing steel, onto and into which employees could fall, shall be guarded to eliminate the hazard of impalement.
- 3.18.2 A limited access zone shall be established whenever a masonry wall is to be constructed. The limited access zone shall conform to the following:
  - 3.18.2.1 The limited access zone shall be established prior to the start of construction of the wall;
  - 3.18.2.2 Be equal to the height of the wall to be constructed plus four feet, and shall run the entire length of the wall;
  - 3.18.2.3 Be established on the side of the wall, which will not contain a scaffold;
  - 3.18.2.4 Be restricted to entry by employees actively engaged in constructing the wall. No other employees shall be permitted to enter the zone;
  - 3.18.2.5 Remain in place until the wall is adequately supported to prevent overturning and to prevent collapse.
- 3.18.3 All masonry walls over eight feet in height shall be adequately braced to prevent overturning and to prevent collapse. The bracing shall remain in place until permanent supporting elements of the structure are in place.
- 3.18.4 When overhand brick laying work is performed from scaffolding, the working side of the scaffold shall be protected from falls by guardrails or three courses of material with an effective height of no less than 24 inches above the work platform.
- 3.18.5 Dust control methods must be used when cutting, chipping, grinding, sand blasting or any other process involving concrete, block or brick. Wet methods must be used as first means of dust control. If not feasible, alternative methods must be in compliance with OSHA Respirable Crystalline Silica Standards.
- 3.18.6 Adequate eyewash facilities must be readily available for all employees working with fresh (uncured concrete or brick) cleaning solutions.
- 3.18.7 Workers placing concrete from a chute, concrete bucket or hose shall wear adequate eye and face protection.

## 4.0 HEALTH REQUIREMENTS

### 4.1 Hazardous/Toxic Substances

- 4.1.1 The contractor/supplier shall develop and maintain a written Hazard Communication Program as required by 29 CFR 1926.59. The written program shall be submitted to the Messer representative prior to beginning work. Contractor/supplier employees and appropriate regulatory officials shall have access to the program. Contractor/supplier shall be responsible for ensuring that sub-tier contractors/suppliers have copies of their Hazard Communication programs on the job sites.
- 4.1.2 The written program requirements include a current list of hazardous chemicals present at the site, a labeling system for containers of chemicals at the work site including dispensing/transfer containers, and corresponding Safety Data Sheets (SDS).
- 4.1.3 The contractor/supplier shall submit copies of all relevant SDS's to the Messer representative before the materials are brought on site.
- 4.1.4 Safety Data Sheets (SDS) shall be requested / obtained from the vendor for all hazardous chemicals or materials brought on site by the contractor. Container labels or warning systems for hazardous chemicals/materials shall include the name of the chemical/material the hazard is associated with, its use and exposure, and any necessary precautions.
- 4.1.5 Contact or exposure to hazardous chemicals/materials exceeding Permissible Exposure Levels (PEL) shall be avoided, preferably through the implementation of engineering or administrative controls. Where such controls are infeasible, appropriate personal protective equipment such as chemical resistant clothing, gloves, aprons, goggles and respirators shall be used. Unnecessary contact with any hazardous materials shall be avoided.
- 4.1.6 Messer representatives shall be notified immediately of a spill or release of a hazardous material. Messer representatives shall inform the owner of the occurrence.
- 4.1.7 Hazardous and/or toxic materials such as solvents, coatings, or thinners shall be stored in approved containers. Original shipping containers that satisfy local safety regulations are considered approved containers for transporting and storing these materials. All hazardous or toxic materials shall be returned to the designated storage area at the end of each shift. Hazardous, toxic or flammable materials shall not be stored in occupied buildings.
- 4.1.8 The contractor/supplier shall train its employees about the contractor's/ supplier's obligations under the law, and hazards and protective measures of chemicals to which they may be exposed. The contractor/supplier shall train its employees on the meaning of any labels, symbols, colors or other codes that might be used at the work site by the contractor, Messer employees, or other contractors/suppliers, to warn of particular worksite hazards. All such training shall be documented and retained by the contractor/supplier, with a copy provided to the Messer representative upon request.

- 4.1.9 Contractors/suppliers engaged in renovation or demolition projects shall ensure employees are trained in the potential environmental health hazards of such work. This includes a minimum of awareness level training in asbestos, lead and mold. Training shall be documented and available to Messer upon request.
- 4.1.10 Contractors/suppliers whose work creates excessive dust or fumes shall provide adequate engineering controls such as an exhaust or ventilation system, and/or conduct work at “off hours”, as approved by the Messer representative. Exhaust and/or ventilation systems must be reviewed with the Messer representative prior to implementation.
- 4.1.11 All equipment with combustion engines used indoors shall be fueled with LP gas, exhausted to the exterior, or be fitted with oxy-cat mufflers. The areas shall also be monitored for carbon monoxide.

## 4.2 Respiratory Protection

- 4.2.1 The contractor/supplier shall protect personnel and the public from exposures to dust, fumes, vapors, mists or gases in excess of Permissible Exposure Limits (PEL) or Short Term Exposure Limits (STEL), as referenced by the Occupational Safety and Health Administration (OSHA), American Conference of Governmental and Industrial Hygienist (ACGIH).
- 4.2.2 Where exposure is unavoidable, and engineering or administrative controls such as isolation of the hazardous materials, ventilation or limiting exposure periods may not provide adequate protection, use of approved respirators shall be required.
- 4.2.3 Personnel shall wear appropriate respiratory protection when applying toxic or hazardous materials inside tanks, rooms, or other areas where adequate ventilation does not exist.
- 4.2.4 Personnel required to wear respiratory protection shall be trained, fit tested, and medically qualified to wear such devices. Documentation shall be made available upon request. Contractors/suppliers shall ensure that sub-tier contractors/suppliers have this information available for review.
- 4.2.5 The contractor/supplier shall implement a respiratory program, which includes proper maintenance and care of the respirators and any related equipment.

## 4.3 Medical Surveillance

- 4.3.1 Individuals, depending upon the type of work and qualifications, may be required to be medically qualified prior to doing certain types of work, or where exposure to certain hazardous materials exists.
- 4.3.2 The contractor/supplier shall provide post exposure surveillance when deemed necessary.

#### 4.4 Hearing Conservation and Noise Control

- 4.4.1 Hearing protection is required in all posted high noise level areas of Messer projects. Hearing protection may also be required where excess noise exposure exists even on a temporary basis. This would include situations where equipment such as jackhammers, saws, drills, grinders, or heavy equipment is being utilized, and the 90-decibel level is exceeded. The contractor shall implement the necessary hearing protection to respond to these noise hazards.
- 4.4.2 Areas where noise levels exceed the 90-decibel standard on a routine shall require adequate hearing protection, and this requirement shall be effectively communicated to those affected. Employees shall also wear adequate PPE when working in areas where noise levels exceed the 90-decibel standard on a temporary and/or intermittent basis. This protection could include muffs, plugs, or a combination thereof. Individuals required to wear such hearing protection shall be properly fitted and trained.
- 4.4.3 Where routine exposure to noise in excess of the 85 TWA (Time Weighted Average, 8-hour Workday) decibel level occurs, the contractor personnel are subject to the provisions of the OSHA Hearing Conservation Standard. This includes audiometric testing, employee training and any other applicable requirements.

#### 4.5 Asbestos Containing Materials

- 4.5.1 If asbestos is suspected or materials containing asbestos are discovered on site, Messer representatives shall be notified immediately. All work in and around the suspected materials shall cease until a determination is made by a qualified third party, and any necessary abatement is completed.
- 4.5.2 Individuals involved with the handling, removal, demolition, and/or disposal of materials containing asbestos shall comply with OSHA, EPA, and other state and/or local standards governing this activity.
- 4.5.3 The OSHA Asbestos Standard requires that personnel working with asbestos shall be properly trained, monitored for exposure, and medically surveyed where necessary. Engineering controls and personal protective equipment shall be utilized to prevent exposures in excess of the Permissible Exposure Limit (PEL).
- 4.5.4 Individuals shall comply with Environmental Protection Agency (EPA) removal requirements for asbestos including: written notification prior to removal, utilization of emission controls, and special handling and disposal procedures.
- 4.5.5 All individuals hired to perform asbestos abatement work shall be properly bonded, insured, and licensed by the appropriate governing agencies.
- 4.5.6 All individuals hired to perform lead abatement shall be properly bonded, licensed, and insured, as required by the appropriate governing agencies.

- 4.5.7 The employer handling abatement work shall confirm or deny materials contaminated with asbestos through the necessary documented testing/surveying resources. This testing may be conducted through an established third party testing agency.

#### 4.6 Lead Containing Materials

- 4.6.1 If lead is suspected or materials containing lead are discovered on site, Messer representatives shall be notified immediately. All work in and around the suspected materials shall cease until a determination is made by a qualified third party and any necessary actions take place.
- 4.6.2 All individuals hired to perform lead abatement and/or disturbing lead-containing surfaces shall be properly bonded, licensed, and insured, as required by the appropriate governing agencies.
- 4.6.3 Individuals involved with the handling, removal, demolition, and/or disposal of materials containing lead shall comply with, EPA, and other state and/or local standards governing this activity. Individuals shall specifically comply with the OSHA Construction Standard, 1926.62.
- 4.6.4 Unless sampling results verify zero concentrations of lead, all existing painted surfaces that will be disturbed shall be assumed to be lead-containing.
- 4.6.5 An exposure assessment/air monitoring shall be conducted to determine the anticipated exposure levels of individuals disturbing the lead-containing surfaces, and the type of protection needed when doing such.
- 4.6.6 All employees performing this type of work shall be trained on the hazards of lead exposure, participate in a medical surveillance program, when necessary and shall be trained on and shall use the appropriate protective equipment.

#### 4.7 Silica

- 4.7.1 Any contractor/suppliers performing potential silica-related work shall submit a written silica exposure control plan prior to beginning work and must identify a competent person for the project. The silica exposure control plan shall include task-specific controls that are in compliance with OSHA Table 1 or documentation of appropriate protection must be provided for alternate controls.
- 4.7.2 Contractor/suppliers shall identify a competent person for the project and shall ensure workers are trained on operations that could result in exposure to silica and proper control measures in compliance with the OSHA standard.

- 4.7.3 Dry sweeping without dust compounds and use of compressed air for cleaning of silica containing dust is strictly prohibited. Dust containing silica shall be wet swept, swept using appropriate sweeping compound or vacuumed using an approved HEPA vacuum and filter.

#### 4.8 Industrial Hygiene and Exposure Standards

- 4.8.1 The contractor/supplier shall be responsible for determining potential job-related health risk exposures as well as the applicable Permissible Exposure Level (PEL) or standard.
- 4.8.2 Where the potential exists for employee exposure to occupational health risk(s) at the job site, the contractor/supplier shall identify and evaluate those risk(s) relevant to its work activity, through various means including medical surveillance, monitoring of health complaints, incident reports and workers' compensation claims, and industrial hygiene sampling and personnel exposure monitoring methods.
- 4.8.3 For industrial hygiene sampling/exposure monitoring, the contractor/supplier shall be responsible for providing the necessary equipment and expertise to do the work. Samples/monitoring results shall be sent to a NIOSH-approved laboratory for evaluation. Results from sampling/monitoring shall be communicated to affected employees with a written record submitted to the Messer representative upon request.

#### 4.9 Moisture Intrusion and Mold

- 4.9.1 While mold may not be completely eliminated during construction activities, Messer requires the following steps to be taken to control mold and minimize any adverse effects:
  - 4.9.1.1 Notify the Messer management team immediately following a water intrusion or the identification of mold;
  - 4.9.1.2 Dry water-damaged areas and materials as soon as possible, within 24 hours and not later than 48 hours after the water intrusion event;
  - 4.9.1.3 Replace porous materials as they cannot be cleaned effectively. Clean non-porous surfaces with detergent and water, and dry them completely.
- 4.9.2 Contractors can often clean a small outbreak of mold. However, if mold growth is extensive, consult a professional with experience. When using disinfectants or biocides, always ventilate the area, using outside air if possible, and exhaust the air to the outdoors. During cleanup employees shall wear long-sleeve shirts and pants that can be washed or discarded after the work. Gloves and eye protection shall be worn as well. And when using cleaning materials such as biocides or disinfectants, follow the manufacturer's directions and wear recommended personal protective equipment, which may include respiratory protection.

#### 4.10 Hexavalent Chromium

- 4.10.1 The contractor is required to meet all applicable requirements under section 1926.1126 and/or Appendix C-1: Portland Cement Inspection Procedures. Implementation will include but not limited to air sampling, employee training, medical surveillance, protective equipment, and suitable hand washing facilities.

## 5.0 ENVIRONMENTAL REQUIREMENTS

### 5.1 Protection of the Environment

- 5.1.1 The contractor/supplier shall be knowledgeable of and comply with all federal, state, and local environmental regulations for materials, including hazardous substances or wastes, under its control. The contractor/supplier shall not dump, release, or otherwise discharge or dispose of any such materials without the express authorization of the Messer representative.
- 5.1.2 Any release of a hazardous substance to the environment, whether into the air, water, or ground, must be reported to the Messer representative immediately.
- 5.1.3 If a release resulting from contractor actions occur, the contractor/supplier shall take proper measures to counter any known environmental or health hazards associated with such a release. These would include remedial procedures such as spill control, containment, and disposal. Documentation of proper disposal shall be provided to Messer. The contractor/supplier shall also provide notification to the proper authorities.

### 5.2 Air Pollution

- 5.2.1 The contractor/supplier, depending on the type and quantity of materials, may be required to have an emergency response plan for any releases of materials to the atmosphere. The contractor/supplier shall also be aware of local ordinances affecting air pollution.

### 5.3 Water Pollution

- 5.3.1 Where materials under contractor/supplier control could be discharged to the ground or to the water, the contractor/supplier shall be aware of and comply with local sewer ordinances or other requirements, which may prohibit the discharge of certain materials into the sewer system.
- 5.3.2 The contractor/supplier shall obtain any necessary permits for materials under its control. These permits include, but are not limited to, National Pollutant Discharge Elimination System (NPDES) permits, Public Owned Treatment Works (POTW) contracts, Storm Water Control Permits, and Spill Prevention Control and Countermeasure (SPCC) plans, as well as any local or regional requirements relating to such.



## **SECTION 00 73 39 – SUPPLIER DIVERSITY REQUIREMENTS**

### **PART 1 - SUPPLIER DIVERSITY UTILIZATION GOAL**

- 1.1 It is the goal of this project to spend a minimum of 18% of the project's construction cost with M/WBE firms.
- 1.2 It is expected by the Contractor that all bidders will join in this effort. Each bidder is expected to make concerted efforts to meet or exceed the M/WBE inclusion goals by utilizing M/WBEs to perform defined portions of work; or provide supplemental labor, materials/supplies, equipment, and professional services in the course of any contract.
- 1.3 For this project, the use of the terms M/WBE Inclusion or M/WBE Participation is synonymous.

### **PART 2 - DEFINITION OF A M/WBE FIRM**

- 2.1 A qualified minority or women owned company for this project is defined as one that:
- 2.2 Must maintain in good standing, certification by a Messer Approved third party authorized to certify businesses as minority or women owned. A reference list of Messer Approved Certifying Agencies may be found at the end of this document.
- 2.3 Must be certified in the commodity or service code(s) for which they supply.
- 2.4 Shall choose the vendor, negotiate the cost, arrange delivery of, and pay for the materials and supplies required for the work of the contract. Vendor invoices for materials shall be billed to the M/WBE supplier and not to the prime contractor. Vendor invoices may periodically be reviewed to verify M/WBE inclusion.

### **PART 3 - BIDDING PROCEDURES**

- 3.1 All bidders are required to make concerted efforts to subcontract to M/WBEs. The ability or desire of a Bidder to perform the work of a contract with its own forces does not relieve the bidder of the responsibility to make concerted efforts to subcontract with M/WBE.
- 3.2 All bidders are expected to participate in Supplier Diversity activities and events established solely for this project. In addition, bidders will be required to provide evidence of the inclusion efforts made to utilize M/WBEs in connection with each bid presented on this project.



- 3.3 The term “Supplier Diversity” is the percentage of the total amount bid for each bid package/category committed to be spent directly with M/WBEs as lower tier subcontractors, material suppliers, or equipment vendors. This amount is to be identified at the time of bid and will be incorporated into the subcontract agreement and identified on payment applications in the schedule of values.
- 3.4 It is the intent of the Contractor to award a contract to the lowest and most responsible bidder, provided the bid has been submitted in accordance with the requirements of the Bidding Documents, and does not exceed the funds available.
- 3.5 Bidders shall provide the percentage of M/WBE participation in their base bid included on the Affidavit of Business Diversity Utilization Plan (SD-0001).
- 3.6 The Contractor shall have the right to waive any informality or irregularity in any bid or bids received and to accept the bid or bids which, in his judgment, is in his own best interest.
- 3.7 Basis of award and determination of lowest and most responsible bidder will consider the Business Diversity Utilization Plan in addition to price.

#### **PART 4 - CERTIFYING ENTITIES**

- 4.1 Documentation of a company's MBE/WBE certification from the Messer Approved Certifying Agencies included in this section, must be provided to the Contractor prior to notice to proceed.

#### **PART 5 - FORMS**

- 5.1 The following form is included in Section 00 41 00 – Bid Forms and must be completed with each submitted proposal or bid. Failure to complete this forms with all requested information may cause a proposal or bid to be determined to be non-responsive:
- A. Affidavit of Business Diversity Utilization Plan (SD-0001):
1. Each bidder/proposer must submit an Affidavit of Business Diversity Utilization Plan (SD-0001) with the bid OR as requested by the Project Leader.
  2. This document must be accurately completed and submitted, and must list all M/WBEs, regardless of contract amount or type of service.
  3. Failure to complete this form with all the requested information (as indicated in each column) may cause a bid or proposal to be determined non-responsive.
- 5.2 The following form is included in this section for information purposes only and does not have to be completed or returned with the bid or proposal. However, these forms are required to be submitted as stated below:
- A. M/WBE Subcontractor/Supplier Monthly Utilization Report (SD-0002):

1. The Subcontractor shall maintain records as are necessary to confirm “Inclusion Efforts” for M/WBE participation. These records shall indicate the identity of the M/WBEs employed on the contract, the type of work performed by each, and the actual dollar value of work committed to each Subcontractor, services and procurement achieved by each Subcontractor.
2. The Subcontractor shall submit information with monthly cost breakdown for progress payments that indicate the dollar value of contracts awarded to small businesses and minority and women business enterprises as the contract work occurs. This information will be submitted as a supplement to the Cost Breakdown for Progress Payments. Failure of the Subcontractor to submit the required supplementary M/WBE participation information may result in delays in processing progress payments.
3. As with other contract requirements, failure of the successful Bidder to carry out the M/WBE assurances set forth in its Subcontract may constitute a breach of contract, and may result in default termination of the Subcontract.
4. Form 00 73 39a included
5. Form 00 73 39b included
6. Form SD 0001 and SD 0002 Forms included

The Economic Inclusion department has obtained and reviewed the certification applications and requirements of the following certifying agencies to determine if their processes are stringent enough to ensure that the companies are true bona-fide Minority and Women-owned businesses.

AGENCY / PROGRAM	DBE	EDGE	MBE	SBE	VBE	WBE
All Regions						
<a href="#">National Minority Supplier Development Council</a>			✓			
<a href="#">National Women Business Owners Corporation</a>						✓
<a href="#">Women’s Business Enterprise National Council</a>						✓
Illinois						
<a href="#">Chicago MSDC</a>			✓			
Indiana						
<a href="#">City of Indianapolis Division of Equal Opportunity</a>			✓		✓	✓
<a href="#">Indiana Department of Transportation</a>	✓					
<a href="#">Mid States Minority Supplier Development Council</a>			✓			
<a href="#">State of Indiana Department of Administration</a>			✓		✓	✓
<a href="#">Women’s Business Enterprise Council – Great Lakes</a>						✓
Kentucky						
<a href="#">Commonwealth of Kentucky Minority and Women Business Certification Program</a>			✓			✓
<a href="#">Kentucky Transportation Cabinet</a>	✓					
<a href="#">Louisville &amp; Jefferson County Metropolitan Sewer District</a>			✓			✓
<a href="#">Louisville Metro Human Relations Commission</a>			✓			✓
<a href="#">Ohio River Valley Women’s Business Council</a>						✓
<a href="#">Tristate Minority Supplier Development Council</a>			✓			
North and South Carolina						
<a href="#">Carolinas-Virginia Minority Supplier Development Council</a>			✓			

<a href="#">Charlotte Mecklenburg M/WSBE Program</a>			✓	✓		✓
<a href="#">City of Greenville (SC) Minority and Women Business Enterprise Program</a>			✓			✓
<a href="#">Greater Women's Business Council</a>						✓
<a href="#">North Carolina Department of Administration's Office for Historically Underutilized Businesses</a>			✓	✓		✓
<a href="#">North Carolina Department of Transportation</a>	✓					
<a href="#">South Carolina Department of Transportation</a>	✓			✓		
<a href="#">South Carolina Governor's Office of Small and Minority Business Assistance</a>			✓			✓
<b>Ohio</b>						
<a href="#">City of Cincinnati</a>			✓	✓		✓
<a href="#">City of Cleveland</a>			✓	✓		✓
<a href="#">City of Columbus Equal Business Opportunity</a>			✓		✓	✓
<a href="#">City of Dayton Human Relations Council</a>			✓	✓		✓
<a href="#">Ohio Department of Transportation</a>	✓					
<a href="#">Ohio Minority Supplier Development Council</a>			✓			
<a href="#">Ohio River Valley – Women's Business Council</a>						✓
<a href="#">State of Ohio Department of Administrative Services</a>		✓	✓			
<b>Tennessee</b>						
<a href="#">City of Knoxville Equal Business Opportunity Program</a>			✓	✓		✓
<a href="#">Governor's Office of Diversity Business Enterprise</a>			✓	✓	✓	✓
<a href="#">Memphis Shelby County Airport Authority</a>	✓					
<a href="#">Metropolitan Nashville Airport Authority</a>			✓	✓		✓
<a href="#">Tennessee Department of Transportation</a>	✓					
<a href="#">Tristate Minority Supplier Development Council</a>			✓			

<a href="#">Women’s Business Enterprise Council South</a>						✓
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PROJECT NAME:		REPORTING PERIOD:	
PROJECT #:		PAY APPLICATION #:	
DESCRIPTION OF CONTRACT:		CURRENT CONTRACT VALUE :	\$ -
COMPANY NAME:		AMOUNT BILLED FOR THE PERIOD:	\$ -
ADDRESS:		TOTAL AMOUNT BILLED TO DATE:	\$ -
CONTACT PERSON:		% OF TOTAL CURRENT CONTRACT VALUE BILLED TO DATE:	#DIV/0!
CONTACT PHONE/FAX:			
CONTACT EMAIL:			

CERTIFIED 2ND TIER M/WBE/SBE VENDOR	CERTIFICATION TYPE: INDICATE ALL THAT APPLY	DESCRIPTION OF WORK	ORIGINAL SUB-CONTRACT AMOUNT	CURRENT SUB-CONTRACT AMOUNT	AMOUNT BILLED FOR THE PERIOD	TOTAL AMOUNT BILLED TO-DATE	PERCENTAGE OF WORK COMPLETED	SCHEDULED START DATE	SCHEDULED END DATE
							#DIV/0!		
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TOTALS:			\$ -	\$ -	\$ -	\$ -	#DIV/0!		
TOTAL MBE:			\$ -	\$ -	\$ -	\$ -	#DIV/0!		
TOTAL WBE:			\$ -	\$ -	\$ -	\$ -	#DIV/0!		
TOTAL SBE:			\$ -	\$ -	\$ -	\$ -	#DIV/0!		

I, the above bidder/prime contractor, agree to the terms and conditions stated above.

Signature of Authorized Bidder/Prime Contractor Officer:		DATE:		Light Green Shaded items are filled in ONCE.  Light Orange Items are updated MONTHLY.  Bright Yellow items are automatically calculated.
Printed Name of Authorized Bidder/Prime Contractor Officer:		TITLE:		

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**SECTION 01 11 11 – VIRTUAL DESIGN & CONSTRUCTION COORDINATION****PART 1 - GENERAL****1.1 SCOPE**

- A. This section identifies and outlines the process for construction coordination using 3D Virtual Construction Models. 3D Models will be used for the coordination process to identify and eliminate installation conflicts between trades and disciplines. Completed coordination will fit MEPFP, and any other trades included in the coordination process, within the design parameters provided by the Architect and Engineers.
- B. Specific administrative and procedural minimum actions are specified in this section, as extensions of provisions in General Conditions and other contract documents. These requirements have been included for special purposes as indicated.
- C. All MEPFP Equipment, Sheet Metal Ductwork, Mechanical Piping, BAS Controls, Plumbing, Process Piping, Electrical, Low Voltage, Fire Protection, Drywall Framing, Miscellaneous Metal, above ceiling Equipment Supports, and Steel Fabrication Subcontractors will be required to provide at minimum: 3D solid models for the coordination process.
- D. Each Subcontractor shall provide the necessary qualified staff to generate their 3D coordination models and subsequent drawings extracted from those models. All personnel shall have previous experience, and will be assigned to the job dedicated for the coordination modeling process. Field Personnel assigned to the job, such as Superintendents or Foreman actively running this project will not be acceptable for this position. Subcontractors at the Post Bid Review Meeting shall submit the name(s) or personnel who will be assigned to perform this work along with a brief description of their 3D modeling experience and the specific modeling software that will be used for the project.
- E. If the Subcontractor does not have the qualified in-house staff to generate their 3D coordination models and are using a third party consultant, that consultant must be approved by the Contractor prior to the Subcontractor awarding their modeling scope of work. The Subcontractor will provide a competent person from their company capable of making decisions on their scope of work, along with their consultant modeler, at each coordination meeting. The consultant will be considered an employee of the Subcontractor and be held to the same standards as the rest of the project teams in-house modeling staff outlined in this specification.
- F. Each Subcontractor shall be fully responsible for keeping their 3D models, and drawings extracted from those models, updated throughout the duration of the contract such that the 3D model and 2D drawings are maintained as a “record drawing” of the facility. In conformity with the requirements of the contract, the updated drawings shall be available for review by the Contractor at any reasonable time during working hours. The Subcontractor shall be responsible for producing any additional schematic or 2D drawings required to construct the facility and/or to document the “record drawing” for the project. The Subcontractor shall submit to the Contractor any such drawings or schematics as required.

- G. All work on the coordination drawings (including BIM's) shall be performed by competent draftsmen in a clear legible manner utilizing standard industry conventions. All Subcontractors shall be responsible for providing their coordination drawing files according to the established coordination schedule. It is the responsibility of each Subcontractor to supply a sufficient number of draftsmen to avoid delaying the coordination process and shop drawing submittals.
- H. Each Subcontractor is required to collaborate with each other through email, telephone, or in person to resolve basic clashes outside of the regularly scheduled coordination meeting times, and arrive at the meeting prepared to address the unresolved clashes in a constructive manner.
- I. Subcontractor shall participate in BIM coordination meetings and follow up review meetings as requested by the Contractor. Subcontractor agrees that because of the information exchanged at such meetings, both the digital submission and the Work depicted in the Subcontractors' digital submissions, may require changes or modifications by the Subcontractor to achieve compliant coordination with other elements of the Project, including when provided by others. Such changes/modifications shall be accomplished at no additional cost or time impact to the project.
- J. Subcontractor agrees that; neither participation in the BIM process, nor the use of BIM, relieves the Subcontractor of the responsibilities described in this document, including to, coordinate their work with the work of other trades, and strictly comply with other requirements of the Subcontract Agreement, the Contract Documents, and Specifications. It is expressly understood and agreed that, notwithstanding the requirement for submittals, traditional shop drawings and other submissions shall be provided by Subcontractor as described in the Contract Documents. No party will be entitled to any claim for extra time or money, dispute, controversy, cost or expense increase, arising out of the direct or indirect use of BIM.
- K. Subcontractor acknowledges and agrees, that the Contractor shall incur no responsibility or liability with respect to the BIM or use thereof, including that resulting from errors, omissions or deficiencies in the BIM process. In the event that Subcontractors provide deficient information or data that does not represent the Work, or is corrupted, or contains a virus, and/or otherwise damages or delays the BIM process, the Subcontractor shall bear all costs associated with reconstructing their BIM's, and to remediate such deficiencies and their negative impact and effects at no additional costs to the Contractor, the Owner or other Subcontractors.
- L. This specification section works in conjunction with any Owner, Architect or Contractor incorporated BIM Execution Plan(s), if applicable to the project.

## 1.2 DESCRIPTION

- A. Extent of Model(s)
  - 1. The 3D model, in Plan View, shall extend (at a minimum) five feet beyond the exterior walls of all new construction on site or as directed by the Contractor.
  - 2. Vertically, the model shall extend from the lowest extent of the foundations, or lowest underground piping, and up through and including the roof and penthouse.
  - 3. To the extent that the building systems are designed, they will be included in the full vertical and horizontal extents of the model including underground utilities and roof-mounted items.
  - 4. A 3D architectural and structural base model will be provided with a scope representing at a minimum the information typically drawn in two dimensions and as required for proper

coordination. The following identifies the Level of Development (LOD) for items that will be provided by the Contractor or the Architect.

- a. Architectural: All exterior slabs, walls, doors, windows, steps, railings, and roofs will be modeled. All interior floor slabs, walls, ceilings, doors, windows, toilet partitions, shower stalls, large furniture that would make access from a ladder difficult, and casework (as needed for coordination) will be modeled.
  - b. Structural: Structural concrete and steel elements will be modeled including columns, beams, stair risers and landings. Handrails will not be modeled unless integral to coordination process.
  - c. Owner provided equipment will be modeled where there are large items (such as sterilizers, cart washers, Operating Room lights, Operating Room booms, etc.) where these items, or features of these items, will have an impact on coordination.
  - d. Elevator shaft clear space will be modeled. Nominal elevator cab size and overrun shall be modeled including hoist beam. Elevator cabs will not be modeled.
  - e. Furnishings will be modeled if deemed necessary for coordination purposes.
  - f. Architectural and Structural Bulletin changes will be modeled if deemed necessary for coordination purposes.
5. Level of Development (LOD) required for other coordination team members (the Contractor reserves the right to require additional information to be included in the coordination model):
- a. Large MEPFP Equipment: Model a "travel-path" into the building to the point-of-installation for all items that are larger than a personnel-door / double-door/ corridor width / freight elevator door opening so that coordination of means & methods + sequence of construction can be coordinated between trades to ensure a travel path will be available for major equipment when it arrives (including equipment that ships in pieces or "splits" that have to be assembled in place and other large items that have a long lead time) so that dedicated construction openings or late-installation of certain walls can be determined in advance of equipment arriving.
  - b. HVAC: At a minimum, all ducts and air handling equipment shall be modeled to the outside face dimension including flanges, joints, fittings, connections, insulation, offset requirements, dampers, controls, access zones, control panels, diffusers and grills, associated piping (to outside diameter of pipe or insulation, whichever is greater), any electrical work, and hangers and supports associated with the HVAC system. Control cables outside the cable tray and wire management hooks are not required to be modeled unless the area is significantly congested as determined by the Contractor. Equipment (with pads) will be modeled to overall height, width, and depth with clearance and maintenance access zones (see 'o.' below) per equipment specs, building code, or Owner requirement.
  - c. Plumbing and Mechanical Piping: At a minimum all plumbing, piping, equipment (with pads), hangers, supports, and piping connections will be modeled to its overall height, width, and depth; including access zones for valves and cleanouts. Pipes will be modeled to the outside diameter of the pipe adding insulation as its own entity where applicable or the pipe insulation, whichever is greater. Fittings, connections, valves, and cleanouts will not be modeled unless the area is significantly congested as determined by the Contractor. Plumbing-feeding fixtures such as sinks, toilets, drinking fountains, floor and roof drains shall be modeled for rough in location.
  - d. Fire Protection: At a minimum, all components of the fire protection system shall be modeled including all piping, valves, valve cabinets, fire pumps (with pads), sprinkler heads, hangers, supports, access zones (see 'o.' below), and control panels.

- e. Pneumatic Tube Systems: At a minimum all piping, hangers, supports, transfer stations, diverters and pumps shall be modeled including required clearance and access zones (see 'o.' below).
- f. Electrical: At a minimum, all panels and devices (including access zones as required by the local AHJ), light fixtures (with installation clearances), cable trays (with clearance above and to at least 1 side per Owner requirements), conduit larger than 3/4", hangers, busways, power feeds to the equipment, generators, and switchgear will be modeled. Large groups of 3/4" (or less) conduit will be modeled to reflect the overall space requirements.
- g. Fire Alarm: At a minimum, all components of the fire alarm system shall be modeled including all panels and devices with access zones and conduit larger than 3/4". Large groups of 3/4" (or less) conduit in a particular location will be modeled to reflect the overall space requirements.
- h. Telecommunications: At a minimum, all cable tray, wire managements hooks, conduit larger than 3/4", and communication racks and cabinets will be modeled. Large groups of 3/4" (or less) conduit in a particular location will be modeled to reflect the overall space requirements.
- i. Structural Fabrication: At a minimum, all columns, beams, girts, purlins, bracing, girders, trusses, joists, kickers, steel shapes, slabs, pre-cast concrete elements, laminated wood framing, metal floors and roof decks, pre-engineered building components, miscellaneous framing, trestles, and catwalks shall be modeled.
- j. Conveyance (elevators, escalators, etc.): At a minimum, all equipment including service access, support connections, and mechanical spaces shall be modeled.
- k. Kitchen Equipment: At a minimum, all manufactured equipment and supporting elements requiring field installation either by this trade or by others shall be modeled. Include rough in locations for equipment services. Refer to HVAC requirements for ductwork associated with hoods or exhaust.
- l. Framing: Although standard wall and ceiling framing is not modeled; any atypical framing features required for tiered ceilings, soffits, curved walls, arched ceilings, etc. should be modeled to ensure there is enough available space for the additional framing / bracing for these components.
- m. All trades: Seismic bracing shall be shown where required.
- n. All trades: All required access panel locations and sizes shall be shown as required.
- o. When modeling Access and/or Clearance Zones:
  - 1) Above ceiling equipment zones must be modeled per equipment spec, building code, or Owner standard – whichever is greater; and must extend down to the level below to insure there is adequate space to land a ladder for access.
  - 2) Zones for equipment installed below ceiling must be modeled per equipment spec, building code, or Owner standard – whichever is greater; and must extend down to the level below.
  - 3) Unresolvable clashes with Zones must be approved by the Contractor.

**B. Software Requirements**

- 1. Each Subcontractor must provide, and be able to read 3D solid model files in at least one of the following standard formats: DWG, NWC, IFC, DWF, or DGN. Other file types will work for submission if they are readable by Navisworks. All files must be created as ACIS solids (including insulation) so accurate clash detection can be performed. 2D drawings will be extracted from the 3D model to maintain a true representation of the model into the drawings. To ensure the measurements on the 2D drawings match the model, the model

features in the 2D drawings may not be edited in any way after the extraction from the 3D model.

2. Subcontractors shall inform the Contractor of any object enablers, software plug-ins, 3D viewers, etc., required for the Contractor to view their 3D models with the latest version of AutoCAD and Navisworks. The Subcontractor is responsible for uploading these specific object enablers to the project File Sharing site.
3. The Contractor requires all Subcontractors to send a test file of their model prior to award of contract in order to ensure that the model format is usable for the coordination process. It is understood that all Subcontractors participating in the coordination process shall provide model files compatible with Autodesk Navisworks – which is the primary tool that will be used for model integration, design collaboration and clash detection.

### 1.3 PROCEDURE

#### A. Coordination Process and Procedures

1. A File Sharing site will be set up which will contain all necessary file information and procedures. Each Subcontractor and design team member will have access. This will be the main path for distributing files and information.
2. The Architect and Engineer will supply, at a minimum, 'DWG' files for Subcontractors to use in developing their 3D coordination models. It is possible that each Subcontractor may need to pay a fee for the electronic files and sign appropriate release forms from the A/E.
3. The Contractor will prepare a Coordination Model comprised of Architectural, Structural, and Civil (if applicable) models prior to starting the coordination process. This model shall be posted to the project File Sharing site for Subcontractors for reference use only. Models will also reference items furnished by the Owner as they relate to coordination.
4. If the building structure is steel the initial coordination model containing the structural engineer's model will be updated with a steel fabrication model (when available). This will require all trades to review the model and may require some re-coordination.
5. Before starting the Coordination Process, the Contractor and Subcontractors will review the pre-coordination model, 2D files, and drawings at a scheduled pre-coordination meeting. Information gathered at this meeting will be used to determine priority areas, identify potential problem areas, and note any details on the drawings that are not currently modeled that may need to be added to the model.
6. BIM Coordination meeting times, posting frequencies and schedule will be agreed upon at the coordination kickoff meeting. There are 3 types of coordination meeting styles to choose from:
  - a. LOCK DOWN – coordination will be conducted in consecutive all day meetings until coordination has been completed. This process should be used if it's determined that coordination can be completed within 2 weeks (10 working sessions) or less. Specific times, durations, and frequency per week to be established in detail between the Contractor and Subcontractors.
  - b. WEEKLY – coordination will be conducted on a weekly basis until coordination is complete. No single meeting should last more than 2 hours. For this method to succeed mechanical Subcontractors and the Contractor Lead must communicate multiple times per week outside the weekly scheduled meeting.
  - c. COMBINATION – A formula of Options a. and b. combined, as agreed upon between Contractor and Subcontractors.
7. The Contractor will lead the coordination team and drive Navisworks during the coordination meetings. Subcontractors shall post prepared 3D coordination models to the project File Sharing site. The Contractor will combine each 3D model into a single 3D

- model and facilitate determination of conflicts. Once conflicts are determined, all coordination team members are responsible for coordinating their work, including re-work of the 3D model until conflicts are minimized and resolved in a satisfactory manner.
8. Accurate and timely coordination is the responsibility of all trades. The Contractor will schedule meetings as required, which Subcontractors must attend. Failure to attend is a serious violation of this agreement, the Contractor will supplement under written notice modeling work of absent Subcontractor, all cost associated with supplementation will be borne by the Subcontractor on notice. Modeling work declared improperly coordinated is non-compliant, and may require the Subcontractor to relocate work as directed by the Contractor. There will be no compensation to any Subcontractor for relocating any part of the work that has been installed without proper coordination between all the Subcontractors, and released by the signoff process through the Contractor for installation. Any work installed not in accordance with the approved coordination composites, that creates additional work to other Subcontractors is non-compliant and shall be removed. The cost of such additional work shall be assessed to the responsible Subcontractor as determined by the Contractor. Errors in coordination will be resolved by the Subcontractor at its own expense. Where agreements cannot be reached, the Contractor will furnish a final resolution. The non-compliant Subcontractor will be responsible for the expense of said resolution.
  9. All Subcontractors must follow the standard file naming convention. The file name will consist of an agreed upon project designation, an approved abbreviation of their discipline, followed by the Level, Building, Area, or other descriptor. Below are some typical sample file names (there may be projects that do not fit this envelope; those will be dealt with as they come up):
    - a. CGHQ-HVAC-L1 (typical naming structure – project, discipline, level)
    - b. WP79-ELEC (no level callout required if project has only one level)
    - c. NRDT-E-L1-HVAC (Project, Building, Level, Discipline)
  10. Typical outline to be used to prioritize clash resolution between systems (every project should customize this list to best suit their specific needs):
    - a. Architecture (walls, ceilings, soffits, framing (typical and any required for additional support) and Structure (columns, beams, joists, kickers, and any additional structure required) will take precedence over other disciplines.
    - b. All code required elements and their integrity are to be maintained.
    - c. Maintenance and service aisles shall be maintained.
    - d. Underground routing and stub-up locations (where applicable).
    - e. Shafts along with core and sleeve locations (where applicable).
    - f. Large HVAC duct and equipment, and gravity pipe will typically have priority among the MEPFP trades.
    - g. FPRO sprinkler heads that are required to be centered in ceiling tiles will only take precedence if conflict occurs at drop location.
    - h. Conflicts will be resolved by the coordination team to take into consideration the best interest of the overall project schedule and budget.
  11. All Subcontractor participants shall agree and understand that the 3D coordination model is only a means for coordination and that each Subcontractor is responsible for cross-referencing all contract documents with model information.
  12. If coordination meetings occur onsite, each Subcontractor will have a competent person, with a laptop, who is capable of running their design software and making competent decisions that do not negatively affect their system at all coordination meetings so changes can be worked out and verified during the meeting.
  13. Subcontractors not internally modeling their own work must still have a representative at each meeting to make system decisions along with the external modeler also available



- either on site or via WebEx. Any cost associated with a web meeting that would not otherwise be required due to external modeling will be the responsibility of that Subcontractor.
14. Any Subcontractor responsible for more than 1 trade must have clashes between those trades worked out prior to coordination meetings. If clashes cannot be corrected before a meeting the issue(s) must be communicated to the coordination team for their input in potential resolutions.
  15. Major changes made during the coordination process shall be clearly documented and submitted through the proper approval process to the Architect/Engineer. Minor changes during this process shall be noted in the “record drawing” documentation.
  16. Each Subcontractor shall be responsible for updating their BIM’s and “field installation” drawings as required to maintain record coordination and construction information. The Contractor may require proof record BIM’s and drawings as a condition for payment. Updates shall include but are not limited to:
    - a. Correction of issues found during coordination
    - b. Incorporation of Bulletin’s and RFI’s
    - c. Submittal modifications and revisions on A/E approved documents
    - d. “Record drawing” field modifications
    - e. “Record drawing” documentation items such as valve tags, access doors, etc.
  17. The Contractor will post the results of each coordination meeting that will include, at a minimum, the following items:
    - a. NWD file of the model used at that meeting for coordination
    - b. Updated Coordination Schedule (PDF) - if applicable
    - c. Signoff Sheet (PDF) - if applicable
  18. Signoff shall occur when all coordination team members are satisfied that coordination conflicts have been adequately resolved. All Subcontractors involved in the coordination process shall sign Contractor’s standard signoff sheet for each completed coordination area. If the Subcontractor pre-fabricates, the ‘Ready for Fab’ box must also be checked to indicate that material is being released into their fab shop. Authorized representatives are to be designated by each Subcontractor and approved by the Contractor. At the following meeting, each Subcontractor may be required to bring physical drawings to be signed by all other coordination team members. Each Subcontractor is responsible for reproduction costs associated with production of hard copy drawings for signoff.
  19. Signoff of the 2D drawings extracted from the coordinated model shall signify the Subcontractor’s intention to complete installation as indicated on the coordination drawing. Each Subcontractor shall be responsible for locating their respective components as shown on the 3D model and field installation drawings. Field installation conflicts will be resolved by the affected party at the direction of the Contractor with no additional cost to the Contractor or the Owner. The signed documents will remain in the Contractor’s possession.
  20. Field QA/QC checks will be performed by the Contractor to ensure the installation of MEP/FP systems are compliant with the tolerances identified within the BIM Coordination effort.
  21. Conflicts that result in re-work due to an item not being included in the modeling process, a lack of modeling detail, or improper field installation will be subject to re-work at no additional cost to other Subcontractors, the Contractor, or the Owner. The Subcontractor in error will be responsible for all costs associated with re-working their system, and/or the cost of having another system(s) move.
  22. Each Subcontractor will provide all other parties involved in the coordination process a copy of their completed documents. This can either be a hard or digital copy, depending on which type is preferred by each Subcontractor.

23. Each Subcontractor is required; in addition to the development of coordinated models, to submit hard copies of their respective coordinated systems in a 2D format as required by the project documents and specifications for approval through the regular submittal process. Subcontractors are responsible for producing 2D coordinated drawings after resolving all clashes for a designated area. This file shall include all coordinated drawing information, full dimensions (especially elevation dimensions), text, tags, etc. needed to successfully install the systems in the field.

B. Modeling Process

1. All Subcontractors' drawings and model files shall be based on the origin point provided by the Contractor. The cost of any changes required by the Subcontractor to their drawings or models, due to the use of an unauthorized origin shall be borne by the Subcontractor.
2. All base models shall be modeled to a Level of Development (LOD) equal to or greater than typical shown on a 2D plan, section or elevation drawn at  $1/8" = 1'-0"$ . Detailed models for specific areas of the project may require greater Level of Development. Refer to the Project BIM Execution Plan for specific LOD per modeled element, per discipline.
3. The Model working units shall be feet/inches. The level of tolerance (allowable interference) shall be determined at the coordination kickoff meeting.
4. If a Subcontractor discovers an error, inconsistency, or omission in its own information or submissions, or the information/submissions provided by others, or any BIM deficiency, it shall promptly report the same to the Contractor via written notice, and shall contain all relevant specifics.
5. Each Subcontractors Model will show only their disciplines equipment with no entities allowed outside the areas defined in 1.2.A. Any text, balloons, or leaders that reference changes made must be on a single separate layer (or workset) so it can be easily hidden before being inserted into the coordination model. Model entities used for reference outside the defined modeling area must be hidden.
6. Subcontractors may create their model in any software that meets the export to Navisworks requirements listed in 1.2.B.1, however, the Owner may require a Revit model upon completion of the project to include any changes made after coordination was completed and/or as-built field conditions. If not originally created in Revit, a Revit model must be created using native Revit objects directly from the coordination model. Any inconsistency between the coordination model and record model will be corrected by the model author.
7. The Subcontractor is responsible for creating and maintaining any necessary Facility Management data required by the Owner or Contractor throughout the process.
8. The Subcontractor will group and name their equipment geometry in accordance to the equipment schedules outlined in the contract design documents for import into the Contractor's QA/QC software.
9. For all other model definition see 1.2.A.

1.4 SCHEDULE

- A. The coordination team shall agree on a coordination schedule based on the Reverse Phase Schedule (RPS). This schedule should take into account delivery and long lead items of all Subcontractors involved in the coordination process. The coordination schedule is a guide and the overall project schedule will determine completion date for coordination. If for any reason schedule is not maintained, Subcontractor(s) will be held responsible per Messer's Subcontractor Agreement included in Section 00 52 00 – Agreement Forms.



- B. The final list of drawings and the coordination drawing schedule will be agreed upon by all Subcontractors and updates to the same, shall be binding on the Subcontractors. Manpower, equipment and material adjustments as necessary to meet the Coordination Drawing Schedule as created by the project team members is the responsibility of each Subcontractor.

**END OF SECTION 01 11 11**

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**SECTION 01 21 00 - ALLOWANCES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
  - 1. Lump-sum allowances.
  - 2. Unit-cost allowances.
  - 3. Quantity allowances.
  - 4. Contingency allowances.
  - 5. Testing and inspecting allowances.
- C. Related Requirements:
  - 1. Section 01 22 00 – Unit Prices for procedures for using unit prices.

**1.2 SELECTION AND PURCHASE**

- A. At the earliest practical date after award of the Subcontract, advise Contractor of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

**1.3 ACTION SUBMITTALS**

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

#### 1.5 COORDINATION

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

#### 1.6 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Subcontractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include material, sales and/or use tax, labor (and/or erection), overhead, tools, equipment, delivery to project site, unloading and warehousing if necessary.
- B. This type of allowance shall be adjusted by the difference of the allowed amount vs. actual expenditures performed on a T&M basis, usually with pre-agreed to unit rates.
- C. Example: A bid category for masonry may include a Lump Sum Allowance of \$5,000 for temporary heating. The bidder shall include this \$5,000 allowance in its Base Bid and document actual expenditures to the Contractor. The bidder's contract amount will then be adjusted based on actual usage.

#### 1.7 MATERIAL ALLOWANCES

- A. The allowance itself shall include the cost of purchasing the specified materials only, including sales and use tax if applicable. The cost of labor (and/or erection), overhead, profit, tools, equipment, delivery, unloading, warehousing, etc. shall be included in the Base Bid and shall NOT be included in the stated allowance.
- B. This type of allowance shall be adjusted by the difference of the allowed material purchase price and the actual purchase price, either additive or deductive, with no consideration given for either increased or decreased OH&P.
- C. Example: A bid category for carpet may include a Material Allowance of \$15.00/sy to purchase carpet. The cost for installation, tools, equipment, delivery, unloading, warehousing, overhead, profit, etc. shall be included in the Base Bid and are not part of the allowance.
- D. Subcontractor shall submit proposals to Contractor for materials selections by the Architect. After selection, subcontractor shall following normal submittal procedures.
- E. Subcontractor shall note if Contract Time will be affected with any material selection.
- F. Invoices shall be submitted to the Contractor to verify actual purchase amounts and quantities.

**1.8 QUANTITY ALLOWANCES**

- A. The allowance itself is to adjust quantity only. All costs such as material, sales tax, labor (and/or erection), overhead, profit, tools, equipment, delivery, unloading, warehousing, etc. shall be included in the Base Bid.
- B. This type of allowance shall be adjusted by the difference in the allowed quantity vs. the actual quantity times a unit price, which includes all material, labor, equipment, OH&P, etc.
- C. Example: A bid category for steel may include a Quantity Allowance of 5 tons of misc. steel that may not be designed at the time of bidding. The bidder shall include the cost of furnishing, fabricating and installing (erecting) this 5 tons of misc. steel in the Base Bid and a unit price to adjust the bidder's contract amount if the actual quantity is different from the allowed amount.
- D. Sufficient documentation to substantiate the quantity difference shall be submitted to the Contractor.

**1.9 UNUSED MATERIALS**

- A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
  - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

**PART 2 - SCHEDULE OF ALLOWANCES**

- 2.1 See Section 00 24 13 Bid Category Descriptions for allowance.

**END OF SECTION 01 21 00**

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**SECTION 01 22 00 - UNIT PRICES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for unit prices.

**1.2 DEFINITIONS**

- A. Unit price is an amount proposed by Bidder, applicable during the duration of the Work, as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.
- B. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- C. Unit prices shall apply whether the Work described is performed by the Subcontractor or by a lower-tier subcontractor.

**1.3 PROCEDURES**

- A. The Contractor reserves the right, prior to an award of Subcontract, to evaluate the Unit Prices submitted and seek adjustment and/or reject any Unit Price that is determined by the Contractor to be unreasonable.
- B. The Subcontractor shall keep a daily log of actual quantities of specified work unit encountered, consumed or expended and submit copies of such logs to the Contractor weekly.
- C. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

**PART 2 - SCHEDULE OF UNIT PRICES**

- 2.1 Provide separate attachment to the 00 41 00 Bid Form that include pricing for the following:

- A. Floor Filling/Leveling
  - 1. Description: Provide self-leveling cementitious material to level floors and fill floor voids.
  - 2. Unit Cost: Include material and labor. Include all floor preparation, aggregate and surface finishing.
  - 3. Unit of Measure: 400 Square Foot: ¼" deep
  - 4. Specification Reference: Section 03 62 13

- B. Provide separate pricing for the following cubic yard of material assuming each truck hauls 12CY's of material:
1. Spoils import per cubic yard: \$ \_\_\_\_\_
  2. Spoils export per cubic yard: \$ \_\_\_\_\_

**END OF SECTION 01 22 00**



**SECTION 01 23 00 - ALTERNATES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for alternates.

**1.2 DEFINITIONS**

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
- B. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
- C. 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.
- D. Work not specifically identified or reasonably inferable as being part of an Alternate shall be considered as being in the base scope of the project.
- E. Unless otherwise indicated, each Alternate shall be considered to include all costs necessitated by its acceptance, including, but not limited to labor, material, delivery, storage, handling, supervision, tools, equipment, taxes, compliance with Division 1 General Requirements, and construction facilities and administration associated with the Alternate.
- F. The Subcontractor shall fully investigate each proposed Alternate and understand each Alternate's effect on the overall Work. Work which, by virtue of acceptance of the Alternate, will be necessary in order to provide a complete and proper installation shall be considered as being part of that Alternate, whether indicated or not. Likewise, work, which is made unnecessary by acceptance of the Alternate, shall be considered as being deducted from the base Work, even if not specifically indicated as such.

**1.3 PROCEDURES**

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Subcontract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or

deferred for later consideration. Include a complete description of negotiated revisions to alternates.

- C. Execute accepted alternates under the same conditions as other work of the Subcontract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

## **PART 2 - SCHEDULE OF ALTERNATES**

### **2.1**

#### **A. Alternates:**

1. Alternate No. 1: The Roofing Contractor shall provide alternate pricing to substitute the TPO Membrane Roofing for Section 07 51 13 for a 2 ply modified bitumen roof system.
2. Alternate No. 2: The General Trades and Electrical Contractors shall include alternate pricing to provide and install card readers and electrified hardware at all residential suite entry doors.
  - BC-01 General Trades shall include pricing for the following:
    - 1) Provide one of the following card readers: HID iCLASS SE® RM40 or Allegion® MTMS15 (aptiQ®) Multi-Technology, Magnetic Stripe Reader (Black). The electrical contractor shall pullall wires and make all connections.
    - 2) Provide and install electronic lockset L9092EU-07B. The electrical contractor shall pull all wires and make connections
    - 3) Provide electrified hinge per the hardware specifications.
  - BC-10 Electrical Contractor shall provide pricing for the following:
    - 1) Pull all wires from MDG/IDF through conduits installed in base bid, connect and install card readers, install electrified hinge provided by BC-01 and connect to wires to electrified hardware on one side of the hinge and the MDF/IDF on the other.
3. Alternate No. 3: Substitute solid wood doors within the suites for hollow core:
  - The BC-01 General Trades Contractor shall provide alternate pricing to replace the solid core wood doors with hollow core wood doors at the shower rooms, toilet rooms, and bedrooms within the unit suites.
4. Alternate No. 4: Provide waterproof membrane under the tile floors in the ADA units located on levels 2-5.
  - a. The BC-17 Resilient Flooring, Ceramic Tile, and Polished Concrete subcontractor shall provide an alternate price to include a water proof membrane under the tile flooring of the shower rooms in the ADA units on Levels 2-5.
5. Alternate No. 5: Provide waterproof membrane in the drying area of the shower room and the toilet room on levels 2-5.

- a. The BC-17 Re Resilient Flooring, Ceramic Tile, and Polished Concrete subcontractor shall provide an alternate price to waterproof membrane in the drying area of the shower room and the toilet room on levels 2-5.
6. "Alternate No. 6: Provide painted finish for 08 40 00 ALUMINUM FRAMING SYSTEMS and 08 41 13 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS."

**END OF SECTION 01 23 00**

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**SECTION 01 25 01**

**SUBSTITUTION REQUEST FORM**

GENERAL: This form is part of the substitution requirements specified in Section 01 25 00.

PROJECT TITLE & NO.

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TO:MOODY NOLAN INC.

300 Spruce Street, Suite 300

Columbus, Ohio 43215

Telephone (614) 461-4664 FAX (614) 280-8881

Contact and Email: [\[add contact name and email address\]](#)

ATTN:

---

SPECIFIED ITEM

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Section

---

Paragraph

---

PROPOSED SUBSTITUTE

---

Attach complete description, catalog, spec data, and laboratory tests if applicable

1. What effect will substitution have on dimensions, gauges, weights, etc. indicated in Contract Documents?

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2. What effect will substitution have on wiring, piping, ductwork, etc. indicated in Contract Documents?

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3. What effect will substitution have on other trades?

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4. What effect will substitution have on construction schedule? \_\_\_\_\_  
\_\_\_\_\_
5. What are the differences in quality and performance between proposed substitute and specified product? \_\_\_\_\_  
\_\_\_\_\_
6. Manufacturer's guarantees of the specified products and proposed products are:  
Same: \_\_\_\_\_ Different (Explain) \_\_\_\_\_  
\_\_\_\_\_
7. What are the differences in all sustainable design characteristics and performance between proposed substitute and specified product? \_\_\_\_\_  
\_\_\_\_\_
8. List (on separate sheet), if applicable, the availability of maintenance services and replacement materials for proposed substitute.
9. List (on separate sheet) names, addresses and phone numbers of fabricators and suppliers for proposed substitutes.
10. There [are \_\_\_\_] [are no \_\_\_\_] license fees and royalties pending on the proposed substitute. (Explain)  
\_\_\_\_\_  
\_\_\_\_\_
11. The undersigned certifies that this substitution meets all requirements of the Contract Documents except as specifically noted herein.

SUBMITTED TO BIDDER BY: (Supplier/Fabricator)

Firm \_\_\_\_\_

Address \_\_\_\_\_

Name and Title of Person Signing \_\_\_\_\_

Signature \_\_\_\_\_

Telephone No. \_\_\_\_\_ Date \_\_\_\_\_

SUBMITTED TO ARCHITECT BY: (Bidder)

Firm \_\_\_\_\_

Address \_\_\_\_\_

Name and Title of Person Signing \_\_\_\_\_

Signature \_\_\_\_\_

Telephone No. \_\_\_\_\_ Date \_\_\_\_\_

FAX No. \_\_\_\_\_ Email \_\_\_\_\_

12. ARCHITECT/ENGINEER'S REVIEW COMMENTS:

\_\_\_ Tentatively Accepted  
(pending issuance of  
Addendum)

\_\_\_ Rejected due to  
incomplete form.

\_\_\_ Not Accepted

\_\_\_ Received Too Late

Signature \_\_\_\_\_

Date \_\_\_\_\_

Remarks \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**END OF SECTION**

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## SECTION 01 31 19 - PROJECT MEETINGS

### PART 1 - MEETING TYPES

#### 1.1 General

- A. The Contractor will provide a location for meetings and conferences at Project site, unless otherwise indicated.
  - 1. Attendees: Owner, Contractor, Subcontractors, Architect/Engineer and other individuals whose presence is required, as determined by the Contractor.
  - 2. Agenda: Contractor will prepare the meeting agenda and distribute to all invited attendees.
  - 3. Meeting Memoranda: Contractor will conduct the meeting and record significant discussions and agreements achieved and distribute the meeting minutes to everyone concerned.

#### 1.2 Preconstruction Conference

- A. Contractor will schedule a preconstruction conference before construction starts, at a time convenient to Owner, Contractor, and Architect/Engineer. Conference will be at Project site or another convenient location. Contractor will review responsibilities and personnel assignments.
- B. Attendees: Authorized representatives of Owner, Contractor, Architect/Engineer, and their consultants; Subcontractors and their superintendents; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
- C. Agenda: Discuss items of significance that could affect progress, including the following:
  - 1. Tentative construction schedule.
  - 2. Phasing.
  - 3. Critical work sequencing and long-lead items.
  - 4. Designation of key personnel and their duties.
  - 5. Procedures for processing field decisions and Change Orders.
  - 6. Procedures for requests for interpretations (RFIs).
  - 7. Procedures for testing and inspecting.
  - 8. Procedures for processing Applications for Payment.
  - 9. Submittal procedures.
  - 10. Sustainability requirements
  - 11. Preparation of Record Documents.
  - 12. Use of the premises and existing building.
  - 13. Work restrictions.
  - 14. Owner's occupancy requirements.
  - 15. Responsibility for temporary facilities and controls.
  - 16. Construction waste management and recycling.
  - 17. Parking availability.
  - 18. Office, work, and storage areas.

19. Equipment deliveries and priorities.
20. Security.
21. Progress cleaning.
22. Working hours.

D. Meeting Memoranda: Contractor will record and distribute meeting memoranda.

### 1.3 Pre-installation Conferences

- A. Contractor will conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.
- B. Attendees: Contractor, Architect/Engineer, Installer 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. The specifications additionally identify Suppliers and/or Subcontractors that are required to attend a pre-installation conference.
- C. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
  1. The Contract Documents.
  2. Options.
  3. Related requests for interpretations (RFIs).
  4. Related Change Orders.
  5. Purchases.
  6. Deliveries.
  7. Submittals.
  8. Review of mockups.
  9. Possible conflicts.
  10. Compatibility problems.
  11. Time schedules.
  12. Weather limitations.
  13. Manufacturer's written recommendations.
  14. Warranty requirements.
  15. Compatibility of materials.
  16. Acceptability of substrates.
  17. Temporary facilities and controls.
  18. Space and access limitations.
  19. Regulations of authorities having jurisdiction.
  20. Testing and inspecting requirements.
  21. Installation procedures.
  22. Coordination with other work.
  23. Required performance results.
  24. Protection of adjacent work.
  25. Protection of construction and personnel.
  26. Construction waste management and recycling
- D. The Contractor will record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

- E. The Contractor will distribute minutes of the meeting to each party present and to parties who should have been present, Architect/Engineer, and Owner.
  - F. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- 1.4 Progress (Weekly Work Plan) Meetings: Contractor will conduct progress meetings at weekly intervals. Purpose of meetings is to coordinate work efforts among the participating Subcontractors.
- A. Attendees: Contractor, each Subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - B. Agenda: Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - 1. Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to the 6-week look ahead and Reverse Phase Schedules. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time. Review schedule for next period.
    - 2. Review present and future needs of each entity present, including the following:
      - a. Interface requirements.
      - b. Sequence of operations.
      - c. Status of submittals.
      - d. Deliveries.
      - e. Off-site fabrication.
      - f. Access.
      - g. Site utilization.
      - h. Temporary facilities and controls.
      - i. Work hours.
      - j. Hazards and risks.
      - k. Progress cleaning.
      - l. Quality and work standards.
      - m. Status of correction of deficient items.
      - n. Field observations.
      - o. Requests for interpretations (RFIs).
      - p. Status of proposal requests.
      - q. Pending changes.
      - r. Status of Change Orders.
      - s. Pending claims and disputes.
      - t. Documentation of information for payment requests.
      - u. Waste management implementation and progress.

3. Minutes: Contractor will record and distribute to all Subcontractors the meeting memoranda.
4. Reporting: Distribute meeting memoranda of the meeting to each party present and to parties who should have been present.
5. Schedule Updating: Contractor will revise the Reverse Phase & 6-week look ahead Schedules after each progress meeting where revisions to the schedule have been made or recognized.

**END OF SECTION 01 31 19**

## **SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE**

### **PART 1 - GENERAL**

- 1.1 Subcontractor shall in conjunction with the Contractor develop an accurate schedule for the completion of the work. The Contractor will utilize Lean Construction / Last Planner methods to manage the project. Each Subcontractor will be required to participate in a detailed schedule planning session for each phase of the project. A detailed schedule will be developed for each phase. The detailed schedules shall be consistent with the Milestone Construction Schedule issued with the bidding documents. Each Subcontractor will be required to attend the weekly Progress Meeting prepared with a weekly work plan for the coming week and a review of work activities required by the detailed schedule for that Subcontractor over the next six weeks. In addition, each Subcontractor will attend brief daily meetings.
- 1.2 See Section 00 31 13 – Preliminary Schedules for the Milestone Construction Schedule used for bidding.

### **PART 2 - LEAN CONSTRUCTION SCHEDULING METHODS**

- 2.1 Overview:
  - A. Lean Construction is a tool to manage schedules and production on projects. By planning and managing the work, uncertainty is removed from the project. When production planning becomes reliable and people fulfill their commitments, performance and workflow are improved, and so are the overall results of the project.
  - B. Lean Construction traces its roots to the Toyota Production System developed after World War II. The system aimed to eliminate the inventory and rework of traditional mass production in favor of a reliable production system that could both work and change quickly to meet a customer's specific requirements without wasteful processes. In mass production, as in traditional construction processes, the project is a series of activities, and the goal is to reduce cost and increase the speed of each activity with consistent high quality.
- 2.2 Application
  - A. Lean Construction involves a systematic approach aiming for more efficient overall workflow. It attempts to understand how value is delivered, making workflow as consistent and reliable as possible, and then reviewing the results to determine how to improve the planning process. Lean differs from traditional construction methods because it decentralizes hierarchical decision-making. With Lean Construction, those closest to the work (the "Last Planners") must have the authority to make the decisions and plan the work. It also utilizes peer pressure to get the job done. Subcontractors agree as a group to meet their deadlines, and each is held accountable not only to the Contractor but also to fellow Subcontractors.

- B. The project will utilize key procedures in the implementation of Lean Construction / Last Planner Methods. These steps require the input of the Foremen for the Subcontractors that will perform the work. These steps are as follows:
1. Flow Planning – This schedule is created to fit within the parameters of the Milestone Construction Schedule. Subcontractors work together to determine the work areas, sequence of work, and Takt time for the project. This ensures that the overall work flow of the project is optimized.
  2. Reverse Phase Scheduling (RPS) – This process is used in lieu and/or in addition to Flow Planning. Similar to Flow Planning, this schedule is created to fit within the parameters of the Milestone Construction Schedule. Subcontractors plan the project starting with the last work activity and working backwards. This ensures that all Subcontractors consider what work must be done prior to any schedule activity and adequate durations are in place for late activities. This RPS is thought of as “What Should Be Done.”
  3. Rolling Six-Week Look Ahead Schedules – Upcoming schedule activities move onto the Six-Week Look Ahead Schedules on a weekly basis. All possible constraints for preventing these activities are identified. This six-week look ahead is the work that “Can Be Done” in the next six-week period.
  4. Weekly Work Plans (WWP) – These plans are brought to weekly Progress Meetings by all Subcontractor foremen and are specific to the work they “Will Be Doing” in the upcoming week. In order for work activities to be on the WWP, there cannot be any known constraints that would prevent the work from occurring.
  5. Plan of Day (POD) – These brief daily meetings evaluate daily performance against key activities identified and coordinated in the WWP. By understanding daily performance, Subcontractor foremen quickly identify barriers and then make minor adjustments to eliminate the barriers allowing work to proceed as planned.

## 2.3 Implementation

- A. Subcontractors will be involved with all Flow Planning and Reverse Phase Scheduling for the project. Bidders should include the cost for foremen and project managers from each company to attend ½ day planning sessions to establish these schedules as required for the complexity of the project.
- B. The Contractor will provide and update the Six-Week Look Ahead Schedules from information developed in the Flow Planning and Reverse Phase Scheduling process and from Subcontractors input. The Contractor and Subcontractors will review and discuss the Six-Week Look Ahead Schedules at the weekly Progress Meetings.
- C. Each Subcontractor must complete a Weekly Work Plan (WWP) and provide to the Contractor by 1pm (2) days before the weekly Progress Meeting. The Contractor reserves the right to meet with each Subcontractor the day before the Progress Meeting to discuss their activities. The Subcontractor shall discuss and coordinate their work at the weekly Progress Meeting.
- D. All Subcontractor foremen are required to attend the daily POD.
- E. Subcontractors will be required to inform the Contractor, on a daily basis, the status of the work that was committed to be complete.

- F. Additional Flow Planning and Reverse Phase Scheduling may be required to update the schedule when project changes occur. Subcontractors will be required to participate in these planning sessions.

**2.4 Updates**

- A. Six-Week Look-Ahead Schedules will be updated weekly.
- B. Construction Progress Schedules will be updated periodically as required.
- C. The Milestone Construction Schedule will be updated as required.

**2.5 Distribution**

- A. The Contractor will provide the Subcontractors access to the Milestone Construction Schedule, Construction Progress Schedules, Six-Week Look Ahead Schedules and Weekly Work Plans.
- B. It is the responsibility of each Subcontractor to inform its field personnel, sub-tier subcontractors and material suppliers of the Milestone Construction Schedule, Construction Progress Schedules, Six-Week Looks Ahead Schedules and Weekly Work Plans, including any updates.

**2.6 Records**

- A. All schedules generated from Flow Planning and Reverse Phase Scheduling, and updates to the same, shall become the revised Project Schedule and shall be binding on the Subcontractors. Each Subcontractor shall provide necessary manpower, equipment, and material as necessary to the revised Project Schedule.

**END OF SECTION 01 32 16**

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## **SECTION 01 32 26 - CONSTRUCTION PROGRESS REPORTING**

### **PART 1 - GENERAL**

#### **1.1 Daily Reports**

- A. Subcontractors are required to prepare daily reports. This daily construction report should record at a minimum, the following information concerning events at the project site:

1. Number of personnel onsite, including subcontractors.
2. Summary of work completed.
3. Equipment onsite.
4. Material deliveries.
5. High and low temperatures and general weather conditions, including the presence of snow or rain.
6. Accidents or incidents.
7. Unusual events (refer to special reports).
8. Stoppages, delays, shortages, and losses.
9. Meter readings and similar recordings.
10. Emergency procedures.
11. Orders and requests of authorities having jurisdiction.
12. Change orders received and implemented.
13. Construction change directives received and implemented.
14. Services connected and disconnected.
15. Equipment or system tests and startups.

- 1.2 Reports are to be submitted electronically in the ViewPoint Team software daily to Contractor no later than each morning for the previous day's work. No progress payments will be made to the Subcontractor until all of their daily reports are received by Contractor for that particular month.

**END OF SECTION 01 32 26**

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## SECTION 01 35 13 – COST SEGMENTATION

### PART 1 - GENERAL

#### 1.1 SCOPE

- A. Accurate construction cost information by healthcare functional area, ie; patient rooms, operating rooms, laboratories, etc. is important to healthcare owners for their strategic planning and cost depreciation activities. This section identifies and outlines the process for identifying construction costs by healthcare functional areas.
- B. Each Subcontractor shall provide detailed cost information for each of the healthcare functional areas indicated.
- C. Each Subcontractor shall provide the breakdown of project costs from bidding, through project award, progress payments during construction and final payment including required change order documentation.
- D. Each Subcontractor shall keep their cost segmentation information updated throughout the duration of the contract. Each Subcontractor shall produce any additional cost breakdown detail required by the Contractor to compile the summary cost segmentation data for the functional areas.

#### 1.2 PROCEDURE

- A. Each Subcontractor shall submit a Payment Breakdown Schedule (Schedule of Values) including applicable healthcare functional area cost information breakdown in accordance with the Messer Subcontract Agreement included in Section 00 52 00 – Agreement Forms.
- B. Each Subcontractor shall submit Work Changes including applicable healthcare functional area cost information breakdown in accordance with the Messer Subcontract Agreement included in Section 00 52 00 – Agreement Forms.
- C. Each Subcontractor shall submit Progress Payments and Final Payment including applicable healthcare functional area cost information breakdown in accordance with the Messer Subcontract Agreement included in Section 00 52 00 – Agreement Forms.

#### 1.3 COST SEGMENTATION DESCRIPTIONS

- A. Sitework – defined as the physical and organizational structures that supports all site utilities (5ft outside of building structure), earthwork, landscaping, roadways, bridges, pavement and site embellishments that encompass the property (land) around a building or structure (i.e. healthcare facilities, hospital, etc.).
- B. Core & Shell – defined as a building superstructure, building foundations, foundation walls, columns, floor slabs, roof structure, building envelope, shaft/elevator/core walls, load bearing walls, stairways, selective demolition and vertical transportation.



- C. MEP Infrastructure / Central Utility Plant
  - 1. MEP Infrastructure is defined as a facilities Primary Plant/Central Utility Plant or source electrical and mechanical systems including: combination fire standpipe/sprinkler, central fire alarm system, packaged roof-mounted heating and ventilating units, Building Automation System (BAS), emergency generators, primary voltage transformation, switchgear, buss duct, UPS systems, raceway wiring and lightning protection.
  - 2. MEP Infrastructure also includes the building utility distribution systems: potable domestic water, service sanitary drains, sanitary vent, sheetmetal trunk-lines to VAV/terminal boxes, electrical power distribution panels, circuit breakers in electrical utility rooms/closets, designated connection point to the central fire alarm panel. All services that provide an extension to each location/department within the facility.
- D. Public Space / Circulation / Lobbies / Restrooms – defined as the “common space” that is accessible to all. This includes areas such as entry vestibules, atriums, public lobbies, public corridors, public circulation space and public restrooms.
- E. Program Space / Diagnostic & Treatment
  - 1. Program Space / Diagnostic & Treatment fit-out includes a wide range of functional areas within a healthcare facility including associated support spaces and egress corridors between functional areas.
  - 2. Program Space / Diagnostic & Treatment includes the following functional areas within a healthcare facility:
    - a. Office & Administration Spaces
    - b. Patient Rooms – Critical / Med Surg
    - c. Exam Rooms / PACU/ Same Day Surgery / Post-Op
    - d. Nutrition
    - e. Pharmacy
    - f. ICU
    - g. General Program Space
    - h. MRI / Nuclear Medicine / CT / Radiology / IR / Cath / EP
    - i. Emergency / Trauma / Triage
    - j. Linear Accelerator
    - k. Laboratories
    - l. Operating Rooms / Hybrid OR’s / Endoscopy
    - m. Women’s Health / OB
    - n. Central Sterile
    - o. Data Center
- F. Fixed Equipment
- G. Owner Furnished Contractor Installed (OFCI)
- H. Furniture, Fixtures & Equipment / Soft Costs

#### 1.4 PROJECT FLOOR PLANS WITH DESIGNATED COST SEGMENTATION

Each Subcontractor shall provide cost segmentation for work in place per the CM for cost segmentation.

**END OF SECTION 01 35 13**



## SECTION 01 35 43 - ENVIRONMENTAL PROCEDURES - 5S PROGRAM

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. The Zero Injury culture embraces the 5S Strategy to create a safe, organized jobsite to prevent slips, trips and falls.
- B. The 5S Program has been put in place to drive consistency across all projects and set a “Best in Class” standard to help achieve Zero Injury by eliminating slips/trips/falls from poor housekeeping/organization.
- C. This summary should in no way be construed as being all-inclusive. It is issued as a guide to aid each Subcontractor in their understanding of the 5S expectations on this project.

#### 1.2 PROJECT DESCRIPTION AND REQUIREMENTS

- A. As a part of the Lean Culture on our project sites, the Contractor is instituting the following MINIMUM requirements for each Subcontractor to achieve a safer more productive project.
- B. The components of the 5S Program are as follows:
  - 1. **Sort – Just in time Deliveries:** Materials are only allowed to be delivered to the site if they will be installed within a one week time period of delivery. Any materials that will not be installed must be removed from the site.
  - 2. **Straighten – Organized Material & Equipment Storage:** Materials and equipment must be stored in designated laydown areas. Walking and working spaces must be kept organized at all times. No material or equipment is allowed to be stored in egress/access paths. Storage requirements for exterior and interior spaces are as follows:
    - a. Exterior – Materials and equipment must be stored on dunnage, pallets or carts.
    - b. Interior – Materials and equipment must be stored on pallets, carts or racks and easily moveable on wheels.
  - 3. **Shine – Continuous Daily Cleanup:** Requirements for continuous cleanup for exterior and interior spaces area as follows:
    - a. Exterior
      - 1) Each Subcontractor shall immediately pick up all of their debris and deposit it into mobile trash carts/hoppers (provided by respective Subcontractor). Each Subcontractor is responsible for emptying these containers into a dumpster provided by the Contractor.

- 2) Every Subcontractor is required at the end of each and every workday to cleanup and organize equipment, materials and debris from that day's work activities and clean their work area.
- b. Interior: Nothing Hits the Floor – Daily cleanup:
  - 1) Every work crew has a cart with necessary cleaning tools. Each Subcontractor shall immediately deposit their debris into mobile trash carts (provide by respective Subcontractor). Each Subcontractor is responsible to remove these carts from the building daily and empty them into a dumpster provided by the Contractor.
  - 2) Every Subcontractor is required at the end of every workday to cleanup and organize equipment, materials, and debris from that day's work activities and sweep their work area.
  - 3) Electrical cords, welding leads, temporary heat, and temporary water lines are to be off the floor 100% of the time and suspended using non-conductive materials.
4. **Standardize – Color Coded Delivery Process:** Each Subcontractor will be designated a specific paint or sticker color (designated by the Contractor and provided by respective Subcontractor) to mark all deliverables to the project. All materials, including but not limited to, pallets, packaging, boxes, buckets, etc., must be marked with their respective paint color. All items that are not marked upon arrival at the project site, will be rejected.
5. **Sustain – Composite Broom Crew:** Every week, or at Contractor's request, each Subcontractor shall provide personnel to participate in cleaning all unidentified debris and broom sweeping for a full work shift or until complete. This polishing effort is in addition to normal daily cleaning.
  - a. Each Subcontractor shall provide (1) person for every (10) people working on site for respective company (including subcontractors) to participate in composite crew.
    - 1) Minimum participation by each Subcontractor is (1) person, regardless of number of people Subcontractor has on site up to (10).
    - 2) Participation requirement applies for each week the Subcontractor has personnel on the project site.
  - b. Each Subcontractor shall furnish all equipment, including but not limited to, brooms, shovels, and dump carts, to complete this activity.
  - c. Contractor will determine the location and scope of the composite cleaning crew each week as dictated by the project conditions. It is understood that this may include "exterior Subcontractors" need to work inside the building and vice versa as project conditions require to maintain the best possible project conditions.

- d. Failure to provide the personnel and equipment as described above will result in a backcharge per 1.2.C below.

**C. Failure to abide by any of the requirements above will result in a back charge of \$250/man hour needed to address any deficiencies.**

1.3 ASSIGNMENT OF RESPONSIBILITY

A. The Contractor will provide the following as a part of the 5S Program

1. Logistics planning for designated material storage and assignment of color codes
2. Dumpsters located appropriately for trade contractors to empty carts
3. Oversight of composite cleaning crews.


B. Each Subcontractor will provide, at a minimum, the following for the 5S Program

1. Mobile Trash Carts/Hopper
  - a. One cart per each individual crew
  - b. Covers for carts as applicable to project work requirements
2. Cleaning Equipment
  - a. Brooms, shovels, etc., for daily cleanup and composite crews
3. Marking Paint and/or Colored Tags for materials, equipment, etc., brought to the project site.

C. Color Codes for all Subcontractor material delivered to/stored on the project site are as follows:

Contractor	Light Green	
General Trades	Brown	
Sitework / Site Utilities	Yellow	
Steel	Dark Blue	
Concrete / Foundations	Green	
Roofing	Purple	
Aluminum & Glass	White	
Framing & Drywall	Light Blue	
Flooring	Maroon	
Fire Protection	Pink	
Plumbing	Blue	



HVAC	Silver	
Electric	Red	
Telecommunications	Orange	
Painting	Black	
Casework / Millwork	Teal	

END OF SECTION 01 35 43



## **SECTION 01 40 00**

### **QUALITY REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.01 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-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 quality-control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-control services required by A/E, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

##### **1.02 RELATED SECTIONS**

- A. Cutting and Patching (for repair and restoration of construction disturbed by testing and inspecting activities): Section 01 73 29.
- B. Specific test and inspection requirements: Divisions 02 through 49 Sections.

##### **1.03 DEFINITIONS**

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by A/E.
- C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. 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. Mockups establish the standard by which the Work will be judged.

- 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 an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., 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, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

#### 1.04 DELEGATED DESIGN

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

#### 1.05 CONFLICTING REQUIREMENTS

- A. Referenced Standards: 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 A/E 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 A/E for a decision before proceeding.

#### 1.05 SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
  - 1. Indicate manufacturer and model number of individual components.
  - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.
- C. Testing Agency Qualifications: 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.
- D. 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. Ambient conditions at time of sample taking and testing and inspecting.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 12. Name and signature of laboratory inspector.
  - 13. Recommendations on retesting and re-inspection.
- E. Permits, Licenses, and Certificates: For Owner's records, submit 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.

#### 1.06 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. 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.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. 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.
- 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 qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- 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. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. 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.

- I. 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 same tasks for Project.
    - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
  2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to A/E, 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.
- J. 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 A/E.
  2. Notify A/E seven days in advance of dates and times when mockups will be constructed.
  3. Demonstrate the proposed range of aesthetic effects and workmanship.
  4. Obtain A/E's approval of mockups before starting work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of each mockup.
  5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
    - a. Cover mock-ups to protect them from deterioration and weathering.
  6. Demolish and remove mockups when directed, unless otherwise indicated.

#### 1.07 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.
  2. Payment for these services will be made by the Owner.
  3. Costs for retesting 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 Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform quality-control services required of Contractor by authorities having jurisdiction, 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 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, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
- 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. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with A/E and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify A/E and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  3. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to A/E, Engineer and Owner with copy to Contractor and to authorities having jurisdiction.
  4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
  5. 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 inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field-curing of test samples.
  5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  6. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

#### 1.08 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by [OBC] [IBC] as the responsibility of the Owner, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
  2. Notifying A/E 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 A/E with copy to Contractor and to authorities having jurisdiction.

4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

**PART 2      PRODUCTS (Not Used)**

**PART 3      EXECUTION**

**3.01          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 A/E.
  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 A/E's reference during normal working hours.

**3.01          REPAIR AND PROTECTION**

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  1. Comply with requirements of Section 01 73 29, Cutting and Patching.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

**END OF SECTION**



## **SECTION 01 40 01 – QUALITY PROGRAM**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements for a Subcontractor Quality Program required to verify compliance with the Contractor Quality Program, including Quality Observation Process. These services do not relieve the Subcontractor of responsibility for compliance with the Contract Document requirements.

#### **1.2 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.

#### **1.3 DEFINITIONS**

- A. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect or Contractor.
- B. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- C. Contractor: The team in charge of supervising the construction phase of the project.
- D. QOR: Quality Observation Report
- E. QR: Quality Representative – The QR should be proficient in their field of work, capable of identifying issues in advance, capable of verifying submitted materials match the contract documents and coincide with materials delivered to the jobsite, and the ability to perform quality control audits and document their findings on a daily basis. The QR must be someone who is onsite full time and has the authority to make decisions in the field.
- F. Field View: Viewpoint Inspection/observation software.

#### **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 documentation of uncertainties to Architect for decision prior to proceeding.

#### **1.5 SUBMITTALS**



- A. **Quality Plan:** Submit a Quality plan for this project. This plan will outline all aspects of the Subcontractor's duties with regard to the quality on the project. Including the following:
  - 1. How Subcontractor plans to manage quality on the Project.
  - 2. Control of Documentation.
  - 3. Material receiving and storage.
  - 4. Fabrication/construction methods.
  - 5. General quality checking procedures during fabrication/construction activities.
  - 6. Specific procedures for documentation of formal testing.
  - 7. Quality checking forms and records to be utilized.
  - 8. Quality audits of Subcontractors during prequalification and prior to acceptance.
- B. **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.
- C. **Permits, Licenses, and Certificates:** For Owner's records, submit 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.

## 1.6 QUALITY ASSURANCE

- A. **General:** Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specifications Sections specify additional requirements.
- B. **Fabricator Qualifications:** A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. **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.
- D. **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.
- E. **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.

- F. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- G. 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 qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.

## 1.7 QUALITY CONTROL

- A. Subcontractor Responsibilities: In addition to responsibilities outlined in 01 40 00 – Quality Requirements each Subcontractor must provide the following:
  - 1. Attend and contribute to the weekly Quality meeting as part of WWP meeting.
  - 2. Appoint a Quality Representative as part of the construction team who will be the point of contact for all quality and turnover issues. This representative must have an email address.
    - a. This representative or representatives shall be submitted to the Contractor in list format with all contact information included.
  - 3. Identify and resolve QOR's in a timely manner. The maximum time allowed for each QOR is as follows
    - a. 7 calendar days for items through the first 50% of the project schedule.
    - b. 5 calendar days for items from 50% through 75% of the project schedule.
    - c. 3 calendar days for items from 75% through 90% of the project schedule.
    - d. 1 calendar day for items from 90% through 100% of the project schedule.
  - 4. Provide suitably qualified designated QR Inspectors.
  - 5. Maintain accurate records of inspections and turnover issues.
  - 6. Submit inspection records for all areas of their unique scope of work, including final reports.
  - 7. Maintain a register of non-conformance reports issued to suppliers/subcontractors and issued from the Contractor.
  - 8. Verify that defects discovered in the work performed by the Subcontractors are identified utilizing the QOR process and adequate corrective actions are to be planned with the Subcontractor's Superintendents and approved by the Contractor prior to their implementation.
  - 9. Cooperate with the Contractor in coordination and execution of the Quality Program including preparatory meetings, initial inspections, follow-up inspections, mock-ups, quality coordination meetings, etc.
  - 10. Participate by using FieldView Software. All construction quality issues will be entered, tracked and closed using FieldView. Training will be provided by the Contractor. Software Licenses will be provided to the Subcontractor by the Contractor.

11. Adequate internet access is required for each Subcontractor and is to be accessed by each Subcontractor. Coordination with the Contractor may be acceptable depending upon conditions in the field.
12. Each Subcontractor is required to provide a minimum of one (1) Tablet device from supported devices list available at

[https://fvdocs.viewpoint.com/Admin\\_web\\_topics/Devices/r\\_supported\\_devices\\_list.html](https://fvdocs.viewpoint.com/Admin_web_topics/Devices/r_supported_devices_list.html)

Device will be located on site at all times at the cost of each Subcontractor. This tablet will be required to have the FieldView mobile application downloaded and utilized for QOR processes. Each Subcontractor is strongly encouraged to have a laptop computer in addition to Tablet with printing capability.

13. All QOR's submitted are required to be electronically through the FieldView system. All other forms will not be accepted by the Contractor.
14. The FieldView Software is not an RFI, Submittal, Daily Log, etc. software and does not replace the existing software. Both systems must be used collaboratively.
15. All construction quality issues entered using FieldView will require photographic evidence of completion from the Subcontractor. If such evidence is not attached to each individual issue in the system by the Subcontractor the said issues is not considered complete until re-inspection can be performed by the Contractor or issue creating party.
  - a. Each photo must include recognizable features clarifying the location accurately corresponds with the issue it is attached with.
16. Implement the Owner's Quality Program requirements accordingly.

B. Contractor Responsibilities: Contractor will provide the following:

1. Appoint a Quality Representative as part of the construction team who will be the Contractor's point of contact for all quality and turnover issues.
2. Conduct weekly quality meetings as part of the WWP meeting.
3. Conduct project inspections.
  - a. Maintain Records of inspections.
  - b. Identify and resolve QOR's in a timely manner.
4. Report defects to the Subcontractor.
5. Record defects: Log and track items through completion of corrections in FieldView.
  - a. Maintain a register of non-conformance reports issues to the Subcontractor.
  - b. Verify that defects discovered in the work performed by the Subcontractors occurring systematically are identified utilizing the QOR process and adequate corrective actions are approved prior to their implementation.
6. Document changes: Log and track modifications to the Contract Documents.
7. Answer tech questions and provide additional training regarding FieldView.

## 1.8 QUALITY OBSERVATION REPORTS

A. Quality Observation Reports (QOR) will be utilized to report discrepancies in performance or Work as follows:

1. Monitoring Phase: Ongoing monitoring of the construction activities by the Contractor, A/E, Special Inspections, Owner and Subcontractor.

2. Reporting Phase: Quality Observation Report will be distributed daily via email consisting of the following:
    - a. Date and time of observation
    - b. Area and location of the observation
    - c. Observers name and company
    - d. Description of the observation
      - 1) Photo and or floor plan will also be attached for clarity if necessary.
  3. Assessment and Recording Phase: QOR will be assessed by the Subcontractor to determine the following:
    - a. Whether observation is deviation from the Contract Documents.
    - b. The observation warrants being placed on the QOR database.
  4. Database Maintenance: Quality observations shall be logged on FieldView by QOR Administrator
    - a. A unique identification number will be allocated to be the observation by FieldView.
    - b. The Subcontractor responsible for the resolution of the issue will be assigned.
    - c. A target closeout date will be assigned.
    - d. The assigned Subcontractor will be issued the QOR for action.
  5. Resolution Phase: Subcontractor shall take action to rectify the issue.
    - a. Notify QOR Administrator in FieldView when the Subcontractor has deemed that the issue has been rectified via photo upload and provided corrective action details via comments feature.
    - b. The QA/QC Team leader and or representative will view photo or re-inspect and determine if the issue has been satisfactory resolved.
    - c. If the issue has been resolved, the database will be updated to show the items as closed.
  6. Disputed Resolution: QOR items that cannot be satisfactorily closed will be resolved by formal meeting with Subcontractor and Contractor to develop a plan to close issues in a manner that will prevent delays in the project schedule.
- B. QOR Database Management (FieldView): Quality Observation Report Database will be administered by the Contractor. The Subcontractor will interact with FieldView to enter, receive, and close QOR's. The database will track and report on such items as:
1. QOR's by Subcontractor / Supplier.
  2. QOR's by Area / System.
  3. Status of each QOR.
  4. Originator.
  5. Description of Quality Observation.
  6. Description of Action required to close QOR.

## 1.9 QUALIFICATIONS AND TRAINING

- A. Qualifications: Subcontractor shall insure that all employees, subcontract employees, and third party employees are suitably qualified to execute the work they are tasked to do.
1. Subcontractors Quality Plan shall indicate what work activities need to have qualified personnel.
  2. The Subcontractor shall insure that there is a file maintained for all persons that require qualifications incorporating current curriculum vitae with such qualifications.
  3. Qualifications must be current, including where periodic re-certification is required.
  4. Maintain all records on site, available for audit by the Contractor.

5. If non-conformities are found, the Subcontractor shall carry out all the necessary reworks and shall obtain the conformity to the specified requirements as well as subsequent tests.
- B. Training: Contractor QA/QC Team Leader shall ensure that all relevant Subcontractor personnel are trained in the requirements of this plan. Training shall be performed over the duration of the project execution.
1. Provide training to all relevant Owner, Architect, Engineer and Subcontractor personnel in the implementation of the QOR process and all other procedures outlined in this plan.
  2. Provide FieldView training to all parties
  3. Maintain records for all training.
  4. In conjunction with training sessions, review quality system documents and revised or update to reflect comments promoting improvement.
- C. Coordination: Coordinate sequence of activities to accommodate required quality assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

**END OF SECTION 01 40 01**

## **SECTION 01 41 13**

### **FIRE RESISTANCE RATINGS REQUIREMENTS**

#### **PART 1 GENERAL**

##### 1.01 SUMMARY

- A. Requirements of this Section apply to the Work of all other Sections.

##### 1.02 STANDARDS

- A. Standards, codes and regulations published by Manufacturer's Associations, governmental agencies, referenced fire resistance rating and other regulatory authorities form a part of these Specifications as minimum requirements.
- B. Where differences occur between the Contract Documents and such standards, the most restrictive requirement shall apply.
- D. Supply all materials and perform all work in accordance with the fire rating assembly and installation procedures, and in conformance with published trade and manufacturer's association standards, unless specifically noted otherwise herein.

##### 1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM)
- B. National Fire Protection Association (NFPA)
- C. Underwriters' Laboratories (UL)

#### **PART 2 MATERIALS**

##### 2.01 MATERIALS AND PRODUCTS

- A. See individual assembly specifications for materials and products used in fire ratings assembly.
- B. References and standards listed in the individual fire rated assembly specification sections apply to the work of this section.

**PART 3      EXECUTION**

**3.01          INSTALLATION**

- A.      Refer to drawings for locations, extent and fire rated assembly to be used. See individual fire rating assembly specification sections for installation requirements and procedures of materials and products used.
- B.      General: Use materials, fabrication, construction personnel and installation methods identical with those indicated and planned for the final Work.

**END OF SECTION**



## **SECTION 01 43 39**

### **EXTERIOR MOCK-UP**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. Prior to the start of construction operations provide the following job mock-up of exterior assemblies. Mockup to demonstrate coordination, assembly methods and transitions between materials and establish quality requirements. See corresponding specification sections for complete requirements.
- B. Provide the following components
  - 1. Storefront framing and glazing. See Specification 08 41 13.
  - 2. Metal panels. See Specification 07 42 13.
  - 3. Metal shingles. See Specification 07 42 13.
  - 4. Metal edge roof coping. See Specification 07 62 00.
  - 5. Concrete masonry and backup assembly. See Specification 04 00 00
  - 6. Mineral-Fiber Cement siding. See Specification 07 46 46.
  - 7. Sealants. See Specification 07 92 00.
  - 8. Air barrier: See Specification 07 27 26.
  - 9. Cold formed framing: See Specification 05 40 00
  - 10. Thermal insulation: See Specification 07 21 00.
  - 11. Aluminum windows: See Specification 08 51 13.
- C. Size: 8' x 8' minimum

##### **1.02 RELATED SECTIONS**

- A. Quality Requirements: Section 01 40 00.
- B. Execution Requirements: Section 01 73 00.
- C. Product Requirements: Section 01 60 00.
- D. Interior Mock-Up: Section 01 43 41.

##### **1.03 QUALITY CONTROL**

- A. General: Use materials, fabrication, construction personnel and installation methods identical with those indicated and planned for the final Work.
- B. Simulate actual construction conditions as accurately as possible.
- C. Materials: As specified in the individual specification sections.

- D. Installation Personnel Qualifications: As specified in the individual specification sections.

1.04 SUBMITTALS

- A. Submittal Requirements: See individual specification sections. All material submittals must be approved prior to construction of room mock-up.

1.05 APPROVALS

- A. Repair, adjust or redo mock-up until accepted by Architect, Owner's Representative and Construction Manager.
- B. Mock-ups must be acceptable to Architect, Owner's Representative and Construction Manager before beginning construction operations used in the room mock-up.
- C. Retain and maintain mock-up throughout remainder of project as a minimum workmanship standard.

**PART 2 MATERIALS**

2.01 MATERIALS AND PRODUCTS

- A. See individual specification sections for materials and products used in mock-up.
- B. References and standards listed in the individual specification sections apply to the work of this section.

**PART 3 EXECUTION**

3.01 INSTALLATION

- A. See individual specification sections for installation requirements and procedures of materials and products used in room mock-up.

**END OF SECTION**

## **SECTION 01 43 41**

### **ROOM MOCK-UP**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. As part of construction operations a job standard mock-up room will be completed. A typical dorm room, as selected by Construction Manager, will be completely finished.
- B. Work includes:
  - 1. new wall construction
  - 2. wall patching
  - 3. door and hardware installation
  - 4. surface preparation and painting
  - 5. acoustic ceiling
  - 6. finish flooring
  - 7. HVAC work
  - 8. sprinkler work
  - 9. electrical work
  - 10. wall and base cabinetry
- C. Room mock-up will be used to ensure the quality level of materials and workmanship and the coordination and sharing of space between trades.

##### **1.02 RELATED SECTIONS**

- A. Quality Requirements: Section 01 40 00.
- B. Execution Requirements: Section 01 73 00.
- C. Product Requirements: Section 01 60 00.
- D. Exterior Mock-Up: Section 01 43 39.

##### **1.03 QUALITY CONTROL**

- A. General: Use materials, fabrication, construction personnel and installation methods identical with those indicated and planned for the final Work.
- B. Simulate actual construction conditions as accurately as possible.
- C. Materials: As specified in the individual specification sections.
- D. Installation Personnel Qualifications: As specified in the individual specification sections.

1.04 SUBMITTALS

- A. Submittal Requirements: See individual specification sections. All material submittals must be approved prior to construction of room mock-up.

1.05 APPROVALS

- A. Repair, adjust or redo room mock-up until accepted by Architect, Owner's Representative and Construction Manager.
- B. Job room mock-up must be acceptable to Architect, Owner's Representative and Construction Manager before beginning construction operations used in the room mock-up.
- C. Retain and maintain mock-up throughout remainder of project as a minimum workmanship standard.

**PART 2 MATERIALS**

2.01 MATERIALS AND PRODUCTS

- A. See individual specification sections for materials and products used in room mock-up.
- B. References and standards listed in the individual specification sections apply to the work of this section.

**PART 3 EXECUTION**

3.01 INSTALLATION

- A. See individual specification sections for installation requirements and procedures of materials and products used in room mock-up.

**END OF SECTION**

## SECTION 01 45 16 – GROUND PENETRATION REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. The purpose of this procedure is to define minimum utility avoidance requirements for all Contractors, Subcontractors, and other companies engaged in ground penetration activities.
- B. This procedure applies to all personnel associated with excavation, trenching, demolition and other ground penetrating activities including dee stakes, sign posts, fence posts, ground rods, etc. on Contractor projects. The result of this procedure is to:
  - 1. Ensure that all excavation, trenching, and demolition activities and work within excavations / trenches are adequately planned and performed safely.
  - 2. Define the standard work process to avoid any utility strikes during all excavation, trenching and demolition activities.
- C. Excavation means the use of hand tools, powered equipment, or explosives to move earth, rock, or other materials in order to penetrate, bore or drill into the earth, or to demolish any structure whether or not it is intended that the demolition will disturb the earth.

#### 1.2 PROJECT DESCRIPTION AND REQUIREMENTS

- A. Pre-Planning:
  - 1. Subcontractor(s) shall conduct thorough planning prior to the execution of any Excavation/Trenching or Penetration activities. This requires the Subcontractor complete the Ground Penetration / Dig Permit DAILY prior to starting work.
- B. Utility Avoidance:
  - 1. All underground and overhead utilities within the Excavation / Trenching or Penetration work area shall be surveyed and positively identified before excavation work commences. It is the responsibility of every Subcontractor performing an excavation to call the 811 Utility Protection Service in their state to obtain an individual reference / dig number. No Subcontractor shall work under another Subcontractor's ticket number, including the Contractor's.

Since 811 will only mark utilities in the Right-of-Way, **a private locating service must also be used to locate any utilities not located by 811 inside the project / excavation area.** Obtain as built drawings showing the location of all known / found utilities with in the excavation site and reference the Contract Documents to verify there are no utilities that were not marked by the Locating Service.

- 2. 811 Procedures:
  - a. Assess the area to be excavated, gather all the information that will needed to complete the locate work order form.
  - b. Premark the location where the excavations will occur in white paint, flags or both.
  - c. Contact 811 and provide details of the excavation.



- d. Obtain reference / ticket number, record the number on the Ground Penetration / Dig Permit and keep it for the duration of the excavation or longer is necessary.
  - e. Utility owners will mark any existing utilities around the excavation site.
  - f. Wait the required amount of time before commencing excavation.
    - 1) Advance notice needed to inform 811 of excavation.
      - a) IND – 2 working days.
      - b) OH – 2 working days
      - c) KY – 2 working days
      - d) TN – 3 working days
      - e) NC – 3 working days
  - g. Protect and preserve the markings of tolerance zones of underground utility facilities until those markings are no longer required for proper and safe excavations. If markings are destroyed or lost do not repaint the markings, contact 811 to remark the found/known utilities. Markings are only valid for the following amount of time before 811 has to be notified again of the excavation.
    - 1) IND – 20 days
    - 2) OH – as long visible
    - 3) KY – 21 days
    - 4) TN – 15 calendar days
    - 5) NC – 15 days
3. Private Property Locating:
- a. ALL excavations/borings/mass excavations/ground penetrating activities must be coordinated with the Contractor and the Owner to have a 3rd Party Locating Service survey the areas of excavation that are not in the right-of-way.
  - b. Subcontractor must coordinate with the Contractor and contact the designated 3rd Party Locating Service prior to any ground penetrating activities to have the service locate the area where the activities occur. Prior to arrival of the 3rd Party Locating Service, the area that needs surveyed should be painted or marked with flags.
  - c. The 3rd Party Locating Service shall mark all found utilities with paint or flags.
  - d. All markings must be protected and preserved so the location of the utility is known at all times.
  - e. Take pictures and keep records of the survey to include with the Excavation Permit.
4. Ground Penetrations:
- a. Prior to any excavation beginning, the scope of work must be reviewed with the Contractor to discuss the process and hazards related to task.
  - b. Subcontractors must complete the Ground Penetration / Dig Permit daily and have it signed by the Contractor's project representative.
  - c. Protect and preserve the markings of utilities until those markings are no longer required for proper and safe excavations.
  - d. The exact location and depth of any known / found utilities within 24" of the excavation must be identified by one of the following means:
    - 1) Hand digging
    - 2) Pot holing
    - 3) Hydro / Vacuum excavation
  - e. Maintain a minimum of 24" (tolerance zone) between the utility and the cutting edge or point of powered equipment.

- f. When approaching and excavating within the tolerance zone of underground utility facilities with powered equipment, the Subcontractor must provide a spotter to visually monitor the excavation activity for any indication of the underground utility.
    - g. Conduct the excavation within the tolerance zone of the utility in a careful, prudent and non-destructive manner such as hand digging, hydro/vacuum excavation. Do not excavate within the tolerance zone with any powered equipment.
    - h. Review area(s) of work to verify there are no power lines/overhead cables in the work area. If there are, a plan must be approved by the Contractor prior to proceeding.
  - 5. Demolition (sub-surface):
    - a. When demoing existing utilities, the same procedures listed in section 1.2-B.4 must be followed.
    - b. When demoing existing structures, the Contractor's demolition checklist must be completed prior to commencement.
- 1.3 ASSIGNMENT OF RESPONSIBILITY
- 1. Contractor shall provide all record documents for the Subcontractor to use to locate new / existing utilities.
  - 2. Subcontractor shall include all costs to achieve the requirements listed in this specification section.

**END OF SECTION 01 45 16**

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## **SECTION 01 45 29**

### **TESTING LABORATORY SERVICES**

#### **PART 1 GENERAL**

##### **1.01 GENERAL REQUIREMENTS**

- A. Laboratory services required to perform the specified testing shall be performed by an independent testing laboratory employed by the Owner.
  - 1. Services will be paid by the Owner.
- B. Cooperate with the laboratory to facilitate the execution of its required services.
- C. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.

##### **1.02 QUALIFICATION OF LABORATORY**

- A. Laboratory(ies) shall:
  - 1. meet "Recommended Requirements for Independent Laboratory Qualification", published by American Council of Independent Laboratories.
  - 2. be authorized to operate in the State in which the Project is located.
  - 3. have a minimum 5 years of experience related to required services.

##### **1.03 REFERENCE STANDARDS**

- A. ASTM D3740: Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- B. ASTM E329: Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
- C. ASTM D698: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>).
- D. ASTM C31: Standard Method for Making and Curing Concrete Test Specimens in the Field.
- E. ASTM C39: Test for Compressive Strength of Cylindrical Concrete Specimens
- G. ASTM C143: Standard Method of Test for Slump of Portland Cement Concrete.
- H. Other references and standards as referenced in the various Specification

Sections.

1.04 LABORATORY RESPONSIBILITIES

- A. Provide qualified personnel at site after due notice and cooperate with Architect and Contractor in performance of services.
- B. Perform specified inspection, sampling and testing of products in accordance with specified standards.
- C. Ascertain compliance of materials and mixes with requirements of Contract Documents.
- D. Promptly notify Architect and Contractor of observed irregularities or non-conformance of work or products.
- E. Perform additional inspections and tests required by Architect.
- F. Attend preconstruction meetings.
- G. Attend job meetings as required.

1.05 LABORATORY REPORTS

- A. After each inspection and test, Laboratory shall promptly submit two copies of laboratory report to Architect and two copies to Contractor.
- B. Each report shall include:
  - 1. Date issued.
  - 2. Project title and number.
  - 3. Testing laboratory name, address and phone number.
  - 4. Name of laboratory inspector and job number.
  - 5. Date and time of sampling or inspection.
  - 6. Record of temperature and weather conditions.
  - 7. Date of test.
  - 8. Identification of specification section.
  - 9. Location of sample or test in the Project.
  - 10. Type of inspection or test.
  - 11. Results of tests and compliance with Contract Documents.
  - 12. Interpretation of test results.

1.06 LIMITS ON TESTING LABORATORY AUTHORITY

- A. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
- B. Laboratory may not approve or accept any portion of the work.

- C. Laboratory may not assume any duties of the Contractor.
- D. Laboratory has no authority to stop Work.

1.07 CONTRACTOR RESPONSIBILITIES

- A. Cooperate with laboratory personnel and provide access to Work.
- B. Provide incidental labor and facilities to provide access to work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, and for storage and curing of test samples.
- C. Notify Architect and laboratory 24 hours prior to expected time for operations requiring inspection and testing services.
  - 1. When tests or inspections cannot be performed after such notice, Contractor shall notify the Laboratory.
  - 2. If Contractor does not notify laboratory before laboratory personnel are scheduled for this work, Contractor shall reimburse the Owner for laboratory personnel and travel expenses.

1.08 PAYMENT FOR TESTING

- A. Initial Services: When initial tests indicate non-compliance with the Contract Documents, the costs of initial tests associated with that non-compliance will be deducted by the Architect from the Contract Sum.
- B. Retesting: When initial tests indicate non-compliance with the Contract Documents, all subsequent retesting occasioned by the non-compliance shall be performed by the same testing agency and the costs thereof will be deducted by the Architect from the Contract Sum.

1.08 PAYMENT FOR TESTING

- A. Initial Tests and Required Retests: All costs related to tests and retests, resulting from failed initial tests, to be borne by the Contractor.

1.09 CODE COMPLIANCE TESTING

- A. Inspections and tests required by codes or ordinances, or by a plan approval authority having jurisdiction over the project site, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

1.10 CONTRACTOR'S CONVENIENCE TESTING

- A. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

**END OF SECTION**

## **SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

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

#### **1.2 REGULATIONS**

- A. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to:
  - 1. Building code requirements
  - 2. Health and Safety requirements
  - 3. Utility company requirements
  - 4. Police, fire department and rescue squad rules
  - 5. Environmental protection regulations.
- B. Inspections: Each temporary utility shall be tested prior to use as per the local authority having jurisdiction.

#### **1.3 ASSIGNMENT OF RESPONSIBILITY**

- A. The Construction Manager shall assign specific responsibility for installation, maintenance and removal of certain temporary facilities below.
- B. Items that have no specific responsibility assigned to them shall apply to each and every Subcontractor.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of Subcontractor. Owner reserves right to take possession of Project identification signs.
  - 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period.

## PART 2 - LISTING OF REQUIREMENTS

### 2.1 TEMPORARY POWER AND LIGHTING

#### A. Summary

1. The Electrical Subcontractor shall provide temporary power and lighting for construction purposes beginning as soon as possible after mobilization, as noted in the project schedule, or as coordinated with the Construction Manager. The Electrical Subcontractor shall then extend the temporary power system and provide temporary lighting as the structure is completed. The Electrical Subcontractor shall maintain the same throughout the remainder of the construction period. Temporary systems shall be removed after the permanent systems are in place by the Electrical Subcontractor and with the approval of the Construction Manager.
2. The Electrical Subcontractor will provide temporary light and power distribution for construction purposes for all trades as describe in the subsequent paragraphs.
3. The Electrical Subcontractor is responsible to maintain the temporary electrical power and lighting system at all times and is to provide off hours service as needed for the same.
4. The Electrical Subcontractor is responsible for all electrical work related to the temporary heating/cooling and ventilation. See appropriate section of this specification for further detail.
5. **Until such time as temporary power is established, each Subcontractor shall provide their own generators to provide their own power as required.**
6. Non-corded battery powered tools are preferred. However, if corded tools are required each Subcontractor shall provide their own extension cords as necessary. Extension cords, if used, must remain suspended by non-conducting materials 9' above finished floor elevation and relocated as necessary to facilitate the work. Extension cords are not permitted to remain out overnight, they must be rolled up at the end of each day.

#### B. Temporary Electric – General Requirements

1. The aid to construction cost, if required, is to be paid by Electrical subcontractor.
2. Construction Manager shall pay for utility consumption charges.
3. The Electrical Subcontractor is to provide a submittal detailing the distribution system, power receptacle bank locations and general information on lighting layout for review by the Construction Manager.
4. Receptacles and panels should be mounted on plywood panels and wood floor stands at all distribution points or an approved alternative. Mobile manufactured receptacle banks can be used for all receptacle bank locations. The Electrical Subcontractor must maintain a log of testing GFCI receptacles as required by OSHA.
5. This service is to consist of panelboards, receptacles, switches, grounding and all other labor and materials necessary to provide a complete and operating system. Label all breakers and the corresponding receptacle and lighting area they feed. This is to be done on the panel directory provided with the panel.
6. The temporary system is to be laid out, balanced, and sized so as to produce a voltage drop of no more than 5% at the extreme end of the line, when operating at full load.
7. Install and maintain a reasonably balanced system and take current readings on the feeders at regular intervals as required. Correct any serious phase unbalance.
8. Protect the installation against weather damage, normal operations of other trades, and other persons on the site.
9. All wiring for the temporary system must be installed a minimum of 9'0" above finished floor and routing shall be coordinated with the Construction Manager.

10. Maintain the temporary electrical service for the duration of this contract.
  11. Removal of all temporary electric material is the responsibility of the Electrical Subcontractor. Damage caused by removing the temporary electric system is the responsibility of the Electrical Subcontractor. This does not include “normal” patching of drywall where conductors pass through partitions.
- C. Temporary Electric – Building Service
1. 600 Amp temporary service shall be supplied to the building.
  2. The Electrical Subcontractor will tie into the utility. The Electrical Subcontractor is responsible for all material and labor necessary for required transformation and service and coordination with the utility of the same.
  3. The distribution panel shall include the following provisions:
    - a. The configuration of switching and circuiting will be as required to satisfy the temporary electrical requirements as described herein.
  4. The temporary electric to the building shall be installed underground unless approved by the Construction Manager. This service must be coordinated with future site utility construction. The Construction Manager must approve the routing of this temporary service.
  5. The Electrical Subcontractor will be responsible for removing the temporary electric transformer, switch and all equipment associated with distribution once temporary electric service is no longer required.
- D. Temporary Electric – Building Distribution
1. 208/120 v panelboards or load centers will serve as the distribution points for each floor of the facility. A minimum of (8) quadplex receptacles must be installed at these distribution locations.
  2. Each distribution point will also feed banks of receptacles spaced no greater than 50ft apart. Each bank of receptacles will include (8) 20 amp quadplex GFCI receptacles.
  3. 100A disconnect will be provided for dedicated use of the Elevator Subcontractor. The Electrical Subcontractor is required to provide necessary step up transformers. Coordinate location of disconnect.
  4. 100A disconnect will be provided for dedicated use for the temporary material hoist (buck hoist). The Electrical Subcontractor is required to provide necessary step up transformers. Coordinate location of disconnect.
  5. 50A disconnect will be provided for dedicated use of the Masonry Subcontractor. The Electrical Subcontractor is required to provide necessary step up transformers. Coordinate location of disconnect.
  6. Additional temporary power required by other trades not listed here is to be furnished, by the trade requiring the power at their cost.
- E. Temporary Electric – Construction Manager Site Office
1. 100Amp Electrical Service, 120/240 Volt, Single Phase, 3-Wire, 60 Hz for Construction Manager Trailer(s) is to be provided.
  2. The Electrical Subcontractor will coordinate tie with the utility.
  3. The distribution for this service shall include the following provisions:
    - a. The configuration and switching necessary to satisfy the distribution and temporary electrical requirements as described herein.
  4. The Electrical Subcontractor will be responsible for removing this service in its entirety once temporary electric service is no longer required. This removal must be coordinated with the Construction Manager.

F. Temporary Lighting

1. Provide labor and material for the installation and maintenance of temporary lighting for all areas of construction as required for the duration of this contract.
2. Maintain temporary outdoor security lighting around the site to illuminate the entire building perimeter as needed to not leave any dark spaces on the project site. As conditions change provide and install additional security lighting at the direction of the Construction Manager.
3. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system. Provide switching on each floor level for the purpose of turning lights off during non-work hours. Minimum night lighting levels must be maintained, as required.
4. Temporary general lighting will be provided such that a minimum of 15 foot-candle illumination level is maintained in all areas. As part of the general requirements above the Electrical Subcontractor must submit a temporary lighting plan to the Construction Manager for approval prior to installation. This plan should include anticipated lighting levels.
5. Fixtures and Lamps are required to be LED type.
6. All wiring for temporary lighting must be installed a minimum of 9'0" above finished floor.
7. Install and maintain a reasonably balanced system and take current readings on the feeders at regular intervals as required. Correct any serious phase unbalance.
8. Protect the installation against weather damage, normal operations of other trades, and other persons on the site.
9. Replace lamps as required for the duration of this contract.
10. The Electrical Subcontractor is responsible for adding any additional lighting as partitions are erected to maintain the required foot-candle level.
11. All temporary lighting will be removed as part of this Contract by the Electrical Subcontractor as directed by the Construction Manager. The Electrical Subcontractor will remove all components off site and repair the work as directed by the Construction Manager.
12. Any temporary lighting required by other trades before project wide temporary lighting is available or more stringent than what is describe herein is to be furnished by the trade requiring the lighting at their cost.

- G. Electrical work shall conform to requirement of the National Electrical Code and all federal, state and local requirements. The Electrical Subcontractor shall obtain and pay for applications, permits, and inspection pertaining to this work.

2.2 CONSTRUCTION TELEPHONES

- A. Subcontractor foremen are required to be provided a Subcontractor issued cell phone.

2.3 SANITARY FACILITIES

- A. The Construction Manager shall provide temporary chemical-type toilet facilities for all workers for the duration of the project. Provide number of units as appropriate for number of workers on-site. Hand washing facilities shall also be provided at designated locations.
- B. Use of new, permanent facilities will not be permitted.



- C. Use of existing facilities nearby will not be permitted.

## 2.4 TEMPORARY WATER

- A. Each Subcontractor shall provide for their own temporary water required for construction purposes. Taps off of existing fire hydrants or water mains may be considered, provided each Subcontractor wanting to do so coordinates with the local water utility company.
- B. Each Subcontractor shall provide its own drinking water.

## 2.5 TEMPORARY HEATING

- A. Each Subcontractor shall provide their own temporary heating facilities and/or protection to continue their work in cold weather, in addition to that provided for by others below.
- B. The **HVAC Subcontractor** shall provide temporary heating and ventilation, adequately distributed throughout the building, starting at the “Dry-In” milestone date, and if the construction period extends into the winter and spring months. Continue until the permanent system can be utilized.
- C. The basis of bid shall be an on-site propane storage tank with a manifold piping distribution system and propane heaters sized to suit the building area and anticipated weather conditions. If the permanent system can be utilized at the outset, there will be no need for a temporary heating system.
- D. The temporary system provided shall provide a consistent space temperature of 65 deg F to allow for drywall finishing. Fans or other means of air distribution to prevent Hot/Cold spots from shall be included with the temporary heating system.
- E. The Construction Manager will pay for utility consumption charges associated with the temporary heat.

## 2.6 INTERIOR SPACE CONDITIONING

- A. The **HVAC Subcontractor** shall provide interior space conditioning (ventilation plus heating and/or cooling depending on the season) for the interior of the building so that temperature or humidity-sensitive materials can be installed in a timely manner to meet schedule. It is anticipated that the permanent HVAC equipment can be utilized for this purpose. The new HVAC equipment shall be operational and able to provide space conditioning by the start of Prime Painting on each floor of each building construction. If this requirement is not met, the HVAC Subcontractor shall provide temporary heating, cooling or ventilating equipment and systems to maintain the temperature and humidity in the building to allow finish trades work to proceed.
- B. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- C. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction

from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

- D. The HVAC Subcontractor shall provide and maintain temporary filter media as required during construction.
- E. Extended warranties shall be provided to allow for use of equipment during construction but also to meet the required warranty duration beginning upon substantial completion.
- F. The Construction Manager will pay for utility consumption charges associated with the use of the permanent equipment.

## 2.7 TEMPORARY STORM WATER CONTAINMENT

- A. If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off site in a lawful manner.
- B. Follow Local Utility Provider rules and regulations concerning storm water containment, filtering, etc.
- C. Filter out excessive amounts of soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
- D. Connect temporary sewers to the municipal system, as directed by sewer department officials.
- E. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.
- F. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

## 2.8 FIELD OFFICES AND SHEDS

- A. The Construction Manager will provide a construction trailer for the duration of the project. This trailer will be used for weekly progress meetings and for the Construction Manager's personnel. Use of this office for Subcontractor operations or storage will not be permitted.
- B. Any Subcontractor requiring office or storage trailers or sheds shall request space for such through the Construction Manager. There will be limited areas for materials storage on the project site. Each Subcontractor shall be responsible for installation, maintenance and removal of their storage facilities.

**2.9 ON-SITE MATERIAL STORAGE**

- A. The Construction Manager shall designate a lay-down area for stored materials. Said areas shall be kept neat and orderly by those subcontractors using it.

**2.10 TEMPORARY ROADS AND PAVING**

- A. Each Subcontractor shall take measures to minimize mud and debris which might be tracked or fall onto existing roads.

**2.11 TEMPORARY PARKING**

- A. Absolutely No Parking on Site.
- B. All construction personnel shall purchase a parking pass to utilize the Construction Parking Lot or any other approved surface parking lots (see site logistics plan for contractor parking).
  - 1. Parking permits can be purchased by going to: <https://inside.nku.edu/parking/permits.html>
- C. A contractor parking only area will be designated for use near the project. Once these spaces have been taken, contractors shall park in designated spaces in overflow areas.
- D. For those who do not wish to purchase a pass, there are hourly and daily parking available for purchase in the nearby garages.

**2.12 DEWATERING FACILITIES AND DRAINS**

- A. Maintain the site, excavations and construction free of water.
- B. Comply with individual specification section requirements. If none stated in the specification section, comply with Division 2 sections.

**2.13 TEMPORARY ENCLOSURES AND PARTITIONS**

- A. Each Subcontractor shall provide and maintain temporary enclosures as required to protect their construction from exposure to weather or other construction operations. Temporary structure's location and size shall be approved by the CM.
- B. When heat is needed and the building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat.
- C. Provide tarpaulins securely attached to building frame. Close openings less than 25 square feet with plywood or similar material.
- D. Close openings in floor or roof decks or horizontal surfaces with load bearing construction. These coverings shall also meet OSHA requirements for fall protection.

- E. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL labeled, fire retardant treated material for framing and sheathing.

**2.14 CONSTRUCTION AND PERSONNEL HOISTING**

- A. All Subcontractors shall be responsible for providing their own hoisting.
- B. A telehandler (rough terrain forklift) with a 10,000lb lifting capacity shall be provide by the CM for 12 months starting after the concrete slab on grades have been installed. Each subcontractor shall include a trained and certified operator for use of the equipment. The CM provided equipment is meant to aid in unloading deliveries, loading material to levels ground through 4, and removing debris from the building. The equipment shall be shared amongst all subcontractors on site, scheduling the use of the equipment is required.
- C. All hoisting above Level 4 prior to the installation of the material hoist is the responsibility of each subcontractor.
- D. The Construction Manager shall provide and operate one personnel hoist (buck hoist). The approximate size of the material hoist is 4' wide by 12' deep and can transport material up to 3,000lbs.

**2.15 TEMPORARY STAIRS**

- A. The Construction Manager shall provide temporary stairs until permanent stairs are available. The temporary stairs shall be installed once the Level 3 concrete has been poured.
- B. Use of new stairs for construction traffic will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Construction Manager.

**2.16 TEMPORARY ELEVATOR USE**

- A. Use of new elevators is permitted after it is installed and inspected and approved for construction use.
- B. If elevators are permitted to be used during construction, elevators shall only be used to transport materials (no riders without material or equipment). Elevators shall be kept clean and maintained in a condition acceptable to Construction Manager at all times.
- C. Do not load elevators beyond their rated weight capacity.
- D. The Construction Manager shall provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. Each Subcontractor shall use care to not damage the protective coverings in addition to the permanent finishes.

**2.17 CONSTRUCTION SIGNAGE**

- A. The Construction Manager will provide jobsite directional signage and project identification signage.
- B. No other signage will be permitted.

**2.18 SITE SECURITY**

- A. Each Subcontractor shall be responsible for securing their materials, tools, and equipment.
- B. There will not be any security provided after hours.

**2.19 TEMPORARY FIRE PROTECTION**

- A. Temporary fire protection measures are to be used until permanent fire protection systems are active and have been inspected and approved by local authorities. Each Subcontractor shall be responsible for providing their own fire protection measures. This includes (1) 10lb ABC fire extinguisher in each gang box or area or stored materials.
- B. Install and maintain temporary fire protection facilities to comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding construction, Alterations, and Demolition Operations." They shall be UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- C. Locate fire extinguishers where convenient and effective for intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
- D. Store combustible materials in containers in fire safe locations.
- E. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.
- F. Provide supervision of welding operations, combustion type temporary heating units and similar sources of fire ignition. This includes a dedicated fire watch per OSHA specifications.
- G. In addition to each Subcontractor's own fire extinguisher requirements, the Construction Manager shall provide fire extinguishers at each floor and near each stair per OSHA regulations.
- H. The Fire Protection Subcontractor shall provide, install, and remove a temporary stand pipe per codes.

**2.20 CONSTRUCTION DEBRIS HANDLING**

- A. The Construction Manager shall provide dumpster(s) for debris and waste materials generated from construction operations. This dumpster shall be used for disposal of materials from this project site only. It shall be emptied promptly when full.

- B. Each Subcontractor shall be responsible for transporting their own debris and waste materials to the dumpster at the end of each day at a minimum.
- C. Subcontractors performing demolition activities shall provide their own means for removal of debris and demolished materials from the site. The aforementioned dumpster shall not be used for demolition debris.

## 2.21 BARRICADES, WARNING LIGHTS AND SIGNS

- A. Subcontractors shall erect and maintain barricades, warning lights and signs necessary to protect other personnel, the public and the Work. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Illuminate when used during periods of darkness.
- B. Provide barricades, identification and illumination as required around excavation hazards.
- C. Subcontractors shall erect temporary fencing, flag line, danger tape, or other barrier where overhead dangers exist. This would include areas under aerial lift baskets, mobile scaffolding, or hoisting swing radius.

## 2.22 MOISTURE AND MOLD CONTROL

- A. Subcontractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  - 2. Keep interior spaces reasonably clean and protected from water damage.
  - 3. Discard or replace water-damaged and wet material.
  - 4. Discard, replace, or clean stored or installed material that begins to grow mold.
  - 5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

**END OF SECTION 01 50 00**



Temporary Pedestrian  
Sidewalk/Crosswalk

Temporary Gravel Access

Temp Fencing  
Existing Asphalt

KENTON DRIVE

CAMPBELL DRIVE

CARROLL DRIVE

NO CONTRACTOR PARKING

CONTRACTOR PARKING

Gate 1

Gate 2

Gate 3

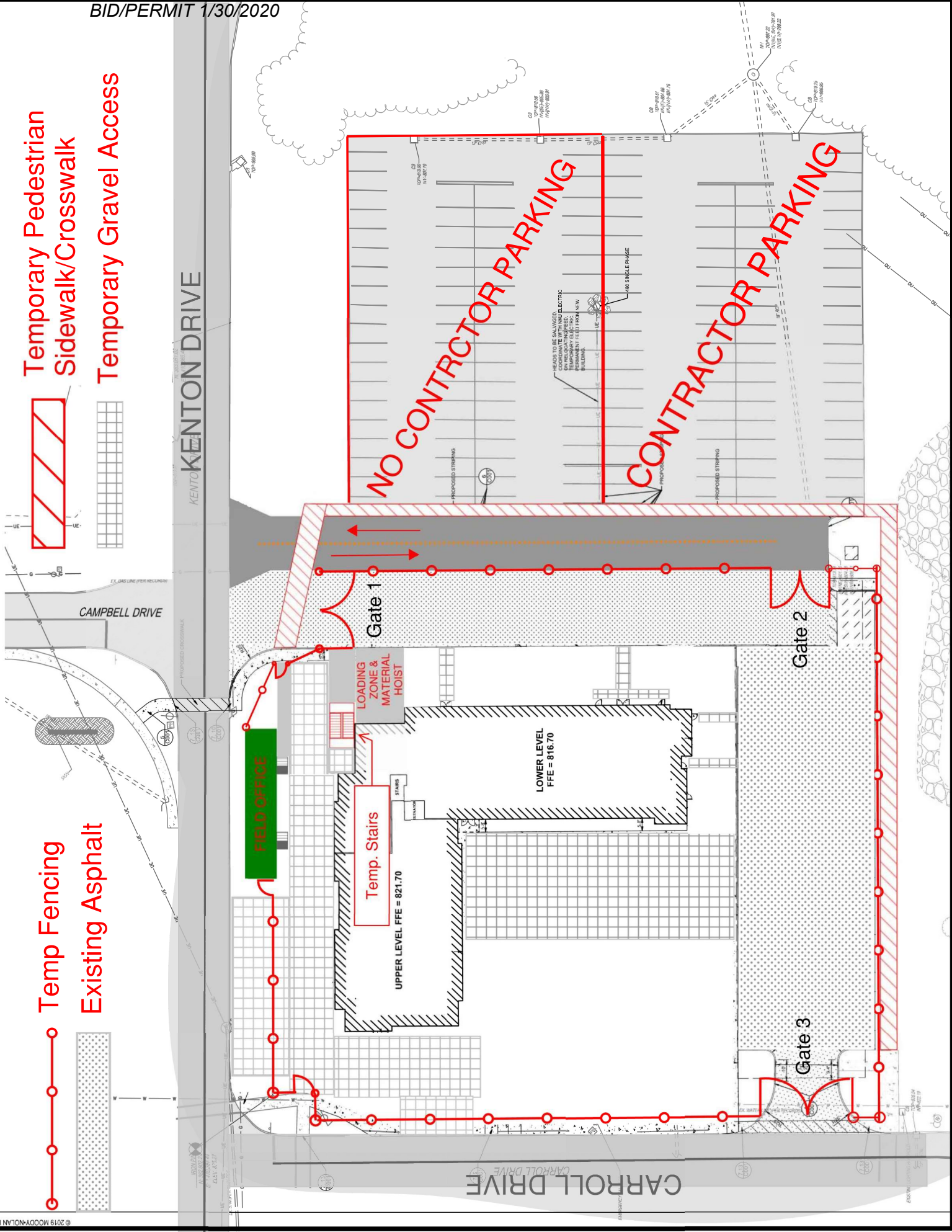
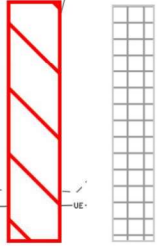
FIELD OFFICE

Temp. Stairs

LOADING  
ZONE &  
MATERIAL  
HOIST

LOWER LEVEL  
FFE = 816.70

UPPER LEVEL FFE = 821.70



- Temp center line by BC01
- Temp fencing & gates by BC01
- Existing asphalt to remain & patch as needed by BC-02
- BC02 remove island and patch asphalt for new road

- Temp crosswalk hatching by BC01
- Temporary gravel access roads by BC02
- Temp sidewalk to trailer and connecting Kenton crosswalk by BC01

KENTON DRIVE

FIELD OFFICE

LOADING ZONE & MATERIAL HOIST

UPPER LEVEL FFE = 821.70

LOWER LEVEL FFE = 816.70

Gate option

Temp stairs by BC01

Temp concrete & hoist by BC01

New asphalt entrance installed by BC-02 Subcontractor

New & temporary asphalt entrances installed by BC-02 Subcontractor

NO CONTRACTOR PARKING

CONTRACTOR PARKING

12" white line by BC01

4ft Fencing on traffic water barriers

New concrete sidewalk by BC01

CARROLL DRIVE



## **SECTION 01 60 00**

### **PRODUCT REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Requirements of this Section apply to the Work of all other Sections.
- B. Section Includes:
  - 1. Transportation and Handling.
  - 2. Storage and Protection.
  - 3. Standards.
  - 4. Manufacturers and Types.
  - 5. Fabrications.
  - 6. Shop Priming.
  - 7. Prohibited Materials and Methods.

##### **1.02 RELATED SECTIONS**

- A. Quality Requirements: Section 01 40 00.
- B. Cutting and Patching: Section 01 73 29.
- C. Shop Drawings, Product Data and Samples: Section 01 33 23.
- D. Execution Requirements: Section 01 73 00.
- E. Sustainable Design Requirements: Section 01 81 13.

##### **1.03 STANDARDS**

- A. Standards, codes and regulations published by Manufacturer's Associations, governmental agencies and other regulatory authorities form a part of these Specifications as minimum requirements. Such references include the latest issue and all amendments up to 30 days prior to the Bid Date.
- B. "Governing Authority" means all federal, state and local laws and regulations.
- C. Where differences occur between the Contract Documents and such standards, the most restrictive requirement shall apply.
- D. Supply all materials and perform all work in accordance with the Manufacturer's Specifications and installation procedures, and in conformance with published trade and manufacturer's association standards, unless specifically noted

otherwise herein.

#### 1.04 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accordance with construction schedules and installation, coordinate to avoid conflict with work and conditions at the site.
  - 1. Transport products by methods to avoid product damage.
  - 2. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
  - 3. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and accepted submittals, and that products are properly protected and undamaged.
- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

#### 1.05 DELIVERY, HANDLING, STORAGE AND PROTECTION

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected. Reject damaged and defective items.
- B. Storage products in accordance with manufacturer's instructions.
  - 1. Store products with seals and labels intact and legible.
  - 2. Store products to allow for inspection and measurement of quantity or counting of units.
  - 3. Store products subject to damage by the elements in weathertight enclosures.
  - 4. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
- C. Exterior Storage
1. Store fabricated products above the ground, on blocking or skids, to prevent soiling or staining. Cover products which are subject to deterioration with impervious coverings. Provide adequate ventilation to avoid condensation.
  2. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign materials.
  3. Store foam plastic away from exposure to sunlight, except to extent necessary for period of installation and concealment.
- D. Arrange storage in a manner to provide access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage.
- E. Protection After Installation: Provide coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

## **PART 2 PRODUCTS**

### **2.01 GENERAL PRODUCT REQUIREMENTS**

- A. Products include materials, equipment and systems.
- B. Products incorporated into the work:
1. Comply with specifications and referenced standards as minimum requirements.
  2. Undamaged.
  2. Manufactured and fabricated products:
    - a. Design, fabricate and assemble in accordance with the best engineering and shop practices.
    - b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
    - c. Two or more items of the same kind shall be identical, by the same manufacturer.
    - d. Products shall be suitable for service conditions.
    - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing by the Architect.
  4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.
  5. New and unused at time of installation, except as otherwise indicated.
  6. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types

that have been produced and used successfully in similar situations on other projects.

7. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

C. Sustainable Design Product Material:

1. See Section 01 81 13 for required project goals.
2. The specified product selections contain sustainable design attributes to achieve project goals. Proposed comparable products must meet or exceed specified product attributes to be considered for acceptance. ]

2.02 MANUFACTURER AND PRODUCT SELECTION PROCEDURES

- A. Specified Product: Where specifications name a single manufacturer and product or refer to a single manufacturer and product indicated on the drawings, provide the named product. Comparable products or substitutions for Contractor's convenience will not be considered.
- B. Specified Manufacturer: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
- C. Multiple Specified Products: Where more than one manufacturer and specific product is listed, provide one of the products named. No substitutions will be permitted after signing the contract. Comparable products or substitutions for Contractor's convenience will not be considered
- D. Multiple Manufacturers: Where specifications include a list of manufacturers names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
- E. Basis of Design: Where specifications name a Basis of Design or refer to a Basis of Design product indicated on the drawings, the design is based on the product listed. Subject to compliance with requirements, provide the specified product or a product manufactured by one of the other manufacturers listed.
  1. The characteristics of the Basis-of-Design Product establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.
  2. Equipment or materials from these manufacturers will be acceptable contingent upon their meeting the design, appearance and functional standards established by the specified items. If equipment or a material of an acceptable manufacturer requires changes; electrically, mechanically,

structurally, from what is indicated on the drawings, it shall be the responsibility of the Contractor requiring such change, to pay all costs involved with no additional costs to the Owner.

3. Submit evaluations as follows:

- a. Submit proposed comparable products for evaluation by the Architect at least two weeks prior to awarding contract to the manufacturer of a comparable product.
- b. Obtain samples of Basis-of-Design product.
- c. Select comparable products that comply with the characteristics specified. Submit evidence demonstrating compliance.
- d. Submit samples of comparable products displayed side-by-side with samples of Basis-of-Design products.

Architect will determine whether the proposed comparable product is acceptable. Architect is not obligated to prove non-equivalence of proposed comparable products.

- F. Where a performance is specified and no manufacturer is listed, submit through the Shop Drawing procedure the name of the manufacturer, the product proposed, and detailed information showing its characteristics. Such proposal shall meet or exceed the specification, line item by line item, or be rejected.
- G. Equivalent components (articles, devices, materials, forms of construction, fixtures, etc.) may be submitted to the Architect for approval prior to bidding regardless of listed manufacturers.
- H. Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.03 CONFLICTING REQUIREMENTS

- A. Documents: If documents state 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 A/E for a decision before proceeding.

2.04 FABRICATION

- A. Fabricate all items in the shop insofar as practicable. Where items cannot be completely shop fabricated and assembled for shipment, assemble and fit in shop, disassemble and ship. Identify parts for field assembly.
- B. Fabricate items to be straight, square, in proper alignment, and with hairline joints where joints are necessary and permitted. Pre-plan field joints to be as inconspicuous as possible; coordinate locations with Architect.

2.05 SHOP PRIMING

- A. Shop prime or seal surfaces of all products to receive paint materials in accordance with the requirements of Section 09 91 00.
- B. Apply a primer or sealer compatible with the specified paint materials.
- C. In the event such a primer is determined to be incompatible with the specified finish paint system, provide a barrier coat or remove the primer and reprime as directed, at no additional cost to the Owner.

2.06 PROHIBITED MATERIALS AND METHODS

- A. The following items are expressly prohibited:
  - 1. Attachment Related Items
    - [a. Powder Fasteners: Powder fasteners are defined as anchors which are driven into place by any device which produces an impact force by use of a powder charge, compressed air, gas or any other propellant. Powder fasteners prohibited for the following conditions:
      - 1) Attachment of structural members.
      - 2) Where public may be endangered by misuse.]
    - [a. Powder Fasteners: Powder fasteners are defined as anchors which are driven into place by any device which produces an impact force by use of a powder charge, compressed air, gas or any other propellant. Powder fasteners are prohibited.
    - b. Plug anchorage by use of wood, lead or plastic.
    - c. Perforated steel strap iron for pipe or other support or anchorage.
    - d. Suspension systems that are not independently supported.
      - 1) Ceiling grid systems shall not be supported from ductwork, electrical conduit, heating or plumbing lines, and vice versa.
      - 2) Each utility system and the ceiling system shall be a separate installation, each independently supported from the building structure.
      - 3) Where interference occurs, provide trapeze type hangers or other suitable supports for each system.
      - 4) Locate hangers and supports where they will not interfere with access to mixing boxes, fire dampers, valves, and other appurtenances requiring servicing.
  - 2. Methods Related Items
    - a. The penetration of floors and walls by pipes, ducts, or other penetrations unless openings are appropriately fire stopped by fire doors or fire dampers, and voids around pipes, ducts, conduits, etc. are sealed with fireproof materials.
    - b. The use of ink marking pens on surfaces of any kind of materials receiving paint or other finish in exposed location.
  - 3. Materials Related Items
    - a. Asbestos or asbestos containing materials.
    - b. Barbed wire in construction fencing.
    - c. Water soluble treatment of insulation jackets or facings, to impede

- or retard smoke or flames.
- 4. Earthwork Related Items
  - [a. Use of explosives is prohibited.]
  - [a. Use of explosives or blasting as a constructing practice is prohibited except as may be approved in writing by the Owner for special cases of demolition or excavation.]
  - b. Grits as backfill material.
- 5. Masonry Related Items
  - a. Chicken wire type masonry reinforcing.
  - b. Cinder block.
  - c. Muriatic acid.
- 6. Door Related Items
  - a. Knock-down (KD) door frames.
  - b. Thresholds raised more than 1/2" at doors indicated as wheel chair accessible.
- 7. Roofing Related Items
  - a. Dead level roofs. All roofs must slope to drain.
  - b. Pitch pans or pitch pockets.

**PART 3 EXECUTION**

Not Applicable

**END OF SECTION**

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## **SECTION 01 73 00**

### **EXECUTION REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Requirements of this Section apply to the Work of all other Sections.
- B. Section Includes:
  - 1. Examination of Substrate.
  - 2. Preparation.
  - 3. Installation.
  - 4. Workmanship.
  - 5. Protection.
  - 6. Overhead Attachments.
  - 7. Prohibited Methods.

##### **1.02 RELATED SECTIONS**

- A. Quality Control: Section 01 45 00.
- B. Cutting and Patching: Section 01 73 29.
- C. Shop Drawings, Product Data and Samples: Section 01 33 23.
- D. Product Requirements: Section 01 60 00.

##### **1.03 STANDARDS**

- A. Standards, codes and regulations published by Manufacturer's Associations, governmental agencies and other regulatory authorities form a part of these Specifications as minimum requirements. Such references include the latest issue and all amendments up to 30 days prior to the Bid Date.
- B. "Governing Authority" means all federal, state and local laws and regulations.
- C. Where differences occur between the Contract Documents and such standards, the most restrictive requirement shall apply.
- D. Supply all materials and perform all work in accordance with the Manufacturer's Specifications and installation procedures, and in conformance with published trade and manufacturer's association standards, unless specifically noted otherwise herein.

1.05 NON-CONFORMING WORK

- A. Faulty work or work not in conformance with the Contract Documents will not be permitted by the Architect.
  - 1. It is the responsibility of the Contractor to propose a remedy by means of detailed drawings and written documentation and submit such documentation to the Architect for comments.
  - 2. All costs for the removal and reconstruction of such work, as well as additional services of the Architect, shall be paid for by the Contractor.

**PART 2 PRODUCTS - NOT APPLICABLE**

**PART 3 EXECUTION**

3.01 EXAMINATION OF SUBSTRATE

- A. Examine the substrates or structure to which a product is to be applied or installed. Do not proceed until unsatisfactory conditions have been corrected. Starting the work indicates acceptance of conditions and the installer assumes full responsibility for results.
- B. Check the substrate or structure for proper tolerances and clearances. Tolerances are listed under individual specification Sections.

3.02 PREPARATION

- A. Substrate: Where the products are applied to a substrate, prepare the substrate as recommended by the product manufacturer. That generally includes the following:
  - 1. Bringing substrate to a uniform surface by smoothing uneven surfaces and filling holes, cracks and depressions with recommended filler or compatible type material.
  - 2. Depressed Slabs: Bring to required elevation to receive finished materials where finished materials cannot completely fill depression. Use approved cementitious filler or compatible type material. Coordinate depressed slab locations with finish material locations.
  - 3. Remove substances such as dust, oils and other foreign matter, not compatible with the product.
  - 4. Surfaces shall be dry, unless moisture content or wetting requirement is specified or recommended.
- B. Concrete Slabs: Provide steel shot abrasive cleaning of concrete slabs receiving designated finish flooring materials.
  - 1. Designated Finish Flooring Materials

- a. Cementitious or cementitious set materials.
  - b. Sheet flooring materials.
  - c. Waterproofing materials.
  - d. Paint materials.
  - e. Polymer or epoxy type seamless flooring.
2. Equipment: Electric powered portable unit with self-contained dust collection system. Size(s) of unit(s) and shot media suitable for conditions and proposed finish materials. WHEELABRATOR CORP. "Blastrac" or similar type system by SASE COMPANY INC., BW MANUFACTURING or INNOVATECH.
  3. Cleaning: Remove concrete surfaces to sufficient depth to remove bond breakers and contaminants such as curing compounds, oils, and other foreign matter which may be detrimental to the completed flooring installation.
    - a. Work smoothly and evenly over entire surface; avoid creating dips, ridges, or other imperfections which would show or telegraph in the completed installation.
    - b. Small transitions for different flooring materials may be obtained by multiple passes if carefully executed to create smooth even slope of not more than 1/8" in 2 feet.
  4. Clean floor as near as possible to flooring installation to avoid contamination from work of other trades. Protect clean floor from soiling with suitable sheet materials. Reclean soiled areas.

C. Inserts and Anchorages

1. Anchorages where not detailed are the responsibility of the installer to design a suitable connection, structurally sound, and aesthetically acceptable to the Architect. Furnish calculations, drawings and product data when requested by the Architect. Such information may or may not be returned as indicated in Section 01 33 23.
2. It is the responsibility of the installer to furnish built-in fastening devices for his/her product to the proper trade for installation as the work proceeds.
3. In the event such devices are not furnished in time to be built-in, it is the installer's responsibility to provide other methods for attaching their product. Submit drawings and other required data to the Architect.

D. Templates: Provide templates, diagrams and other coordinating documents to the proper Contractor, manufacturer or supplier of related items affecting the Work.

E. Dimensions

1. If the exact location of an item is not indicated by dimension on the Drawings or noted in the Specifications, the Architect reserves the right to determine such location in the field prior to roughing-in.
2. If the exact dimensions of a product are not indicated, the Architect reserves the right to determine dimensions prior to the ordering or fabrication of a product.
3. Such dimensional changes shall not be a basis for changes in the Contract

Sum.

4. Where miscellaneous devices, such as thermostats, switches, controls, grilles, pipes, or outlets of any nature are not specifically located by the Contract Documents, request such location or obtain approval of the location prior to installation. If approval has not been obtained, the Architect may direct the relocation of such devices at the expense of the installer.

### 3.03 INSTALLATION

- A. General: 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.
    - a. Where pipes occur in partitions, furred-out spaces and chases, determine exact location and size and fit entirely concealed into allotted space. Report conflicts to Architect prior to installation.
    - b. Where two or more pipes are to be installed in parallel, or parallel to the piping of other trades, the piping shall be installed with sufficient space between the pipes to allow for the proper application of pipe covering, painting, and servicing.
    - c. Furnish advance information on locations and sizes of frames, boxes, sleeves and openings needed for the Work to installers.
  4. Install work to allow for installation of future work identified on drawings.
  5. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.
- B. Install products in accordance with manufacturer's recommendations or the requirements of trade associations, listed standards, Shop Drawings and Contract Documents.
- C. If a conflict exists between these references, the most strict requirements govern. If printed instructions are not available, consult with the manufacturer or the manufacturer's field representative, where applicable.
- D. Provide hangers, auxiliary framing, and other means for installing ceiling suspension systems, lighting fixtures, diffusers, and other equipment in ceilings to avoid ductwork, piping, etc.
  1. Suspend from structural members (i.e. joists, beams, etc.), and not from ductwork or piping.
  2. Provide supplemental framing members (i.e. angles, tubes, light gage steel framing, etc.) to span between structural members where required to support items of this paragraph C.

- E. Install work that will not interfere with the proper installation of the Work of other trades.
- F. Install work in a manner to facilitate operating, servicing and repairing.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

### 3.04 SPACE PREFERENCE

- A. Carefully check and coordinate the location and level of all Work to avoid conflicts between all contractors. Where conflicts occur, the following preferences shall generally govern:
  - 1. Recessed electrical light fixtures
  - 2. High and medium pressure ductwork
  - 3. Low pressure ductwork
  - 4. Soil, waste, vent and storm piping
  - 5. Sprinkler piping
  - 6. Liquid heat transfer and refrigerant piping
  - 7. Domestic water piping
  - 8. Electrical conduits from branch circuits
- B. However, no ductwork or liquid heat transfer main shall have preference over plumbing piping below plumbing fixtures, nor over electrical conduits above or below electrical switchgear and panels. No piping conveying liquids shall be installed directly over electrical or elevator equipment. No piping shall be installed in electrical or elevator equipment rooms.
- C. Where headroom or space conditions resulting from application of these preferences appear inadequate, notify the Architect prior to installing the Work.
- D. Coordinate the mounting heights of busways, electrical equipment and raceways to clear the opening heights of doors, the height of vehicles and the heights of equipment which needs to be routinely removed, and out of paths required for maintenance.

### 3.05 WORKMANSHIP

- A. Install products straight, plumb, level and in line. Securely attach items to the substrate, using recommended adhesives, mechanical fasteners or other devices. Where holes are provided for attachment, do not field drill or cut new holes without the approval of the Architect.

- B. Where applicable, match finished work to the approved samples or mock-ups.
- C. Conceal fasteners wherever possible, unless exposed fasteners are permitted or specified.
- D. Weld in accordance with AWS standards; comply with AWS for qualifications of operators and for workmanship.
- E. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.

3.06 PROTECTION

- A. Protect finished surfaces of product being installed and surrounding products from damage during installation. Provide protective devices as required and as recommended by the manufacturer. Cover work subject to damage at the end of each day's work.
- B. Coat concealed surfaces of metal products with a bituminous or other approved coating to prevent contact between dissimilar metals or other material which can cause deterioration.
- C. Correct damage by repairing or replacing as directed by the Architect. Repairing will be permitted only where the repair is undetectable and does not cause structural damage or interfere with proper functioning of the part.
- D. Protect finish of installed products until Substantial Completion of the Project by use of wrappings, covers or other approved protective devices. Remove such protection immediately prior to final cleaning.
- E. Limiting Exposures: Coordinate and supervise construction activities 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. Maintain exposures within the manufacturers recommended limits. Where applicable, such exposures include, but are not limited to, the following:
  - 1. Excessive static or dynamic loading
  - 2. Excessive internal or external pressure
  - 3. Excessive high or low temperatures
  - 4. Thermal shock
  - 5. Excessively high or low humidity
  - 6. Air contamination or pollution
  - 7. Water or ice
  - 8. Solvents
  - 9. Chemicals

10. Light
11. Radiation
12. Puncture
13. Abrasion
14. Heavy traffic
15. Soiling, staining and corrosion
16. Bacteria
17. Rodent and insect infestation
18. Combustion
19. Electrical current
20. High speed operation
21. Improper lubrication
22. Unusual wear or other misuse
23. Contact between incompatible materials
24. Destructive testing
25. Misalignment
26. Excessive weathering
27. Unprotected storage
28. Improper shipping
29. Theft
30. Vandalism

- F. Take precautions to protect existing concrete and asphalt pavement from damage due to vehicle loads, parking, and storage.
1. Schedule loading to minimize pavement material consolidation during hot weather. Distribute wheel loads to the greatest extent possible.

### 3.07 OVERHEAD ATTACHMENTS

- A. Where overhead hangers are required, and not indicated on the drawings, provide one or more of the following as required:
1. Concrete inserts prior to placement of concrete or drilled type inserts after concrete is placed.
  2. Trapeze from adjacent structure with suitable steel framing.
  3. Connections to Structure: Suitable anchorage devices with a minimum load carrying capacity of 250 pounds plus safety factor of 4:1 for the applied load.
    - a. Concrete: Steel expansion anchors. See Prohibited Material and Methods specified in Section 01 60 00.
    - b. Steel: Bolted or welded connections to steel structure.
- B. Where metal deck is furnished with hanger tabs or similar devices, applied total load, including work of other trades, not to exceed 75 pounds for each device. Loads in excess of permitted limit to be supported by trapeze framing as specified above.
- C. Verify support requirements of heavy or unusual loads not specifically shown on

drawings with Architect.

3.08 OPERATION AND MAINTENANCE

- A. Contractor shall maintain all systems and equipment operated during construction. The contractor responsible for the installation of the system shall operate and maintain it. Make all repairs and perform all maintenance to assure Work is turned-over to Owner in first class condition.
- B. Maintenance work includes:
  - 1. Lubrication
  - 2. Adjustments
  - 3. Filter replacements
  - 4. Chemical treatment.

**END OF SECTION**



## **SECTION 01 73 29**

### **CUTTING AND PATCHING**

#### **PART 1      GENERAL**

##### **1.01      DESCRIPTION**

- A.      Execute cutting, fitting or patching of Work, required to:
  - 1.      Make several parts fit properly.
  - 2.      Uncover Work to provide for installation of ill-timed Work.
  - 3.      Remove and replace defective Work.
  - 4.      Remove and replace Work not conforming to requirements of Contract Documents.
  - 5.      Remove samples of installed Work as specified for testing.
  - 6.      Install specified Work in existing construction.
  
- B.      In addition to contract requirements, upon written instructions of Construction Manager:
  - 1.      Uncover Work to provide for Architect's observation of covered Work.
  - 2.      Remove samples of installed materials for testing.
  - 3.      Remove Work to provide for alteration of existing Work.
  
- C.      Do not endanger any Work by cutting or altering Work or any part of it.
  
- [D.      Each Contractor shall be responsible for and pay all cost involved with cutting and patching that may be required to complete the work in his Contract with the following stipulations:
  - 1.      General Contractor shall provide cutting and infill work for other trades only when indicated on General Trades Drawings. Cutting and patching required but not indicated on the General Contractor's drawings is the responsibility of the Contractor whose work requires the cutting and patching.
  - 2.      All cutting and patching shall be done by craftsmen skilled in type of work involved.
  - 3.      Where applicable, each Contractor shall furnish the General Contractor with, and be responsible for, exact location and size of all holes and openings required to be cut or necessary for his work. Cost of cutting the hole shall be borne by the Contractor requiring the hole or opening.
  - 4.      Cutting and patching responsibilities specified herein takes precedence over those specified in other Sections of the Specifications.
  
- E.      Do not cut or alter Work of another Contractor without written consent of Construction Manager.

1.02 SUBMITTALS

- A. Prior to cutting which affects structural safety of Project, submit written notice to Architect, requesting consent to proceed with cutting, including:
  - 1. Identification of Project.
  - 2. Description of Affected Work.
  - 3. Necessity for cutting.
  - 4. Affect on other Work, on structural integrity of Project.
  - 5. Description of proposed Work. Designate:
    - a. Scope of cutting and patching.
    - b. Contractor and trades to execute work.
    - c. Products proposed to be used.
    - d. Extent of refinishing.
  - 6. Alternative to cutting and patching.
  - 7. Designation of party responsible for cost of cutting and patching.
- B. Should conditions of Work, or schedule indicate change of materials or methods, submit written recommendation to Architect, including:
  - 1. Conditions indicating change.
  - 2. Recommendations for alternative materials or methods.
  - 3. Submittals as required for Substitutions.
- C. Submit written notice to Architect, designating time Work will be uncovered, to provide observation.

**PART 2 PRODUCTS**

2.01 MATERIALS

- A. Patching of materials and surfaces shall be in accordance with the requirements of the Contract Documents. Where not otherwise defined, patching shall match adjacent surfaces and proper materials shall be provided accordingly.

**PART 3 EXECUTION**

3.01 INSPECTION

- A. Inspect existing conditions of Work, including elements subject to movement or damage during cutting and patching.
- B. After uncovering Work, inspect conditions affecting installation of new products.

3.02 PREPARATION PRIOR TO CUTTING

- A. Provide shoring, bracing and support as required to maintain structural integrity of Project.
- B. Provide protection for other portions of the Project, including all Contractors' personnel.

3.03 PERFORMANCE

- A. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances, finishes.
- B. Execute cutting and demolition by method which will prevent damage to other Work, and will provide surface to receive installation of repairs and new Work.
  - 1. No cutting shall be performed which will, in any way, reduce the structural strength of the building. Should such cutting be necessary, consult Architect and do not proceed with such operation unless written approval is given.
  - 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.
- C. Restore Work which has been cut or removed; install new products to provide completed Work in accord with requirements of Contract Documents.
- D. Patching of materials and surfaces shall be in accordance with the requirements of the Contract Documents. Where not otherwise defined, patching shall match existing or adjacent surfaces and proper materials shall be provided accordingly.
  - 1. Wherever existing walls, floors, ceilings, etc., are cut, the exposed surfaces must be neatly finished by patching, painting, wall covering, etc., as required to blend patched areas into adjacent existing surfaces. Patched areas shall not be visible when viewing entire wall surface.
    - a. 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.
  - 2. Where painting or finishing of patched surfaces or application of wall or floor covering is required, finish the entire plane of surface in which patched area occurs.
  - 3. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  - 4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

3.04 SLEEVES AND OPENINGS

- A. Where pipes, conduits, ductwork or other materials pass through new walls, partitions, floors, roof or ceilings, provide suitable sleeves in these elements or provide openings where sleeves are not practical.
- B. Close sleeves and openings to prevent passage of smoke or fire using approved methods and materials to maintain the fire rating of the construction being penetrated. See Section 07 84 00.

[1. Unless otherwise indicated, extend floor sleeves 2" above finished floor.]

- C. Where pipes, conduit, ductwork etc., pass through, behind, or above existing construction, provide all cutting, patching, and refinishing for doing this work as specified herein.
- D. Lintels: Provide steel or precast concrete lintels to span openings in masonry walls sized in accordance with schedule shown or as detailed on structural drawings. In general, lintels are not required for openings less than the width of masonry unit in which wall is being constructed. Penetrations under beams or other concentrated loads require approval of Architect.

3.05 CLEANING

- A. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

## **SECTION 01 74 00**

### **CLEANING**

#### **PART 1 GENERAL**

##### **1.01 GENERAL REQUIREMENTS**

- A. These requirements supplement paragraph 3.15, General Conditions. Refer to General Conditions for additional requirements.
- A. These requirements supplement paragraphs 2.10 and 11.4, General Conditions. Refer to General Conditions for additional requirements.
  - 1. See General Conditions and modifications specified in the Special Conditions for each individual Prime Contractors' specific cleaning requirements.
- B. Each Prime Contractor: Execute cleaning, during progress of the work and at completion of the work, as required by Contract Documents.

##### **1.02 RELATED SECTIONS**

- A. Cutting and Patching: Section 01 73 29.
- B. Cleaning for Specific Products or Work: Specification section for the work.

##### **1.03 CLEANING AND DISPOSAL REQUIREMENTS**

- A. Standards: Maintain project in accord with the following safety and insurance standards:
  - 1. Applicable Federal and State Requirements.
  - 2. National Fire Protection Association.
- B. Hazards Control: Each Prime Contractor shall comply with the following requirements:
  - 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.
- C. 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 sewers.
  3. Do not dispose of waste into streams or waterways.
  4. Wet down dry materials and rubbish to prevent dust.
- D. Clean streets, highways, and private properties of all mud, earth, rubbish, rocks, refuse or other debris of any kind resulting from such work or related transportation to and from the work site.

**PART 2      PRODUCTS**

2.01      MATERIALS

- A. Select and use cleaning materials and equipment with care to avoid scratching, marring, defacing, staining or discoloring surfaces cleaned.
- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.
  1. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.
- C. Use cleaning materials only on surfaces recommended by the cleaning material manufacturer.

**PART 3      EXECUTION**

3.01      PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
- B. Provide, maintain and empty 55 gallon metal and dumpster type containers for collection of waste materials, debris and rubbish. Locate containers as directed by Architect.
  1. Provide containers with adequate capacity to accommodate anticipated needs. If containers do not have adequate capacity, increase intervals of waste removal or capacity of containers until adequate capacity is provided.
- C. At reasonable intervals during progress of Work, but in no case less than once a week, dispose of waste materials, debris and rubbish.
- D. Site: Maintain Project site free of waste materials and debris.
- E. 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.
- F. 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.
- G. Direct Special Attention To:
1. Provide non-staining layout lines and other markings on masonry and concrete. Use chalk lines wherever possible and remove when no longer needed.
  2. Remove all stains from concrete surfaces, including floors.
  3. Shop marks shall not appear on exposed surfaces of any item.
  4. Remove concrete, mortar and paint spatters.
  5. Clean both brick and concrete unit masonry.
  6. Protect aluminum frames during construction and thoroughly clean upon completion of the installation.
- H. Clean interior surfaces before start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- I. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.
- J. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- K. Vacuum interior building areas where work is performed prior to painting and other finish work. Continue vacuum cleaning on an as needed basis until building is ready for occupancy.
- L. Protect interior of ductwork during construction from accumulation of dirt, dust or debris.
- M. Clean trash from all chases and concealed spaces before final enclosure.
- 3.01 PROGRESS CLEANING
- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
- B. General Contractor
1. Provide, maintain and empty 55 gallon metal and dumpster type containers

for collection of waste materials, debris and rubbish. Locate containers as directed in General Conditions. These containers will be utilized by all Prime Contractors and their subcontractors.

- a. Provide containers with adequate capacity to accommodate anticipated needs. If containers do not have adequate capacity, increase intervals of waste removal or capacity of containers until adequate capacity is provided.
  2. At reasonable intervals during progress of Work, but in no case less than once a week, dispose of waste materials, debris and rubbish.
  3. Direct Special Attention To:
    - a. Provide non-staining layout lines and other markings on masonry and concrete. Use chalk lines wherever possible and remove when no longer needed.
    - b. Remove all stains from concrete surfaces, including floors.
    - c. Shop marks shall not appear on exposed surfaces of any item.
    - d. Remove concrete, mortar and paint spatters.
    - e. Clean both brick and concrete unit masonry.
    - f. Protect aluminum frames during construction and thoroughly clean upon completion of the installation.
  4. Clean interior surfaces before start of finish painting and continue cleaning on an as-needed basis until painting is finished.
  5. Vacuum interior building areas where work is performed prior to painting and other finish work. Continue vacuum cleaning on an as needed basis until building is ready for occupancy.
- B. HVAC Contractor: Protect interior of ductwork during construction from accumulation of dirt, dust or debris.
- C. All Prime Contractors
1. Site: Maintain Project site free of waste materials and debris.
  2. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
    - a. Remove liquid spills promptly.
    - b. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
  3. 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.
  4. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.
  5. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
  6. Clean trash from all chases and concealed spaces before final enclosure.

### 3.02 FINAL CLEANING



- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
  - 1. Leave Project clean and ready for occupancy.
- B. Employ experienced workmen, or professional cleaners for final cleaning.
- C. At the completion of the work, remove all surplus material, false work, temporary structures, including foundations thereof, plants of any description and debris of every nature resulting from their operations and put the site in a neat and orderly condition.
- D. Clean exposed interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition.
- E. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- F. Sweep concrete floors broom clean in unoccupied spaces.
- G. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- H. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior surfaces, including light fixtures and lenses; polish surfaces so designated to a shine finish.
  - 1. Clean finishes free of dust, stains, films and other foreign substances.
  - 2. Clean transparent and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.
- I. Remove temporary protection and labels not required to remain
- J. Clean surfaces of equipment; remove excess lubrication.
- K. Remove debris, rubbish, dirt, etc. from open concealed spaces, chases and above ceilings.
- L. Repair, patch and touch-up marred surfaces to specified finish, to match adjacent surfaces.
- M. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.

- N. Remove waste, foreign matter, and debris from roofs, gutters, areaways, and drainage systems.
- O. Clean plumbing fixtures to a sanitary condition.
- P. Clean permanent filters of ventilating equipment and replace disposable filters when units have been operated during construction; in addition, clean ducts, blowers, and coils when units have been operated without filters during construction.
- Q. Clean light fixtures and lamps; polish lenses.
- R. Clean dirt and debris from interior of all electrical panels and user accessible electrical enclosure boxes prior to installation of covers or in the case of hinged access doors, before final cleaning of adjacent space. Clean the exterior surfaces of all switchgear located in Mechanical and Electrical Rooms and spaces.
- S. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- T. Clean dirt and dust from interior of air handling units before installing final filters. Wipe down the exterior surfaces of all HVAC equipment located in Mechanical Rooms and spaces.
  - 1. Exposed painted ductwork to be brushed clean of dust.
- U. Site/Exterior Items: Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
  - 1. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
  - 2. Rake grounds that are neither planted nor paved to a smooth, even textured surface.
  - 3. Remove tools, construction equipment, machinery, and surplus material from Project site.
  - 4. Clean exposed hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces.
- V. Maintain cleaning until Final Completion.
- W. Prior to Final Completion, or Owner occupancy, Contractor shall conduct an inspection of sight exposed interior and exterior surfaces, and all work areas, to verify that the entire work is clean.

3.02 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
  - 1. Leave Project clean and ready for occupancy.
- B. Each Prime Contractor: At the completion of their branch of the work, remove all surplus material, false work, temporary structures, including foundations thereof, plants of any description and debris of every nature resulting from their operations and put the site in a neat and orderly condition.
- C. General Contractor Requirements
  - 1. Conform to requirements of General Conditions.
  - 2. Employ experienced workmen, or professional cleaners for final cleaning.
  - 3. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
  - 4. Clean exposed interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition.
  - 5. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
  - 6. Sweep concrete floors broom clean in unoccupied spaces.
  - 7. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
  - 8. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior surfaces, including light fixtures and lenses; polish surfaces so designated to a shine finish.
  - 9. Clean finishes free of dust, stains, films and other foreign substances.
  - 10. Clean transparent and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.
  - 11. Remove temporary protection and labels not required to remain
  - 12. Clean surfaces of equipment; remove excess lubrication.
  - 13. Remove debris, rubbish, dirt, etc. from open concealed spaces, chases and above ceilings.
  - 14. Repair, patch and touch-up marred surfaces to specified finish, to match adjacent surfaces.
  - 15. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
  - 16. Remove waste, foreign matter, and debris from roofs, gutters, areaways, and drainage systems.

18. Site/Exterior Items: Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
  1. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
  2. Rake grounds that are neither planted nor paved to a smooth, even textured surface.
  3. Remove tools, construction equipment, machinery, and surplus material from Project site.
  4. Clean exposed hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces.
- D. Plumbing Contractor: Clean plumbing fixtures to a sanitary condition.
- E. HVAC Contractor
  1. Clean dirt and dust from interior of air handling units before installing final filters. Wipe down the exterior surfaces of all HVAC equipment located in Mechanical Rooms and spaces.
  2. Clean permanent filters of ventilating equipment and replace disposable filters when units have been operated during construction; in addition, clean ducts, blowers, and coils when units have been operated without filters during construction.
- F. Electrical Contractor
  1. Clean dirt and debris from interior of all electrical panels and user accessible electrical enclosure boxes prior to installation of covers or in the case of hinged access doors, before final cleaning of adjacent space.
  2. Clean and polish lighting fixture lenses.
  3. Clean the exterior surfaces of all switchgear located in Mechanical and Electrical Rooms and spaces.
- G. Maintain cleaning until Final Completion.
- H. Prior to Final Completion, or Owner occupancy, Contractor shall conduct an inspection of sight exposed interior and exterior surfaces, and all work areas, to verify that the entire work is clean.

**END OF SECTION**

## **SECTION 01 74 19**

### **CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Section includes administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous demolition and construction waste.
  - 2. Recycling nonhazardous demolition and construction waste.
  - 3. Disposing of nonhazardous demolition and construction waste.

##### **1.02 RELATED SECTIONS**

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Selective Demolition - for disposition of waste resulting from partial demolition of buildings, structures, and site improvements: Section 02 41 19.
- C. Structure Demolition - for disposition of waste resulting from demolition of buildings, structures, and site improvements: Section 02 41 16.
- D. Masonry – for disposal requirements for masonry waste: Section 04 00 00.

##### **1.03 DEFINITIONS**

- A. Alternative Daily Cover: Material other than earthen material placed on the surface of the active face of a landfill at the end of each operating day to prevent odor, scavenging, and litter.
- B. Commingled Waste: Building waste streams that are combined on the project site and hauled away for sorting into recycling streams.
- C. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- D. Construction Waste Management Plan: Plan for reducing the construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.
- E. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- F. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

- G. Land-Clearing Debris and Soil: Materials that are natural (e.g., rock, soil, stone, vegetation). Materials that are man-made (e.g., concrete, brick, cement) are considered construction waste even if they were on site.
- H. Onsite Separated Waste: Each type of material is sent to a separate recycling facility.
- I. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- J. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- K. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

#### 1.04 PERFORMANCE GOALS

##### [MR: CONSTRUCTION DEMOLITION WASTE MANAGEMENT – PATH 1]

- A. General: Achieve end-of-Project rates for salvage/recycling of 50% of total construction and demolition debris and at least three material streams. Alternative daily cover and land-clearing debris do not qualify as material diverted for disposal.

##### [MR: CONSTRUCTION DEMOLITION WASTE MANAGEMENT – PATH 2]

- A. General: Achieve end-of-Project rates for salvage/recycling of 75% of total construction and demolition debris and at least four material streams. Alternative daily cover and land-clearing debris do not qualify as material diverted for disposal.

#### 1.05 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00, "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
  - 1. Review and discuss waste management plan including responsibilities of waste management coordinator.
  - 2. Review requirements for documenting quantities of each type of waste

and its disposition.

3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

#### 1.06 SUBMITTALS

- A. Waste Management Plan: Submit 2 copies of plan within 14 days after the Notice to Proceed.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include separate reports for demolition and construction waste. Include the following information:
  1. Material category.
  2. Generation point of waste.
  3. Total quantity of waste in tons.
  4. Quantity of waste salvaged, both estimated and actual in tons.
  5. Quantity of waste recycled, both estimated and actual in tons.
  6. Total quantity of waste recovered (salvaged plus recycled) in tons.
  7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit three (3) copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- H. LEED Submittal: LEED letter template for Credit MR 2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
- I. Qualification Data: For waste management coordinator and refrigerant recovery technician.

- J. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.07 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 31 19 "Project Meetings." Review methods and procedures related to waste management including, but not limited to, the following:
  - 1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
  - 2. Review requirements for documenting quantities of each type of waste and its disposition.
  - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
  - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
  - 5. Review waste management requirements for each trade.

1.08 CONSTRUCTION WASTE MANAGEMENT (CWM) PLAN

- A. General: Develop a waste management plan according to Section 01 81 13: Sustainable Design Requirements. Waste Management Plan must include the following information:
  - 1. Waste diversion goals
  - 2. 5 targeted materials, both structural and non-structural, for diversion and approximate percentage of overall project waste these materials represent
  - 3. Separation procedures
  - 4. Description of where the material will be taken and how the facility will process the material
  - 5. Tracking procedures and records
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of



waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

**PART 2      PRODUCTS (Not Used)**

**PART 3      EXECUTION**

**3.01      PLAN IMPLEMENTATION**

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
  1. Comply with Division 01 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
  1. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

### 3.02 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
  1. Clean salvaged items.
  2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
  3. Store items in a secure area until installation.
  4. Protect items from damage during transport and storage.
  5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: Not permitted on Project site.
- C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
  1. Clean salvaged items.
  2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
  3. Store items in a secure area until delivery to Owner.
  4. Transport items to Owner's storage area designated by Owner.
  5. Protect items from damage during transport and storage.
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- F. Plumbing Fixtures: Separate by type and size.
- G. Lighting Fixtures: Separate lamps by type and protect from breakage.
- H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

### 3.03 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.

- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
  - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
    - a. Inspect containers and bins for contamination and remove contaminated materials if found.
  - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
  - 4. Store components off the ground and protect from the weather.
  - 5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

#### 3.04 RECYCLING DEMOLITION WASTE

- A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.
- B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
  - 1. Pulverize concrete to maximum 1-1/2-inch size.
  - 2. Crush concrete and screen to comply with requirements in Division 31 Section "Earthwork" for use as satisfactory soil for fill or sub base.
- C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
  - 1. Clean and stack undamaged, whole masonry units on wood pallets.
- D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- E. Metals: Separate metals by type.
  - 1. Structural Steel: Stack members according to size, type of member, and length.

2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- F. Asphalt Shingles: Separate organic and glass fiber asphalt shingles and felts. Remove and dispose of nails, staples and accessories.
- G. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- H. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in dry location.
- I. Metal Suspension System: Separate metal members, including trim and other metals, from acoustical panels and tile and sort with other metals.
- J. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
- K. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- L. Plumbing Fixtures: Separate by type and size.
- M. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- N. Lighting Fixtures: Separate lamps by type and protect from breakage.
- O. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
- P. Conduit: Reduce conduit to straight lengths and store by type and size.

### 3.05 RECYCLING CONSTRUCTION WASTE

- A. Packaging
  1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
  2. Polystyrene Packaging: Separate and bag materials.
  3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
  4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Site-Clearing Wastes: Chip brush, branches, and trees at landfill facility.
  1. Comply with requirements in Division 32 Section "Plants" for use of chipped organic waste as organic mulch.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
  - a. Comply with requirements in Division 32 Section "Plants." for use of clean sawdust as organic mulch.

D. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.06 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

**END OF SECTION**

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**SECTION 01 77 00**  
**PROJECT CLOSEOUT**

**PART 1      GENERAL**

1.01      GENERAL REQUIREMENTS

- A. Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the work.
- B. Related Requirements
  - 1. Fiscal Provisions, Legal Submittals and Additional Administrative Requirements: Conditions of the Contract.
  - 2. Operating and Maintenance Data: The respective specification sections.
  - 3. Warranties and Bonds: The respective specification sections.
  - 4. Close-out Submittals Required of Each Contractor: The respective specification sections.
  - 5. Final property survey: Section 01 50 00.

1.02      SUBSTANTIAL COMPLETION

- A. When Contractor considers the work to be substantially complete, he shall submit to the Architect:
  - 1. A written notice that the work, or designated portion thereof, is substantially complete.
  - 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, the Architect will make an inspection to determine the status of completion.
- C. Should the Architect determine that the work is not substantially complete:
  - 1. Architect will promptly notify the Contractor in writing, giving the reasons therefore.
  - 2. Contractor shall remedy the deficiencies in the work, and send a second written notice of substantial completion to the Architect.
  - 3. Architect will re-inspect the work.
- D. When the Architect concurs that the work is substantially complete, he will:
  - 1. Prepare a Certificate of Substantial Completion on AIA Form G 704, accompanied by Contractor's list of items to be completed or corrected as verified and amended by the Architect.
  - 2. Submit the Certificates to Owner and Contractor for their written

acceptance of the responsibilities assigned to them in the Certificate.

1.03 FINAL INSPECTION/COMPLETION

- A. When a Contractor considers the work is complete, he shall submit written certification that:
  - 1. Contract Documents have been reviewed.
  - 2. Work has been inspected for compliance with Contract Documents.
  - 3. Work has been completed in accordance with Contract Documents.
  - 4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
  - 5. Work is completed and ready for final inspection.
- B. Submit certified copy of Owner and Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Owner and Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
- C. Architect will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- D. Should Architect consider that the work is incomplete or defective:
  - 1. Architect will promptly notify the Contractor, in writing, listing the incomplete or defective work.
  - 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to Architect that the work is complete.
  - 3. Architect will reinspect the work.
- E. When the Architect finds that the work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.

1.04 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit 2 copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  - 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
  - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  - 3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.



- c. Name of Architect.
- d. Name of Contractor.
- e. Page number.
- 4. Submit list of incomplete items in the following format:
  - a. PDF electronic file.

1.05 CLOSE-OUT SUBMITTALS

- A. Evidence of compliance with requirements of governing authorities:
  - 1. Certificate of Occupancy
  - 2. Certificates of Inspection
    - a. Plumbing
    - b. Fire Protection
    - c. HVAC
    - d. Electrical
    - e. Health Department
- B. Project Record Documents: To requirements of Section 01 78 39.
- C. Warranties and Bonds: To requirements of respective Specification Sections.
  - 1. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of **[final acceptance of the work] [substantial completion]** is indicated.
  - 2. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
  - 3. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
    - a. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
    - b. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
    - c. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
  - 4. Provide additional copies of each warranty to include in operation and maintenance manuals.
- D. Evidence of Payment and Release of Liens: To requirements of General and Special Conditions.

- E. Certificate of Insurance for Products and Completed Operations.
- F. Unless a greater number of hard copies are indicated, provide two (2) copies and an electronic (pdf) file of all submittals.
- G. Submit all documents required for final LEED Certification. See Section 01 81 13.
- H. Submit all Quality Assurance/Quality Control reports. See Section 01 40 00.
- I. Submit copies of all RFIs, ASIs, addenda and bulletins. Include all attachments.
- J. Maintenance Materials (Attic Stock): Submit a complete list of required maintenance materials.
- K. Final Project Schedule: Indicate completion dates of all items.
- L. Final Commissioning Documentation: See Section 01 91 13.

1.05 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to Architect.
- B. Statement shall reflect all adjustments to the Contract Sum:
  - 1. The original Contract sum.
  - 2. Additions and Deductions Resulting From:
    - a. Previous Change Orders
    - b. Allowances
    - c. Unit Price
    - d. Deductions for uncorrected work
    - e. Other adjustments
  - 3. Total Contract sum, as adjusted.
  - 4. Previous payments
  - 5. Sum remaining due
- C. Architect will prepare a final Change Order reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.06 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

**END OF SECTION**

## **SECTION 01 78 23**

### **OPERATION AND MAINTENANCE DATA**

#### **PART 1 GENERAL**

##### **1.01 GENERAL REQUIREMENTS**

- A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under contract.
- B. Instruct Owner's designated personnel in the maintenance of products and in the operation of equipment and systems.
- C. Related Requirements
  - 1. Each respective section of specifications listing operating and maintenance data requested for specific products.
  - 2. Division 22: Additional Plumbing requirements.
  - 3. Division 23: Additional HVAC requirements.
  - 3. Division 26: Additional Electrical requirements.

##### **1.02 QUALITY ASSURANCE**

- A. Preparation of data shall be performed by personnel:
  - 1. Trained and experienced in maintenance and operation of described product.
  - 2. Skilled to extent required to communicate essential written data and prepare required drawings.

##### **1.03 FORM OF SUBMITTALS**

- A. Prepare data in the form of an instructional manual for use by Owner's personnel.
  - 1. 2 hard copies
  - 2. 1 electronic copy (USB device).
- B. Format for Manuals
  - 1. Size: 8-1/2 inch by 11 inch white paper for typed pages.
  - 2. Text: Manufacturer's printed data or typewritten.
  - 3. Drawings: Provide reinforced punched binder tab, bind in with text. Fold larger drawings to the size of the text pages.
  - 4. Product Literature: Provide for each separate product or each piece of operating equipment. Include typed description of product and major component parts of equipment.

5. Cover: Identify each volume with type or printed title, "OPERATING AND MAINTENANCE INSTRUCTIONS", title of project, and general subject matter covered in the manual.
  - C. Binders: Commercial quality three-ring binders with durable plastic covers. When multiple binders are used, correlate data into consistent groupings.
- 1.04 CONTENT OF MANUAL
- A. Title Page: Identify title of project, address, date of submittal, name, address and telephone number of Contractor and Architect.
  - B. Table of Contents: Typewritten list of each product or system required to be included.
  - C. Product Data
    1. Include only those sheets which are pertinent to the specific product.
    2. Annotate each sheet to:
      - a. Clearly identify the specific product or part installed.
      - b. Clearly identify the data applicable to the installation.
      - c. Delete references to inapplicable information.
  - D. Drawings
    1. Supplement product data with drawings as necessary to clearly illustrate:
      - a. Relations of component parts of equipment and systems.
      - b. Control and flow diagrams.
    2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
    3. Do not use Project Record Documents as maintenance drawings.
  - E. Written text, as required to supplement product data for the particular installation:
    1. Organize in a consistent format under separate headings for different procedures.
    2. Provide a logical sequence of instructions for each procedure.
  - F. Copy of each warranty, bond, and service contract issued.
  - G. Provide information sheet for Owner's personnel giving:
    1. Proper procedures in the event of failure.
    2. Instances which might affect the validity of warranties or bonds.
- 1.05 MANUAL FOR MATERIALS AND FINISHES
- A. Submit two copies of complete manual in final form.

- B. Content for architectural products, applied materials, and finishes:
  - 1. Manufacturer's data, giving full information on products.
  - 2. Catalog number, size, composition.
  - 3. Color and texture designations.
  - 4. Information required for reordering specially manufactured products.
  - 5. Instructions for care and maintenance.
  - 6. Manufacturer's recommendation for types of cleaning agents and methods.
  - 7. Cautions against cleaning agents and methods which are detrimental to the product.
  - 8. Recommended schedule for cleaning and maintenance.
  - 9. Housekeeping Manuals containing manufacturer's recommended cleaning practices for vinyl wallcoverings, painted surfaces and all floor finishes.
- C. Content for moisture protection and weather exposed products:
  - 1. Manufacturer's data, giving full information on products.
  - 2. Applicable standards.
  - 3. Chemical composition.
  - 4. Details of installation.
- D. Instructions for inspection, maintenance and repair.
- E. Additional requirements for maintenance data: The respective sections of Specifications.
- F. Provide complete information for products of applicable sections of the Project Manual including, but not limited to, the following types of materials, as applicable:
  - 1. Metal fabrications.
  - 2. Waterproofing.
  - 3. Roofing.
  - 4. Flashing and sheet metal.
  - 5. Roof accessories.
  - 6. Joint sealants.
  - 7. Doors and frames.
  - 8. Windows.
  - 9. Hardware.
  - 10. Glazing.
  - 11. All finish materials.
  - 12. Toilet partitions.
  - 13. Toilet accessories.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit two copies of complete manual in final form.
- B. Content for each unit of equipment and system, as appropriate:

1. Description of unit and component parts.
  2. Function, normal operating characteristics, and limiting conditions.
  3. Performance curves, engineering data, and tests.
  4. Complete nomenclature and commercial number of all replaceable parts.
- C. Operating Procedures
1. Start-up, break-in, routine and normal operating instructions.
  2. Regulation, control, stopping, shutdown, and emergency instructions.
  3. Summer and winter operating instructions.
  4. Special operating instructions.
- D. Maintenance Procedures
1. Routine operations.
  2. Guide to "troubleshooting."
  3. Disassembly, repair, and reassembly.
  4. Alignment, adjusting, and checking.
- E. Servicing and lubrication schedule.
1. List of lubricants required.
- F. Manufacturer's printed operating and maintenance instructions.
- G. Description of sequence of operation by control manufacturer.
- H. Original manufacturer's parts list, illustrations, assembly drawings, and diagrams, required for maintenance.
1. Predicted life of parts subject to wear.
  2. Items recommended to be stocked as spare parts.
- I. As-installed control diagrams by controls manufacturer.
- J. Coordination drawings.
1. As-installed color coded piping diagrams.
- K. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
- L. Other data as required under pertinent sections of Specifications.
- M. Content for each electrical and electronic system, as appropriate:
1. Description of system and component parts.
  2. Function, normal operating characteristics and limiting conditions.
  3. Performance curves, engineering data, and tests.

4. Complete nomenclature and commercial number of replaceable parts.
  5. Circuit directories of panelboards.
  6. Electrical service.
  7. Controls.
  8. Communications.
  9. As-installed color-coded wiring diagrams.
  10. Operating schedules
    - a. Routine and normal operating instructions
    - b. Sequences required.
    - c. Special operating instructions.
  11. Maintenance procedures
    - a. Routine operations.
    - b. Guide to "troubleshooting."
    - c. Disassembly, repair, and reassembly.
    - d. Adjustment and checking.
  12. Manufacturer's printed operating and maintenance instructions.
  13. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
  14. Other data as required under pertinent sections of Specifications.
- N. Prepare and include additional data when the need for such data becomes apparent during the instruction of Owner's personnel.
- O. Additional requirements for operating and maintenance data: The respective sections of Specifications.
- P. Provide complete information for products of applicable sections of the Project Manual including, but not limited to, the following types of materials:
1. Drainage systems.
  2. Plumbing systems.
  3. Domestic water conditioners.
  4. Fire protection.
  5. Power or heat generation.
  6. Air distribution.
  7. Controls and instrumentation.
  8. Motors.
  9. Power generation and transmission.
  10. Service and distribution.
  11. Lighting.
  12. Special systems.
  13. Communications.
  14. Chemical Treatment.

1.07 SUBMITTAL SCHEDULE

- A. Submit two copies of preliminary draft of proposed formats and outlines of contents 6 months before project completion.

- B. Submit one copy of completed data in final form before final inspection and acceptance.
- C. Submit specified number of copies of approved data in final form after final inspection and acceptance.

1.08 INSTRUCTION OF OWNER'S PERSONNEL

- A. Before final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment and systems.
- B. Operating and maintenance manual shall constitute the basis of instruction.
- C. Review contents of manual with personnel in full detail to explain all aspects of operation and maintenance.

**END OF SECTION**



## **SECTION 01 78 39**

### **PROJECT RECORD DOCUMENTS**

#### **PART 1 GENERAL**

##### **1.01 GENERAL**

- A. Refer to General Conditions for additional requirements.
- B. Each Prime Contractor: Maintain at the site one record copy of:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Order and other modifications to the Contract.
  - 5. Architect's field orders or written instructions.
  - 6. Approved shop drawings, product data and samples.
  - 7. Field test records.
  - 8. Approved permit sets.
- C. Related Requirements
  - 1. Conditions of the Contract.
  - 2. Section 01 33 23: Shop Drawings, Product Data and Samples.
  - 3. Operation and Maintenance Manuals: The respective specification sections.

##### **1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES**

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
  - 1. Provide files and racks for storage of documents.
  - 2. Provide locked cabinet or secured storage space for storage of samples.
- B. File documents and samples in accordance with the table of contents of the Project Manual.
- C. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for inspection by the Architect.

##### **1.03 MARKING DEVICES**

- A. Provide colored marking pens for recording information in the color code designated by Architect.

1.04 RECORDING

- A. Label each document "PROJECT RECORD" in neat printed letters.
- B. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
- C. Drawings: Legibly mark to record actual construction.
  - 1. Depths of various elements of foundation in relation to finish first floor datum.
  - 2. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
  - 4. Field changes of dimension and detail.
  - 5. Changes made by Field Order or by Change Order.
  - 6. Details not on original contract drawings.
- D. Specifications and Addenda: Legibly mark each Section to record:
  - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
  - 2. Changes made by Field Order or by Change Order.

1.05 SUBMITTAL

- A. At Contract close-out, deliver Record Documents to Architect for submission to the Owner.
- B. Accompany submittal with transmittal letter in duplicate, containing:
  - 1. Date.
  - 2. Project title and number.
  - 3. Contractor's name and address.
  - 4. Title and number of each Record Document.
  - 5. Signature of Contractor or his authorized representative.

**END OF SECTION**

## **SECTION 01 79 00**

### **DEMONSTRATION AND TRAINING**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.
  - 3. Demonstration and training video recordings.

##### **1.02 RELATED SECTIONS**

- A. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

##### **1.03 SUBMITTALS**

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. At completion of training, submit one complete training manual(s) for Owner's use.

##### **1.04 QUALITY ASSURANCE**

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

##### **1.05 COORDINATION**

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

## **PART 2 PRODUCTS**

### **2.01 INSTRUCTION PROGRAM**

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
  - 1. Motorized doors, including overhead coiling doors and automatic entrance doors.
  - 2. Fire-protection systems, including fire alarm fire pumps and fire-extinguishing systems. .
  - 3. Heat generation, including boilers, feedwater equipment, pumps and water distribution piping.
  - 4. Refrigeration systems, including chillers, condensers, pumps, and distribution piping.
  - 5. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices
  - 6. HVAC instrumentation and controls.
  - 7. Electrical service and distribution, including transformers, switchboards, panelboards, and uninterruptible power supplies.
  - 8. Packaged engine generators, including transfer switches.
  - 9. Lighting equipment and controls.
  - 10. Telecommunications Systems, including voice / data, wireless access points and cable television.
  - 11. Audiovisual Systems, including Audiovisual System and Public Address equipment.
  - 12. Security Systems, including Access Control System, Video Surveillance System, Intrusion Detection System, Wired Duress System, Wireless Duress System and Intercom equipment.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
  - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.

2. Documentation: Review the following items in detail:
  - a. Emergency manuals.
  - b. Operations manuals.
  - c. Maintenance manuals.
  - d. Project Record Documents.
  - e. Identification systems.
  - f. Warranties and bonds.
  - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
  - a. Instructions on meaning of warnings, trouble indications, and error
  - b. Instructions on stopping.
  - c. Shutdown instructions for each type of emergency.
  - d. Operating instructions for conditions outside normal operating Limits.
  - e. Sequences for electric or electronic systems.
  - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
  - a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
  - a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
8. Repairs: Include the following:
  - a. Diagnosis instructions.

- b. Repair instructions.
- c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
- d. Instructions for identifying parts and components.
- e. Review of spare parts needed for operation and maintenance.

**PART 3      EXECUTION**

**3.01          PREPARATION**

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.
- B. Set up instructional equipment at instruction location.

**3.02          INSTRUCTION**

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Owner will furnish Contractor with names and positions of participants.
  - 2. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
    - a. Schedule training with Owner with at least seven days' advance notice.
    - b. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

**END OF SECTION**

## **SUSTAINABLE DESIGN**

Northern Kentucky University has invested in sustainable design goals both through a campus-wide Sustainability Plan and through the incorporation of sustainable design goals in the master planning process. The Residence Hall project will support these goals in several ways:

- Increasing the number of residence hall beds available to students on campus
- Creating a welcoming, comfortable, nurturing environment
- Transitioning from a commuter institution to one with vibrant student-life
- Integrating sustainability into daily operations and student life
- Preserving greenspace while promoting activity, leisure, and learning
- Supporting campus wide goals in the area of waste management, energy efficiency, and stormwater management

## **CURRENT STATUS**

The residence hall project has been registered with USGBC under the project name “NKU Residence Hall” with project reference number 1000119772. The project is required by NKU standards to meet a LEED Certified level; however, the team is working to meet a LEED Silver goal. Some aspects of LEEDv4.1 may be used as allowed by USGBC, however the project will not be pursuing full v4.1 certification. A preliminary LEED checklist is included as Appendix C.

Key sustainable design strategies include:

1. Site development in context with existing campus buildings, hardscape and lighting. The project is to be connective, enhancing student life and culture.
2. Adjacent green space envisioned as a series of terraces, enabling social interactions, outdoor learning, and gathering space.
3. Incorporate energy efficiency measures that maximize long term efficiency. (Focus on envelope and systems)
4. Inclusion of geothermal wellfield – 60 wells at a depth of 400 foot.
5. Enhanced commissioning (Commissioning agent is being engaged for this project. It is unclear if envelope systems will be included).
6. Construction waste management
7. Low-emitting materials
8. Indoor air quality standards

Reference Documents:

- [2017 Sustainability Strategy](#)
- [2009 Master Plan](#)
- [NKU Design Standards](#)
- [NKU Climate Commitment](#)

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## **SECTION 018113**

### **SUSTAINABLE DESIGN REQUIREMENTS - LEED v4 BD+C**

#### **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.
- B. LEEDv4 Reference Guide for Building Design and Construction.
- C. 01 81 14 Material Tracking LEEDv4
- D. 01 81 16 VOC Limits

##### **1.2 SUMMARY**

- A. Section includes general requirements and procedures for compliance with certain prerequisites and credits needed for Project to obtain "LEED Version 4 for Building Design and Construction" (LEED v4 BD+C) Silver certification based on USGBC's LEED v4 BD+C.
  - 1. Specific requirements for LEED are also included in other Sections.
  - 2. Some LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
  - 3. A copy of the LEED Project checklist is attached at the end of this Section for information only.
    - a. Some LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.

##### **1.3 DEFINITIONS**

- A. LEED: USGBC's "LEED Version 4 for Building Design and Construction."
  - 1. Definitions that are a part of "LEED Version 4 for Building Design and Construction" (LEED v4 BD+C) apply to this Section.

- B. Biobased Materials: Materials that may not fall under the wood or bamboo category, such as cotton, wool, straw, soy, or corn-based polymers. Sustainable Agriculture Network (SAN) certification or manufacture-declared conformance to SAN is required to be classified as a biobased material in LEED rating system.
- C. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001. Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
- D. Environmental Product Declaration (EPD): independently verified reports based on life-cycle assessment studies.
- E. Extended Producer Responsibility: Known as “product take-back” programs, manufacturer has set up systems to reclaim its products at the end of useful life and to recycle them into the same or similar project.
- F. Health Product Declaration (HPD): disclosure of potential chemicals of concern within a product, comparing product ingredients to a set of priority hazard lists.
- G. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.
- H. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.
  - 1. "Postconsumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
  - 2. "Preconsumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials, such as rework, regrind, or scrap, generated in a process and capable of being reclaimed within the same process that generated it.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Review LEED requirements and action plans for meeting requirements.

#### 1.5 ADMINISTRATIVE REQUIREMENTS

- A. Work of this project includes application for LEED certification – this process is complete when the Owner has accepted USGBC's final review of the project.

- B. Provide materials and resources to comply with the requirements of all credits assigned to the General Contractor.
- C. Respond to questions and requests for additional information from the Architect and USGBC with regards to LEED documentation.
- D. Generate and upload LEED documentation data directly to LEEDOnline. Complete forms at least monthly as necessary to document LEED credits required for submission.
- E. A weekly conference call will be scheduled by an Owner Representative to review progress related to LEED.

#### 1.6 ACTION SUBMITTALS

- A. General: Submit additional sustainable design submittals required by other Specification Sections.
- B. Sustainable design submittals are in addition to other submittals.
  - 1. If submitted item is identical to that submitted to comply with other requirements, include an additional copy with other submittal as a record copy of compliance with indicated LEED requirements instead of separate sustainable design submittal. Mark additional copy "Sustainable design submittal."

- C. Sustainable Design Documentation Submittals:

**[MR: Building Product Disclosure and Optimization: Environmental Product Declarations]**

- 1. Environmental Product Declarations complying with LEED requirements.

**[MR: Building Product Disclosure and Optimization: Sourcing of Raw Materials]**

- 2. Documentation for products that comply with LEED requirements for leadership extraction practices. Include the following:
  - a. Product data and certification letter from product manufacturers, indicating participation in an extended producer responsibility program and statement of costs.
  - b. Product data and certification for bio-based materials, indicating that they comply with requirements. Include statement of costs.
  - c. Product data and chain-of-custody certificates for products containing certified wood. Include statement of costs.
  - d. Receipts for salvaged and refurbished materials used for Project, indicating sources and costs.
  - e. Product data and certification letter from product manufacturers, indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement of costs.

- f. Documentation for regional materials, indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material and costs of regional materials.

**[MR: Building Product Disclosure and Optimization: Material Ingredients]**

3. Material ingredient reports for products that comply with LEED requirements for material ingredient reporting.
  - a. Product data and manufacturers' self-reported inventory complying with LEED Requirements
  - b. Health Product Declarations complying with LEED Requirements
  - c. Cradle to Cradle version 3 Bronze level or higher certification or "Material Health" certification
  - d. Declare label indicating ingredients have been evaluated and disclosed down to 1000 ppm

**[MR: Construction and Demolition Waste Management Planning]**

4. Documentation complying with Section 017419 "Construction Waste Management and Disposal."

**[IEQ: Low Emitting Materials]**

5. Product data for adhesives and sealants used inside the weatherproofing system, indicating VOC content and laboratory test reports showing compliance with requirements for low-emitting materials.
6. Product data for paints and coatings used inside the weatherproofing system, indicating VOC content and laboratory test reports showing compliance with requirements for low-emitting materials.
7. Laboratory test reports for flooring, indicating compliance with requirements for low-emitting materials.
8. Laboratory test reports for products containing composite wood or agrifiber products or wood glues, indicating compliance with requirements for low-emitting materials.
9. Laboratory test reports for ceilings, walls, and thermal insulation, indicating compliance with requirements for low-emitting materials.

**[IEQ: Minimum IAQ Performance]**

10. Construction Indoor-Air-Quality (IAQ) Management:
  - a. Construction IAQ management plan.
  - b. Product data for temporary filtration media.
  - c. Product data for filtration media used during occupancy.
  - d. Construction Documentation: Six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.

**[IEQ: Indoor Air Quality Assessment]**

11. IAQ Assessment:

- a. Signed statement describing the building air flush-out procedures, including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
- b. Product data for filtration media used during flush-out and occupancy.
- c. Report from testing and inspecting agency indicating results of IAQ testing and documentation showing compliance with IAQ testing procedures and requirements.

**[EA: Advanced Energy Metering]**

12. Product data for meter, sensors, and data collection systems used to provide continuous metering of building energy-consumption performance.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Construction Manager LEED coordinator.
- B. Materials Tracking Form: Project submittals must be accompanied by a completed Materials Tracking form and must also include documentation supporting sustainable material claims.
- C. Project Materials Cost Data: Provide statement indicating total cost for materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:
  1. Plumbing.
  2. Mechanical.
  3. Electrical.
  4. Specialty items, such as elevators and equipment.
- D. Sustainable Design Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with sustainable design action plans.

1.8 QUALITY ASSURANCE

- A. LEED Coordinator: Engage an experienced LEED-accredited professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to these LEED credits, the Contractor shall provide additional materials and procedures necessary to obtain LEED credits indicated.

**[MR: Building Product Disclosure Optimization – Environmental Product Declarations]**

- B. At least 20 different products from at least five different manufacturers shall have Environmental Product Declarations that comply with LEED requirements. Industry-wide (generic) Environmental Product Declarations shall be valued as one-half of a product.

**[MR: Building Product Disclosure Optimization – Sourcing of Raw Materials]**

- C. Not less than 20 percent of building materials, by cost, shall comply with at least one of the LEED requirements for leadership extraction practices.
1. Extended Producer Responsibility Program: Products purchased from a manufacturer that participates in a product take-back program
  2. Bio-based materials: bio-based products that meet the Sustainable Agriculture Standard.
  3. Wood Products: Wood products certified by the Forest Stewardship Council or USGBC-approved equivalent.
  4. Material Reuse: Reuse includes salvaged, refurbished, reused products
  5. Recycled Content: Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content, based on cost.

**[MR: Building Product Disclosure Optimization – Material Ingredients]**

- D. At least 20 different products from at least five manufacturers shall comply with LEED requirements for material reporting
1. Product data and manufacturers' self-reported inventory complying with LEED Requirements
  2. Health Product Declarations complying with LEED Requirements
  3. Cradle to Cradle version 3 Bronze level or higher certification or "Material Health" certification
  4. Declare label indicating ingredients have been evaluated and disclosed down to 1000 ppm

**[IEQ: Low-Emitting Materials]**

### 2.2 LOW-EMITTING MATERIALS

- A. Comply with the VOC requirements listed in 01 81 16.

PART 3 - EXECUTION

3.1 NONSMOKING BUILDING

- A. Smoking is not permitted

3.2 CONSTRUCTION WASTE MANAGEMENT

- A. Comply with Section 017419 "Construction Waste Management and Disposal."

3.3 CONSTRUCTION IAQ MANAGEMENT

- A. Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction."
  - 1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Section 015000 "Temporary Facilities and Controls," install MERV 8 filter media at each return-air inlet for the air-handling system used during construction.
  - 2. Replace air filters immediately prior to occupancy.

END OF SECTION 018113.14

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Project Name: NKU Student Housing Project  
Northern Kentucky University  
1/30/2020

**SECTION 01 81 13**  
LEED-NC v4 Working Project Checklist

Y	M	No
	1	
	1	

4	2	26
1		16
		2
3		2
		5
	1	
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1	3	6
Y		
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2	1	8
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Y		
Y		
		2
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18	9	6
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Y		
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3	3	
14	2	2
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1		
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6	2	5
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2		
1	1	
1	1	
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4	2	7
Y		
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1	3	2
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1		

2	1	1
		1
1		
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1		

38	24	61
Y	M	No

Integrative Process		26 Points
Credit 1	Integrative Process	1

Location and Transportation		16 Points
Credit 1	LEED for Neighborhood Development location	16
Credit 2	Sensitive Land Protection	1
Credit 3	High Priority Site	2
Credit 4	Surrounding Density and Diverse Uses	5
Credit 5	Access to Quality Transit	5
Credit 6	Bicycle Facilities	1
Credit 7	Reduced Parking Footprint	1
Credit 8	Green Vehicles	1

Sustainable Sites		10 Points
Prereq 1	Construction Activity Pollution Prevention	Required
Credit 1	Site Assessment	1
Credit 2	Site Development - Project Restore Habitat	2
Credit 3	Open Space	1
Credit 4	Rainwater Management	3
Credit 5	Heat Island Reduction	2
Credit 6	Light Pollution Prevention	1

Water Efficiency		11 Points
Prereq 1	Outdoor Water Use Reduction	Required
Prereq 2	Indoor Water Use Reduction	
Prereq 3	Building-Level Water Metering	
Credit 1	Outdoor Water Use Reduction	2
Credit 2	Indoor Water Use Reduction	6
Credit 3	Cooling Tower Water Use	2
Credit 4	Water Metering	1

Energy & Atmosphere		33 Points
Prereq 1	Fundamental Commissioning	Required
Prereq 2	Minimum Energy Performance	Required
Prereq 3	Building-Level Energy Metering	Required
Prereq 4	Fundamental Refrigerant Management	Required
Credit 1	Enhanced Commissioning	6
Credit 2	Optimize Energy Performance	18
Credit 3	Advanced Energy Metering	1
Credit 4	Demand Response	2
Credit 5	Renewable Energy Production	3
Credit 6	Enhanced Refrigerant Management	1
Credit 7	Green Power	2

Materials & Resources		13 Points
Prereq 1	Storage & Collection of Recyclables	Required
Prereq 2	Construction and Demolition Waste Management Planning	
Credit 1	Building Life-Cycle Impact Reduction	5
Credit 2	Building Product Disclosure and Optimization - EPD	2
Credit 3	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
Credit 4	Building Product Disclosure and Optimization - Material Ingredients	2
Credit 5	Construction and Demolition Waste Management Planning	2

Indoor Environmental Quality		16 Points
Prereq 1	Minimum IAQ Performance	Required
Prereq 2	Tobacco Smoke (ETS) Control	Required
Credit 1	Enhanced Indoor Air Quality Strategies	2
Credit 2	Low Emitting Materials	3
Credit 3	Construction Indoor Air Quality Management	1
Credit 4	Indoor Air Quality Assessment	2
Credit 5	Thermal Comfort	1
Credit 6	Interior Lighting	2
Credit 7	Daylight	3
Credit 8	Quality Views	1
Credit 9	Acoustic Performance	1

Innovation & Design Process		6 Points
Credit 1.1	Walkable Project Site	1
Credit 1.2	Green Cleaning	1
Credit 1.3	Purchasing - Lamps	1
Credit 1.4	Innovation or Pilot Credit	1
Credit 1.5	Innovation or Pilot Credit	1
Credit 2	LEED® Accredited Professional	1

Regional Priority		4 Points
Credit 1.1	High Priority Site	1
Credit 1.2	Outdoor Water Use Reduction	1
Credit 1.3	Indoor Water Use Reduction	1
Credit 1.4	Optimize Energy Performance	1
	Regional Priority:	1
	Regional Priority:	1

Project Totals (pre-certification estimates)		110 Points
Certified 40-49 points Silver 50-59 points Gold 60-79 points Platinum 80-110 points		



LEEDv4 Product Data Sheet One Product/ Material per data sheet

**Project:** \_NKU Residence Hall\_\_\_\_\_

**Location:** Northern Kentucky U.\_\_\_\_\_

**Product/ Material Information** (Please complete for all products including low-emitting and certified wood)

Name of Product / Material: -

Spec Number:

Description:

Manufacturer:

Product / Material Cost:

Product Weight:

**Environmental Product Disclosure: (all non-MEP products/ materials)**

An environmental product disclosure (EPD) reports environmental data over the life cycle of products in accordance with ISO 14025. For additional information refer to specification section 01 81 13.

☐ Attach a copy of the EPD

**Sourcing of Raw Materials: (all non-MEP products/ materials)**

These requirements support products whose manufacturers exercise a commitment to responsible extraction/manufacturing processes.

Select ONE of the following categories to report data:

☐ The manufacturer provides a take-back or recycling program of the product  
☐ Attach a copy of program information or a letter from manufacturer stating the program and that the product is eligible

☐ This is a bio-based material compliant with ASTM Test Method D6866

☐ This is Forest Stewardship Council certified wood

☐ Attach vendor invoices for wood products/Chain of Custody

☐ This is a reused material (salvaged, refurbished, reused)

☐ This material has recycled content

\_\_\_\_\_ % post-consumer \_\_\_\_\_ % preconsumer

**Material Ingredients:** (all non-MEP products/ materials)

These requirements encourage use of products for which chemical ingredients are documented and verified

This product has ONE of the following documentation/certifications

- ☐ CASRN (Chemical Abstract Service Registration Number)
- ☐ Health Product Declaration
- ☐ Cradle to Cradle Material Health Certificate OR Cradle to Cradle Certified
- ☐ Declare Label
- ☐ GreenScreen Assessment
- ☐ Attach selected documentation

---

Regional Qualifications for Product/ Material (all non-MEP products/ materials)

Location of manufacturer (City, State, Zip): \_\_\_\_\_

Distance from project site ☐ Over 100 miles ☐ Under 100 Miles \_\_\_\_\_ miles (if under)

---

**Low-Emitting Materials** (Please use one sheet per product/ material)

Interior Paints/Adhesives/Flooring/Ceiling/Walls/Thermal/Acoustic Insulation

This product meets one of the following standards/certifications

- ☐ FloorScore (General Emissions Evaluation)
- ☐ GreenLabel Plus (General Emissions Evaluation)
- ☐ UL Greenguard Gold (General Emissions Evaluation)
- ☐ SCS Indoor Advantage Gold (General Emissions Evaluation)
- ☐ CDPH Standard Method v1.1 VOC requirements

Is this a wet applied product? If yes, must meet:

☐ CARB 2007 or SCAQMD (Rule 1113 paints and coatings/ Rule 1168 adhesives and sealants)

Composite Wood and Agrifiber Products

☐ This product meets the CARB ATCM for formaldehyde requirements for ultra-low emitting formaldehyde resins or no added formaldehyde resins.

This information has been provided by:

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Company: \_\_\_\_\_

Phone: \_\_\_\_\_

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## SECTION 01 81 16

### VOC LIMITS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This Section includes requirements for volatile organic compound (VOC) limits for the following categories
  - 1. Interior Paints and Coatings
  - 2. Interior Adhesives and Sealants
  - 3. Flooring
  - 4. Composite Wood
  - 5. Ceilings, Walls, Thermal, and Acoustic Insulation
- B. Related Sections:
  - 1. Section 01 81 13: "Sustainable Design Requirements"
  - 2. LEEDv4 Reference Guide: Low-Emitting Materials

##### 1.2 REFERENCE STANDARDS

- A. General: Comply with the applicable provisions of the referenced standards except as modified by governing codes and the Contract Documents. Where a recommendation or suggestion occurs in the referenced standards, such recommendation or suggestion shall be considered mandatory. In the event of conflict of referenced standards and this specification or within the standards themselves, the more stringent standard or requirement shall govern.
  - 1. California Department of Public Health (CDHP), Standard Method v1.1 [https://www.cdph.ca.gov/Programs/CCDCPHP/DEODC/EHLB/IAQ/CDPH%20Document%20Library/CDPH-IAQ\\_StandardMethod\\_V1\\_1\\_2010\\_ADA.pdf](https://www.cdph.ca.gov/Programs/CCDCPHP/DEODC/EHLB/IAQ/CDPH%20Document%20Library/CDPH-IAQ_StandardMethod_V1_1_2010_ADA.pdf)
  - 2. Rule 1168 - "Adhesive and Sealant Applications", South Coast Air Quality Management District (SCAQMD), State of California <http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1168.pdf>
  - 3. Rule 1113 - "Architectural Coatings": South Coast Air Quality Management District (SCAQMD), State of California <http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1113.pdf>
  - 4. California Air Resources Board (CARB) 2007 [https://www.arb.ca.gov/coatings/arch/Approved\\_2007\\_SCM.pdf](https://www.arb.ca.gov/coatings/arch/Approved_2007_SCM.pdf)

##### 1.3 DEFINITIONS

- A. Building exterior – a structure's primary and secondary weatherproofing system, including weatherproofing membranes and air- and water-resistant barrier materials, and all building elements outside of that system

- B. Building Interior – products inside a structure’s weatherproofing membrane
- C. Interior Floor Finish – all the layers applied over a finished subfloor or stairs, including treads and risers and other walking surfaces. Interior finish excludes structural members, such as beams, trusses, studs, or subfloors.
- D. Interior Wall and Ceiling Finish – all the layers comprising the exposed interior surfaces of buildings, including fixed walls, partitions, columns, exposed ceilings, paneling, interior trim/finish applied mechanically for decoration, acoustical correction, surface fire resistance.
- E. Product Category – general group of similar products intended for a particular application and performance, such as carpet, sheet vinyl flooring, plywood, etc.
- F. VOCs –

#### 1.4 SUBMITTALS

- A. Manufacturer’s technical information for VOCs included in all LEEDv4 Product Tracking Sheets for each category.
  - 1. Provide product data indicating compliance with General Emissions evaluation and VOC content requirements.
- B. Documentation providing the quantity of each adhesive, sealant, paint, and coating product type used on the Project.

### PART 2 - PRODUCTS

#### 2.1 INTERIOR ADHESIVES

- A. VOC Limits
  - 1. The volatile organic compound (VOC) content of all field-applied adhesives, adhesive bonding primers, and adhesive primers used on the interior of this Project shall not exceed the limits defined in Rule 1168 - "Adhesive and Sealant Applications" of the South Coast Air Quality Management District (SCAQMD), of the State of California, with a rule amendment date of October 6, 2017.
  - 2. The VOC limits defined by SCAQMD are measured in grams per liter (g/L), less water and less exempt compounds.
  - 3. General: For specified building construction related applications, the allowable VOC content is as follows:
    - a. Architectural Applications:

1) Building Envelope Membrane Adhesive	250
2) Indoor carpet adhesive	50
3) Carpet Pad Adhesive	50
4) Wood Flooring Adhesive	100
5) Rubber Floor Adhesive	60
6) Subfloor adhesive	50
7) Ceramic Tile Adhesive	65

8)	VCT and asphalt tile adhesive	50
9)	Drywall and panel adhesive	50
10)	Cove base adhesive	50
11)	Multipurpose construction adhesive	70
12)	Structural glazing adhesive	100
b.	Specialty Applications:	
1)	PVC welding	510
2)	CPVC welding	490
3)	ABS welding	325
4)	Adhesive primer for plastic	550
5)	Contact Adhesive	80
6)	Special Purpose Contact Adhesive	250
7)	Adhesive Primer for Traffic Marking Tape	150
8)	Structural Wood Member Adhesive	140
9)	Top and trim adhesive	250
c.	Substrate Specific Applications:	
1)	Metal to metal	30
2)	Plastic foams	50
3)	Porous material (except wood)	50
4)	Wood	30
5)	Fiberglass	80
6)	Reinforced Plastic Composite	250

## 2.2 INTERIOR AEROSOL ADHESIVES

### A. VOC Limits

1. The volatile organic compound (VOC) content of all field-applied aerosol adhesives, used on the interior of this Project shall not exceed the limits defined in the Green Seal standard GS-36, Commercial Adhesives, Edition 2.1, July 12, 2013. Product specific requirements are as follows:
  - a. Aerosol Adhesives
 

1) General purpose mist spray	65% VOCs by weight
2) General purpose web spray	55% VOCs by weight
3) Special purpose aerosol adhesives	70% VOCs by weight

## 2.3 INTERIOR SEALANTS

### A. VOC Limits

1. The volatile organic compound (VOC) content of all field-applied adhesives, adhesive bonding primers, and adhesive primers used on the interior of this Project shall not exceed the limits defined in Rule 1168 - "Adhesive and Sealant Applications" of the South Coast Air Quality Management District (SCAQMD), of the State of California.
2. The VOC limits defined by SCAQMD are as follows. All VOC limits are defined in grams per liter, less water and less exempt compounds.
3. General: For specified building construction related applications, the allowable VOC content is as follows:
  - a. Sealants:
    - 1) Clear, Paintable, and Immediately

	Water-Resistant Sealant	280
2)	Foam insulation and sealant	250
3)	Grout Sealant	65
4)	Non-Staining Plumbing Putty	150
5)	Potable Water Sealant	100
6)	Single Ply Roof Membrane Sealants	450
7)	Other Roof Sealants	300
8)	All other Architectural Sealants	250
9)	All other Sealants	420
b.	Sealant Primer:	
1)	Architectural - Nonporous	250
2)	Architectural- Porous	775
3)	Other	750

## 2.4 INTERIOR ARCHITECTURAL PAINTS

### A. VOC Limits

1. The volatile organic compound (VOC) content of all field-applied architectural paints, used on the interior walls and ceilings of this Project shall not exceed the limits defined in the Green Seal standard GS-11, Paints, Edition 3.2, October 26, 2015. Product specific requirements are as follows:
  - a. Paints
    - 1) Flat 50
    - 2) Non-Flat 100
    - 3) Non-Flat High Gloss Coatings 150
  - b. Coatings:
    - 1) Concrete/Masonry Sealers 100
    - 2) Fire resistive Coatings 350
    - 3) Floor coatings 100
    - 4) Low-Solids Coatings 120
    - 5) Primers, Sealers, and Undercoaters 100
    - 6) Roof Coatings 50
    - 7) Rust Preventative Coatings 250
    - 8) Wood Coatings 275

## 2.5 INTERIOR COATINGS

### A. VOC Limits

1. The volatile organic compound (VOC) content of all field-applied coating used on the interior of this Project shall not exceed the limits defined in Rule 1113 - "Architectural Coatings" of the South Coast Air Quality Management District (SCAQMD), of the State of California, Amended February 5, 2016.
2. The VOC limits defined by SCAQMD are measured in grams per liter (g/L), less water and less exempt compounds.
3. General: For specified building construction related applications, the allowable VOC content is as follows:
  - a. Coatings
    - 1) Building Envelope Coatings 50
    - 2) Clear Wood Finish:



	a)	Varnish	275
	b)	Sanding Sealers	275
	c)	Lacquer	275
3)		Concrete-Curing Compounds	100
4)		Dry Fog Coatings	50
5)		Floor Coatings	50
6)		Low-solids Coatings	120*
7)		Magnesite Cement Coatings	450
8)		Primers, Sealers and Undercoaters	100
9)		Shellac	
	a)	Clear	730
	b)	Pigmented	550
10)		Stains	100
11)		Waterproofing Sealers	100
12)		Waterproofing Concrete/Masonry Sealers	100
13)		Wood Preservatives	350

\*Note: VOC levels for Low-Solids coatings are measured in grams of VOC per liter of material, including water.

### PART 3 - EXECUTION (NOT USED)

END OF SECTION

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## **SECTION 01 91 15**

### **BUILDING ENVELOPE COMMISSIONING REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.01 RELATED DOCUMENTS**

- A. Owner's Project Requirements (OPR) and Basis of Design (BOD) documentation are included for information only.
- B. 'LEED Requirements' for additional LEED requirements.

##### **1.02 SUMMARY**

- A. Section includes commissioning process requirements for Building Envelope systems.
- B. Related Sections:
  - 1. Division 01 Section 01 91 13 "General Commissioning Requirements" for general commissioning process requirements.
  - 2. Division 04 Masonry.
  - 3. Division 07 Thermal and Moisture Protection.
  - 4. Division 08 Openings.
- C. The purpose of the commissioning process is to provide the Owner of the facility with a comfort level that the designated Building Envelope Systems have been installed according to the contract documents, and operate within the performance guidelines set out in the design contract documents and these specifications. The CxA will provide the Owner with an unbiased, objective view of the system's installation and performance. The commissioning process does not take away or reduce the responsibility of the installing contractors to provide a finished product, installed and fully functional in accordance with the Contract Documents.
- D. Commissioning is intended to enhance the quality of the Building Envelope systems. The CxA will be the leader of the commissioning team, planning and coordinating all commissioning activities in conjunction with the design professionals, Contractor, subcontractors, manufacturers, equipment suppliers and the Owner.
- E. Building Envelope Systems to be commissioned are as follows:
  - 1. Masonry
  - 2. Aluminum Windows
  - 3. Aluminum Doors
  - 4. Roofing
  - 5. Steel Doors and Frames

6. Building Air and Water Barrier Systems

1.03 DEFINITIONS

- A. Reference “General Commissioning Requirements” and “Definitions” section for definitions and terminology.

1.04 COMMISSIONING DOCUMENTATION:

- A. General Contractor shall provide or verify that subcontractors supply the following information to the CxA for inclusion in the overall commissioning plan:
1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
  2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
  3. Copies of all submittals for CxA review and copies of all approved submittals for all items included to be commissioned.
  4. Process and schedule for completing performance testing of Building Envelope systems, and components to be verified and tested.
  5. Test and inspection reports and certificates.
  6. Corrective action documents.
  7. Documented verification of testing and corrective measures.
  8. Copies of all extended warranties required to be furnished in the Contract Documents.
  9. Operating and Maintenance Manuals.

1.05 PERFORMANCE REQUIREMENTS

- A. Preconstruction Testing of Mockups: See requirements in the individual specification sections in Divisions 03 through 08.

1.06 QUALITY ASSURANCE

- A. Masonry and Roofing Pre-Construction Meeting: The Construction Manager will conduct masonry and roofing pre-construction meeting before construction of the exterior enclosure starts. The CxA will review commissioning responsibilities and personnel assignments.
1. Attendees: Authorized representatives of Owner, Construction Manager, CxA, Architect and consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to commissioning.
  2. Agenda: Discuss items of significance that could affect progress, including the following: Certificate of completion, certifying that exterior enclosure assemblies, systems, equipment, and quality control testing required in this specification.
  3. The following is a list of tentative items to be discussed in the meeting:
    - a. Commissioning plan

- b. Construction schedule.
  - c. Phasing.
  - d. Critical work sequencing and long-lead items.
  - e. Designation of key personnel and their duties.
  - f. Procedures for inspecting.
  - g. Submittal procedures.
  - h. LEED requirements.
  - i. Preparation of Record Documents.
- B. Building Envelope Mockup Review: The CxA should be notified and participate when review of the building exterior mockup by the Construction Manager, Architect, Contractor, Owner, and all other concerned parties will take place.
- C. Final Building Inspection: At the time of substantial completion prior to Owner move-in, the CxA should conduct a final building inspection with the Owner, Construction Manager, and Architect

**PART 2      *PRODUCTS (Not Used)***

**PART 3      *EXECUTION***

**3.01      CONTRACTOR'S COMMISSIONING RESPONSIBILITIES**

- A. The Contractors and all the Sub-Contractors and suppliers within the appropriate division, shall cooperate with the CxA, and other commissioning team members, to facilitate the successful completion of the commissioning process.
- B. The Building Envelope Contractor shall assign a representative to the commissioning team, and submit the person's name to the CxA, within one (1) month of the award of the construction contract and prior to the scheduling of any commissioning activities. The representative shall have the authority to make decisions on behalf of the Building Envelope Contractor as they relate to the organization and scheduling of HVAC commissioning. The representative shall ensure communications between Division 08 contractors and suppliers and all other commissioning team members, and shall foster the necessary cooperative action. One specific responsibility shall be to attend commissioning meetings, and ensure action items arising from them are attended to as required to allow the commissioning process to precede on schedule.
- C. The Building Envelope Contractors, and all Sub-Contractors and suppliers, shall cooperate with the Commissioning Agency in carrying out the commissioning process. In this context, the Contractors shall:
  - 1. Each contractor, sub-contractor and supplier as applicable in this division shall include in their quotes the cost of participating in the commissioning process as specified herein.
  - 2. Ensure the testing agency performs commissioning responsibilities as listed herein and in the specified criteria.
  - 3. Provide a complete set of as-built drawings and manuals to the CxA.
  - 4. Contractor shall ensure all construction debris and dirt have been removed and that all systems, where applicable, have been cleaned.

- D. Provide information in electronic format when possible requested by the CxA for tests and final commissioning documentation, including but not limited to all approved shop drawings, testing reports, installation manuals, maintenance manuals and warranty information. This information shall be provided in a timeline so as to not delay the overall commissioning process.

3.02 COMMISSIONING AGENT'S (CxA'S) RESPONSIBILITIES:

- A. Review and comment on Architects CD drawings, details and technical specifications relative to Building Envelope systems, and provide recommendations to assist in the production of an integral envelope package suitable for bidding and construction purposes.
- B. Review Submittals for Building Envelope systems to be commissioned. Note that CxA will not approve or disapprove submittals but rather will offer comments to the design professional and Owner regarding adherence to the design systems of submitted systems.
- C. Assess contractor proposals and value engineering proposals. Prepare a written analysis of the proposals, including recommendations.
- D. Witness QC testing performed by others, or review reports with results of testing.
- E. Provide field observations to assess the quality of the work put into place, provide a captioned photographic report for each field observation.
- F. Deficiencies will be documented by the CxA to and the Architect will determine corrective action. Deficiencies shall be corrected and CxA notified. CxA will have the option to re-inspect or contractor submit pictorial evidence that the issue has been resolved.

3.03 OWNER'S RESPONSIBILITIES:

- A. The Owner will ensure the availability of applicable operating staff for all scheduled commissioning sessions where he deems appropriate.
- B. The Owner will also request the appropriate involvement of the Architect, and any other consultants as required, in the commissioning process.

3.03 CxA's FINAL COMMISSIONING REPORT:

- A. The final commissioning report will be submitted by the CxA to the Owner after the receipt of all required project information in electronic format.
- B. The final commissioning report will contain in general the following information:
  - 1. Documentation of all checklists completed in the installation verification.
  - 2. Documentation of all tests performed, initial rejected tests and final acceptance tests, of all work performed during the verification.
  - 3. All documentation assembled during the Submittal Review Process.

4. Agreed upon un-correctable deviations from Contract Documents.
5. List of all recommended Post Commissioning Procedures.
6. Operating and Maintenance information.

3.04           WARRANTY

- A. Eleven Month Walkthrough: The CxA, Owner, Architect and Construction Manager shall return to the project eleven months after the Owners move-in and before any affected envelope warranty expires in order to evaluate the performance of the building envelope during post construction.

**END OF SECTION**

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## **SECTION 02 41 13**

### **SELECTIVE SITE DEMOLITION**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. The extent of demolition work is indicated on drawings, and includes, but is not necessarily limited to, the following:
  - 1. Selective breaking up, dismantling and/or removal of existing site work items.
  - 2. Salvage of selected existing materials to be turned over to Owner as may be determined by the Owner
  - 3. Cutting and patching.
  - 4. Clean up.
- B. Additional Plumbing, HVAC and Electrical demolition information is specified in Divisions 22, 23 and 26.

##### **1.02 PROJECT CONDITIONS**

- A. The Owner assumes no responsibility for actual condition of items to be removed.
  - 1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable.
  - 2. It is solely the Contractor's responsibility to determine demolition procedure and sequence and to insure the safety adjacent items designated to remain during demolition. This includes the addition of whatever shoring, sheeting, temporary bracing, guys or tie-downs which might be necessary. Such material shall maintain the Contractor's property after completion of the project.
  - 3. It is solely the Contractor's responsibility to follow all applicable safety codes and regulations during all phases of the work.
- B. Coordination
  - 1. Demolition sequence, phasing and methods must be approved by Architect prior to start of demolition work.
  - 2. Coordinate shoring with structural modifications. Shoring to be left in place until completion of structural work permits it's removal.
- C. Title to Removed Property
  - 1. All removal items, unless otherwise indicated for salvage or reuse will become the property of the Contractor and shall be removed from the Site.

- D. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities.
  - 1. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.
- E. Protections: Ensure safe passage of persons around area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
- F. Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.
- G. Utility Services
  - 1. Locate and identify electrical and mechanical services passing through or located within affected area and serving areas outside the work limits.
  - 2. Maintain existing utilities and protect against damage during demolition operations.
  - 3. Notify corporations, companies, individuals and local authorities owning conduits running to property. Arrange for removal of wires running to and on property. Remove pipes and sewers in accordance with instructions of above Owners.
  - 4. Protect and maintain conduits, drains, sewers, pipes and wires that are to remain on the property.
  - 5. Shut-off Active Utilities
    - a. Where existing utilities are to be permanently abandoned, shut-off and cap or arrange with proper utility company for shut-off.
    - b. Where existing utilities are to be rerouted: Where utilities remaining in service interfere with demolition or future construction, shut-off, disconnect, remove, relocate and reconnect as indicated or as required.
  - 6. Shut-down periods
    - a. Arrange timing of shut-down periods of all in-service utilities with the Owner. Do not shut down any utility without prior written approval.
    - b. Keep shut-down period to a minimum or use intermittent period as directed.
    - c. Some shut-down hours may be required after normal working hours. No extra compensation will be made for Work after normal working hours, weekends or holidays.
- H. Explosives: Not permitted.
- I. Scheduling: Conduct work so as to avoid interference with operations and work on areas of site which are to remain in service.

- J. Permits, Fees and Inspections: Obtain and pay for all permits, fees and inspections required by governing authorities.

**PART 2 PRODUCTS**

2.01 MATERIALS

- A. Fill Materials (For filling voids resulting from demolition operations): See Section 31 00 00, Earthwork.
- B. Shoring Materials: As determined by Contractor.

**PART 3 EXECUTION**

3.01 PROTECTION

- A. Use water sprinkling, temporary enclosures and other approved methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.
  - 1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, pollution and electrical shock.
  - 2. Clean adjacent structures and improvements of dust, dirt and debris caused by demolition operations, as directed by the Architect. Return adjacent areas to conditions existing prior to the start of the work.
- B. In removal of existing materials, take care not to damage work remaining in place, salvageable materials or equipment. Repair or replace any existing construction, materials or equipment damaged during demolition to Owner's satisfaction at no additional cost.

3.02 DEMOLITION

- A. Site Items
  - 1. General
    - a. Items specified herein or indicated on drawings.
    - b. Where indicated to be removed and either turned over to Owner or reinstalled, use methods for removal which will provide the least potential damage to adjacent materials to remain.
    - c. Miscellaneous Items: Material or equipment encountered during construction which must be removed to aid in construction operations or that which will not be used in completed facilities.
  - 2. Concrete: Where cut line will be exposed in the finished work and where physically feasible, make edges by saw cutting.
  - 3. Asphalt: Where cut line will be exposed in the finished work or where new asphalt is placed contiguous with existing asphalt, existing asphalt edge shall be saw cut to provide vertical surface.

3.03 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Remove from site, debris, rubbish and other materials resulting from demolition operations that is not permitted as fill material as determined by Geotechnical Engineer.
  - 1. Burning of removed materials from demolished structures will not be permitted on site.
- B. Removal: Transport materials removed and dispose of off site except as follows:
  - 1. Transport material indicated to be "salvaged" to storage areas as directed by Architect. Storage areas are within a 10 mile radius of the project site.
  - 2. Store salvaged materials, protected from dirt and damage.
- C. Clean Up
  - 1. Leave exterior areas "rake clean."
  - 2. Remove barricades as directed.
  - 3. Remove shoring.

**END OF SECTION**

## **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 1 Specification Sections, apply to this Section.

##### **1.2 SUMMARY**

###### **A. Section Includes:**

- 1. All labor, materials, equipment, special tools and services to complete cast-in-place concrete work required for the Project, as herein specified, and as indicated on the Drawings.

###### **B. Related Sections:**

- 1. Section 04 15 00 – Masonry Reinforcement and Accessories.
- 2. Section 04 00 00 – Unit Masonry
- 3. Section 05 12 00 – Structural Steel.
- 4. Section 05 30 00 – Metal Decking.
- 5. Section 31 30 00 – Earthwork.
- 6. Section 31 63 20 – Drilled Piers.
- 7. Divisions 21 through 26 – Pads, inserts, sleeves and embedments for mechanical and electrical items specified therein.

##### **1.3 REFERENCES**

- A. A copy of each reference shall be kept in the field office for the duration of the project. The reference standards shall govern the work except as modified herein.
- B. American Concrete Institute (ACI) 301-16 Specifications for Structural Concrete is hereby incorporated as part of this Section. Supplemental requirements and modifications listed herein take precedence over the requirements of ACI 301. All ACI 301 items unless modified by the Contract Documents are incorporated as written. When any part of any item is modified or voided, the unaltered provisions of the part shall apply as written.
- C. ACI 305.1-14 Specification for Hot Weather Concreting.
- D. ACI 306.1-90 Standard Specification for Cold Weather Concreting.
- E. The ACI MNL-15(16) Field Reference Manual.
- F. Other ACI references as noted in this Section.

- G. American Association of State Highway and Transportation Officials (AASHTO) Specifications as noted in this Section.
- H. ASTM International (ASTM) Specifications as noted in this Section.
- I. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice, 28<sup>th</sup> Edition.
- J. National Ready Mixed Concrete Association (NRMCA) Quality Control Manual.

#### 1.4 SUBMITTALS

##### A. General.

1. Shop drawings shall be produced by the Contractor and submitted to the Architect/Engineer for review. The Architect/Engineer will endeavor to complete review of a shop drawing submittal within 14 days of receipt of the submittal. Fabrication of material prior to the receipt of approved shop drawings for that material shall be at the Contractor's risk.
2. The Contractor is responsible to furnish field-verify information, coordinate material requirements, and review shop drawings prior to submittal of shop drawings to the Architect/Engineer. Receipt of shop drawings by Architect/Engineer will be an assumption by Architect/Engineer that this has been done.
3. Notations by the Architect/Engineer made on the shop drawings do not authorize additional compensation for the Contractor.
4. The Contract Documents (Drawings and Specifications) govern all concrete work. Errors on shop drawings or discrepancies between shop drawings and Contract Documents shall be governed by the Contract Documents. Even if shop drawings contain errors after review by the Architect/Engineer, no additional compensation is due Contractor to correct work to what is shown on Contract Documents.
5. Architectural and mechanical drawings supplement the structural drawings. Requirements for concrete work may be shown on architectural and mechanical drawings.
6. The Architect's and Engineer's review of details and construction operations shall not relieve the Contractor of responsibility to successfully complete the work in accordance with these Specifications and within the Contract time.
7. Shop drawings may be received and returned electronically. If paper copies are submitted no more than two copies will be returned to the Contractor or Construction Manager.

- B. Submit mix designs and test results conforming to the requirements of Section 4 of ACI 301. Submit request for approval to use admixtures, if any. A complete mix design submittal must be furnished at least three weeks prior to the planned use of that mix. The Contractor is cautioned to undertake mix design preparation and submittal procedures immediately after authorization to proceed with the Project.

1. The submitted mix designs shall address weather conditions that are expected to occur during the concrete construction phase. Concrete mixes shall not only be designed for average temperature and humidity conditions, but also for adverse conditions (hot and cold weather), as applicable to this project.

- C. Submit letter stating that concrete subcontractors and suppliers are familiar with the reference standards.
- D. Submit a Quality Control Plan in accordance with Section 1 of ACI 301.
- E. Submit reinforcing steel shop drawings in accordance with Section 3 of ACI 301.
- F. For exposed-to-view concrete work submit formwork shop drawings for architectural review of formwork factors affecting appearance of the completed Work, including types of forms, ties, finishes, and joint types and locations. Review is for general architectural applications and features only.
  - 1. Where the finish is to match a reference sample, reproduce a mockup of the sample in a location approved by the Architect. Obtain acceptance of mockup before proceeding with that finish in the locations designated on the Drawings.
- G. Submit procedures and records required in hot and cold weather concreting work.
- H. Submit insert certifications and installation instructions requested herein for ledge angle inserts (See ACI 301, Section 5.2.1.10).
- I. Submit documentation that epoxy coating applicator is certified under the Concrete Reinforcing Steel Institute's Fusion-Bonded Epoxy Coating Applicator Plant Certification Program.
- J. Submit the following certifications:
  - 1. All coating, floor covering and surface treatment manufacturer's approvals (in writing) of concrete curing compounds that are not removed prior to the product's installation.
  - 2. Subsequent treatment manufacturers' approvals (in writing) of form release agent.
- K. Submit the following product samples for review:
  - 1. Samples of form(s) to be used for exposed-to-view concrete.
- L. The following submittals shall be provided in accordance with ACI 301 and Division 01 - General Requirements.
  - 1. Contractor's proposed Testing Agency.
  - 2. Field and Laboratory tests that are the Contractor's responsibility.
  - 3. Data and test documentation on proposed materials including but not limited to:
    - a. Cement.
    - b. Aggregates.
    - c. Admixtures.
    - d. Reinforcing.
    - e. Curing materials.
    - f. Related materials for concrete construction specified herein.
    - g. Material for repair of surface defects if other than site-mixed portland-cement mortar.
  - 4. Construction joints not shown on the drawings.
  - 5. Method of developing bond at joints (except slabs on grade).
  - 6. Method of adding admixtures.

7. Procedure for adding water to ready-mixed concrete at site, including method of measuring water.
  8. Method(s) for preserving moisture in the concrete.
  9. Ready-mixed concrete delivery tickets.
  10. Thermal control plan for all mass concrete placements.
- M. Submit Certificate of Conformance for concrete production facilities by NRMCA.
- N. Submit documentation of all flatwork finishers and flatwork supervisors' certifications.
- 1.5 QUALITY ASSURANCE
- A. Regulatory requirements:
1. Comply with applicable laws, ordinances, and the Kentucky Building Code (KBC).
  2. Comply with the referenced ACI publications, as modified and supplemented in this Section.
- B. Tests and inspections:
1. The Owner will employ a Geotechnical Engineer to inspect and approve foundation bearings and backfill compaction. Do not place concrete until subgrade approvals have been obtained.
  2. The Owner will employ a testing and inspection agency to provide the services specified in Section 1.6.3 of ACI 301, including supplemental requirements defined in Article 1.8 of this Specification.
  3. The Contractor shall select an independent testing agency, subject to the Architect/Engineer's approval, to perform all testing required by the Contractor for qualification of proposed materials and the establishment of mix designs, for his use in determining concrete strengths for early form removal, and for all other testing services needed or required by the Contractor.
- C. Flatwork finishers certification:
1. All flatwork finishers must be ACI Concrete Flatwork Technician certified.
  2. The on-site flatwork supervisor must be ACI Concrete Flatwork Finisher and Technician certified.
- D. Ready-Mixed Plant Certification:
1. All ready-mixed concrete production facilities shall be certified by the NRMCA Program for Certification of Ready-Mixed Concrete Production Facilities.
- E. Preconstruction Meeting:
1. A preconstruction meeting shall be arranged by the Contractor to review concrete pre-placement and placement activities, inspection and testing requirements, formed and unformed concrete finishes, hot and cold weather concreting procedures, form removal, and critical tolerances.
  2. Ready-mix supplier, Contractor, concrete finishers, Construction Manager, Owner's concrete testing agency, and Architect/Engineer shall attend.



## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver reinforcement to the project site bundled, tagged and marked. Use durable tags indicating bar size, lengths, etc., and other information corresponding to markings shown on placing drawings.
- B. All reinforcement at the site shall be stored off the ground and protected from damage, accumulation of dirt and excessive rust.
- C. Comply with CRSI "Field Handling Techniques for Epoxy-Coated Rebar at the Job Site" and as modified by this Section.
- D. All formwork at the site shall be stored in a clean, dry location off the ground, covered and protected from damage and accumulation of dirt, etc.

## 1.7 SUBSTITUTIONS

- A. Requests for product substitutions must be submitted for review and approval, with all necessary documentation, a minimum of 10 days before bids are due. Product substitutions will only be permitted if incorporated into the bid documents by addendum.

## 1.8 SUPPLEMENTAL REQUIREMENTS AND MODIFICATIONS TO ACI 301-16

- A. The following statements modify and supplement ACI 301. All unaltered parts of ACI 301 shall apply as written.
- B. The Section and paragraph numbers correspond to those in ACI 301. Note that each technical section of ACI 301 includes General requirements, Products, and Execution per the Three-Part Section Format of the Construction Specification Institute.

### Section 1 (ACI 301) - General Requirements

- 1.5.3.1 The Contractor shall submit a quality control plan that addresses the following.
  - (a) Control and maintenance of project documents.
  - (b) Subcontractor/supplier services and verification of purchased products and materials.
  - (c) Concrete production inspection and testing.
  - (d) Pre-placement inspection including formwork, reinforcing and embedments.
  - (e) Placement inspection including consolidation, finishing and initial curing of concrete.
  - (f) Post-placement inspection including monitoring of moist curing and curing temperatures, verification of in-place strength before removal of shoring, and protection of exposed surfaces.
- 1.6.2.2(c) The Contractor is required to arrange for all testing, giving the Owner's testing agency at least 24 hours advance notice.
- 1.6.2.2(d)1 The Contractor shall provide curing boxes as required by ASTM C31. Coordinate quantity and location with the Construction Manager and Testing Agency.

- 1.6.3.1(c) The Owner's testing agency shall report in writing all test results to Architect/Engineer, Contractor, Construction Manager and concrete supplier within three (3) working days after the tests are performed. Report by phone or email the results of early break cylinders to Contractor and Construction Manager. Reports of strength tests shall contain the name of the project, date and time of placement, location of placement, placement method, water added at site, sample location, weather conditions, batch ticket number, batch size, mix identification, specified strength, breaking strength and type of break, specimen diameter and weight, types of admixtures, percentage of entrained air, slump, concrete temperature, and detailed information of storage and curing of specimens before testing.
- 1.6.3.2(d)1 Unless noted otherwise concrete shall have at least one strength test for each 150 cubic yards, or fraction thereof, placed in any one day, nor less than one test for each 5000 square feet of surface area of slabs or walls, or fraction thereof. Strength tests are not required for backfill concrete.
- 1.6.3.2(d)2 Determine the slump (ASTM C143) for each batch of concrete that high-range water-reducer (superplasticizer) is added to in the field. Test and report slump both before and after superplasticizer is added.
- 1.6.3.2(e)1 When 6 by 12 in. cylinders are used make four test specimens for each sample (five required for mixes requiring 56 day strength tests). When 4 by 8 in. cylinders are used make five test specimens for each sample (six required for mixes requiring 56 day strength tests). One specimen shall be a hold specimen, to be tested only if a defective specimen is found.
- 1.6.3.2(e)2 Age of concrete for acceptance shall be 28 days unless otherwise shown in TABLE 4.2.2.8.b. Concrete mixes with strength specified at 56 days shall have one cylinder tested at 7 days, one at 28 days, and two 6 by 12 in. cylinders or three 4 by 8 in. cylinders at 56 days.
- 1.6.3.2(f) Air content tests shall be conducted on the first three batches in each placement of all mixes in which air entrainment is specified and until three consecutive batches have air contents within the range specified, at which time every third batch shall be tested. This test frequency shall be maintained until a batch is not within the range specified, at which time testing of each batch will be resumed until three consecutive batches have air contents within the specified range.
1. For pumped concrete the second or third batch in the placement, and periodically throughout the placement but not less than once for each 100 cubic yards, shall have air content checked at both the end of the truck discharge and at the end of the hose.
  2. Concrete that does not satisfy air entrainment requirements shall be rejected.
- 1.6.3.2(g) Testing services provide the basis for acceptance or rejection of concrete furnished by this contract. Therefore, it is necessary that testing for air

content and slump not only be done after all adjustments have been made, but before the concrete is discharged.

1.6.3.3(f) The Owner will employ an inspection agency to visually inspect the placement of reinforcing steel. Reference KBC 1705.3. Do not place concrete until all outstanding issues cited in the inspection reports have been corrected. Inspection of reinforcing steel to include, but not limited to:

1. Size, spacing, and quantity of bars.
2. Bar splices.
3. Embedments.
4. Concrete cover.
5. Support and securement.
6. Coatings.
7. Spacing and drape of post-tensioning strands.
8. Encapsulation system of post-tensioning strands.

1.6.3.3(g) The Owner will employ an inspection agency to inspect concrete operations including, but not limited to:

1. Use of proper concrete mix.
2. Consolidation.
3. Finish and finishing operations.
4. Curing methods, materials, and procedures.
5. Shoring removal and reshoring operations.
6. Formwork materials.

1.6.4.1(a) Contractor shall be responsible for costs of tests on hardened concrete performed by Owner's testing agency if the tests are required to verify the strength or air content of the concrete because representative concrete cylinder tests or air content tests failed to meet acceptance criteria. Owner will be responsible for costs of tests on hardened concrete performed by Owner's testing agency if the tests are at the Owner's request and representative concrete cylinder and air content tests meet acceptance criteria.

1.6.8.4 Concrete which fails to meet the requirements of this Specification shall be rejected.

1.7.1.6 The Contractor shall bear all costs of correcting rejected work, including the cost of the Architect's and Engineer's additional services thereby made necessary.

1.8.4 Masonry shall not be placed on or supported off of structural floors until the concrete is at least 28 days old and all shoring has been removed.

## Section 2 (ACI 301) - Formwork and Formwork Accessories

2.1.2.1(g) Form tie configuration and spacing for all exposed-to-view concrete shall be submitted for review and approval of the Architect.

- 2.2.1.3 Form release agent shall be a commercial formulation form coating compound that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces. The form release agent manufacturer shall certify that the form release agent is chemically and physically compatible with all subsequent treatments of concrete surfaces. Furthermore, the form release agent shall be approved in writing by the manufacturers of all subsequent treatments.
- 2.2.1.4 Preformed Expansion Joint Filler: Non-impregnated type, closed cell resilient polyethylene foam, 1/2 in. thick unless otherwise noted on the Drawings.
- 2.2.1.5(a) Waterstops:
1. Bentonite rope joint sealant shall be installed in all vertical and horizontal construction joints in concrete walls below and exposed to grade, including slab/wall construction joints, unless otherwise noted. Secure with manufacturer's adhesive and mechanical fasteners as required for a secure installation. Construction joint shall be clean and dry. Prior approved products: Volclay Waterstop-RX 101T, HYPER STOP DB-2515, QUELLMAX 18x24.
  2. Unless otherwise noted provide ribbed type, virgin PVC waterstop meeting Corps of Engineers CRD-C 572 at expansion joints in below grade and exposed to grade walls. Expansion Joint Waterstop shall be type with center bulb, and center bulb shall be 100% within joint. Do not embed center bulb in concrete. Expansion Joint Waterstop to be minimum 9 in. wide, and all butt joints shall be cut in miter box and welded per manufacturer's recommendations. Provide premolded unions, fittings and appropriate adhesive. Thoroughly clean joint, secure waterstop to reinforcing mat with hog rings, and vibrate concrete to eliminate voids.
- 2.2.1.5(b) Embedded items shall not be made of aluminum.
- 2.2.2.1 Design and engineering of formwork shall be the responsibility of the Contractor. Design of formwork and preparation of formwork drawings shall be under the supervision of a licensed design engineer registered in the state where the Project is located. Formwork drawings shall be sealed by the licensed design engineer responsible for the design of the formwork.
- 2.2.2.3 Earth cuts may be used for vertical forms for footings below ground where the ground stands vertical and is approved by the Owner's testing agency prior to placement of concrete.
- 2.2.2.5(e) Construction joints shall be located such that the maximum placement length of a continuous concrete wall will not exceed 100 feet in any one day.

- 2.2.3.2 Form ties for exposed-to-view concrete walls shall leave a 1 in. diameter cone hole. This hole will be left open or epoxy mortared at the discretion of the Architect. The ties shall be one of the following:
- (a) Stainless steel "snap-ties" with a 1 in. break back.
  - (b) Galvanized "coil-bolt" type tie.
  - (c) "She-bolt" tie with the inner male unit galvanized.
  - (d) Other removable type tie with approval of the Architect.
- 2.3.1.2(a) Exposed edges of walls, slabs and beams shall have 3/4 in. bevels, unless otherwise noted.
- 2.3.1.5(a) Concrete construction tolerances, even portions above 100 feet in elevation, shall be in accordance with ACI 117 with the following exceptions:
- 1. Variation in concrete edges supporting masonry and surfaces behind masonry and glass curtain wall shall not exceed plus or minus 1/2 in. from theoretical plan dimension.
  - 2. Variation of beam soffit supporting masonry shall not exceed plus or minus 1/2 in. from theoretical elevation.
  - 3. The class of surface for offset between adjacent pieces of formwork facing material shall be Class A for all surfaces exposed to view, and class C for all surfaces not exposed to view when the project is complete. Refer to 5.3.3.7 for ribbed slabs formed with metal pans.
  - 4. Tolerances for placing anchor bolts and other embedded items for structural steel work (Section 05 12 00) shall be in accordance with the AISC Code of Standard Practice for Steel Buildings and Bridges.
- 2.3.1.5(b) A preconstruction meeting shall be arranged by the Contractor for the purpose of reviewing critical tolerances, methods of making measurements, and the basis for acceptance or rejection of completed work to avoid misunderstandings at the time of final acceptance.
- 2.3.1.6(a) If required, retighten forms and bracing after concrete placement, but before concrete has taken its initial set, to eliminate mortar leaks and maintain proper alignment.
- 2.3.1.12(a) All sleeves, inserts and embedded items required by mechanical trades shall be furnished and placed by the appropriate mechanical contractor. All other sleeves, inserts, reglets, dovetail anchor slots, anchors and embedded items shall be furnished by the appropriate supplier and placed by the Contractor performing the work of this Section.
- 2.3.1.12(b) Sleeves, inserts, anchors and embedded items not shown on structural drawings must be approved by Architect/Engineer before placement of concrete.
- 2.3.1.14(a) Remove chips, wood, sawdust, dirt and debris just before concrete is placed.
- 2.3.1.18 Provisions for Other Trades: Provide openings in concrete and concrete formwork to accommodate work of other trades. Determine size and

location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms. Size and location of openings, recesses and chases not shown on structural drawings must be approved by Architect/Engineer before placement of concrete.

- 2.3.2.4(a) Forms may be removed when the in-place concrete reaches the specified 28-day compression strength, or when the concrete reaches 75% of the specified 28-day compression strength and is no less than 7 days old. The 7-day minimum age requirement may be waived pending review of the proposed mix designs, forming systems, reshoring procedures and in-place concrete strengths.
- 2.3.2.6(a) Forms for post-tensioned concrete shall remain in place until tensioning of tendons is complete.
- 2.3.3.4(a) Reshoring is required for multistory construction. The Architect/Engineer has the prerogative of disallowing any specific procedures that he may consider to be deleterious to the performance of the structure in its completed form.
- 2.3.3.4(b) The attention of the Contractor is directed to the following:
1. Live load and superimposed dead load capacities of each level are noted on the Drawings. Live loads are typically reduced per the building code for the design of beams and girders.
  2. In general, the weight of newly placed concrete for a level, plus adequate construction load allowance, will exceed the combined live and superimposed dead load capacity of the level below.
  3. When shores or reshores must extend to the ground to provide the required load-carrying capacity, the floors above the ground shall not be considered to be contributory to the shoring and reshoring capacity.
- 2.3.4.2(b)1 When Windsor Probe tests are used to evaluate the in-place strength of the concrete for form removal, the tests shall be performed by an approved testing agency in accordance with ASTM C803, with at least one test for each 1800 square feet of elevated structure. Windsor Probe tests shall be correlated to laboratory cured cylinders or drilled cores of the same material and mix-design to be tested.
- 2.3.4.3 Forms may not be removed until the actual in-place strength of the concrete is demonstrated by field-cured test cylinders, Windsor Probes, pullout tests, or the maturity method (ASTM C1074), regardless of the results of tests on laboratory-cured cylinders. These additional test cylinders or other tests must be arranged and paid for by the Contractor.

### Section 3 (ACI 301) - Reinforcement and Reinforcement Supports

- 3.1.3.1(a) Protect reinforcement surfaces from contact with soil, oil, formwork release agent, or other materials that decrease bond to concrete.

- 3.2.1.1(a) All reinforcing steel shall have a minimum  $F_y$  of 60 ksi. In addition, all reinforcing steel to be welded shall meet ASTM A706 and have a maximum carbon equivalent of 0.45%.
- 3.2.1.2(b)1 Provide epoxy coated steel where shown on the Drawings.
- 3.2.1.2(b)2 Epoxy coating shall be applied in plants certified in accordance with the CRSI Epoxy Coating Plant Certification Program.
- 3.2.1.2(b)3 Since the epoxy coating is flammable, the coated bars shall not be exposed to any fire or flame. Cutting coated bars by burning will not be permitted.
- 3.2.1.2(b)4 Repairs of coatings on epoxy coated bars and coated accessories shall be made at all breaks, abrasions, etc. exceeding an area of 0.01 sq. in., and at cut ends.
- 3.2.1.2(b)5 Every reasonable effort shall be made to repair all damaged areas of epoxy-coated reinforcing steel and accessories before any rusting occurs. If infrequent and small damaged areas do rust, the rust shall be thoroughly removed by media blasting or other approved method before the areas are repaired. The Contractor shall exercise care to ensure that coated bars, when incorporated into the work, are free from dirt, paint, oil, grease, or other foreign substances. The Architect/Engineer reserves the right to require cleaning of the reinforcement without additional compensation due the Contractor. It is the intent of this specification that an entirely rust-free and completely coated steel reinforcement system be provided before the concrete is placed. Placing of concrete shall be performed with methods and equipment that will not damage the coated materials.
- 3.2.1.7(a)1 Welded wire reinforcement shall be in accordance with ASTM A1064 (smooth wire) unless noted otherwise on the Drawings. Furnish in flat sheets.
- 3.2.1.9(a) All clips, chairs, bars, and bar supports and other metallic materials used for installation or support of epoxy-coated reinforcing shall be entirely coated with epoxy or another polymer approved by the epoxy coating manufacturer.
- 3.2.1.9(b) Bar supports touching forms in concrete exposed to view, exterior or interior, shall be stainless steel, except use plastic or epoxy coated bar supports where bars are epoxy coated. Provide bar spacers for reinforcement in all walls.
- 3.2.1.10(a) Mechanical and welded splices of reinforcing steel shall be in accordance with ACI 318 and ACI 439.3R and approved by the Architect/Engineer.
- 3.2.1.11 Tie wire for all epoxy-coated bars shall be mylar or plastic-coated. Typically, ends of tie wire must have a minimum of 1 in. clear distance to face of concrete.

- 3.2.2.2(a)1 Welding of reinforcing steel and welded wire reinforcement is not permitted without the approval of the Architect/Engineer.
- 3.3.2.8(e) Bending of reinforcing steel partially embedded in concrete is not permitted, unless otherwise detailed on the Contract Documents.
- 3.3.2.11 Placement of bars shall also be in accordance with the detailed recommendations given in the Concrete Reinforcing Steel Institute's "Placing Reinforcing Bars", 9<sup>th</sup> Edition.
- 3.3.2.12 Provide material and placement of contingency reinforcement as noted on the drawings. Bars are to be cut, bent and placed as directed by the Architect/Engineer as extra reinforcement without additional cost.

#### Section 4 (ACI 301) - Concrete Mixtures

- 4.1.1.1 The ready-mix concrete producer is completely and solely responsible for the design, production, and delivery of the concrete mixes to satisfy this Specification. The Contractor shall coordinate the review of the mix designs between the Ready-Mix Producer, Forming Contractor, and Placing/Finishing Contractor. The Contractor is responsible for informing the Ready-Mix Producer of the conditions at the job site, such as methods being used for placing concrete. Adjustments required to facilitate placing and achieve the desired results shall fall within the criteria of this Specification and shall be at no additional cost to the Owner. All mix designs and proposed adjustments to the same shall be submitted to the Architect/Engineer for review.
- 4.2.1.1(a)1 Cement for all concrete shall be ASTM C150, Type I or Type II unless otherwise noted. Air-entrained cement shall not be used. Air requirements shall be met by use of separate admixtures.
- 4.2.1.1(d)1 Class C and Class F fly ashes shall comply with ASTM C618, except that in addition to the requirements of ASTM C618, Type F fly ash shall have a maximum Loss on Ignition of 3%, with a maximum variation of 1%. Contractor's mix design submittal for mixes which include fly ash must be accompanied by complete chemical and physical analyses and quality control records for the proposed fly ash source for at least two years immediately prior to the proposed use on this project.
- 4.2.1.1(d)2 When fly ash is used, the ratio of fly ash to total cementitious materials shall be not less than 15% and no greater than 25%.
- 4.2.1.1(e)1 Ground granulated blast-furnace slag shall be Grade 100 or Grade 120 per ASTM C989.
- 4.2.1.1(e)2 When ground granulated blast-furnace slag is used, the maximum amount shall be limited to 40% by weight of the total cementitious materials.
- 4.2.1.2(a) All normal weight aggregates shall be graded, a mix of fine, intermediate, and coarse aggregates, and shall also conform to Kentucky



Transportation Cabinet (KTC) Section 804 & 805 as required for superstructures.

1. Aggregate certification submittal shall include copies of test reports on the fine, intermediate, and coarse aggregates proposed to be used, made by a testing laboratory acceptable to the Architect/Engineer, showing source of the materials and conformance with specification requirements. Date of test shall not be more than six months prior to date of submittal. Contractor shall furnish similar copies, of current date, when there is a change in source of material and at any time upon demand by the Architect/Engineer.
- 4.2.1.3(a) Concrete mixer washout water shall not be used in any concrete except Backfill Concrete.
- 4.2.1.4.2(a) Calcium chloride, or admixtures containing more than .05% calcium chloride ions are not permitted. Written conformance to this requirement and the chloride content is required from the admixture manufacturer prior to mix design review.
- 4.2.1.4.3 High-range water-reducing admixture (superplasticizer) conforming to ASTM C494, Type F or G shall be used in all concrete with a specified maximum water-cementitious materials ratio below 0.42. The admixture may also be used at Contractor's option in other mixes, with the written approval of the Architect/Engineer, at no additional cost to the owner.
- 4.2.1.4.4 Water-reducing, non-chloride, non-corrosive, accelerating admixture conforming to ASTM C494, Type C or E, shall be used when early initial set is required. The admixture must have non-corrosive test data of a year's duration from an independent testing laboratory using an acceptable, accelerated corrosion test method such as that using electrical potential measures.
- 4.2.1.4.5 Water-reducing, retarding admixture conforming to ASTM C494, Type D shall be used when delay of the setting time for concrete is required.
- 4.2.1.4.6 Extended set-control admixtures, if used shall be added to the concrete during or immediately after the batching process. The dosage rate for each Mix Type shall be pre-determined by trial mixtures in which the admixture is added to a minimum 8 cu. yd. batch.
- 4.2.1.4.7 All admixtures shall be approved by the cement manufacturer.
- 4.2.1.6(a) Materials used for exposed concrete shall be furnished from the same source throughout the project unless otherwise approved by the Architect/Engineer.
- 4.2.2.2(a) Concrete shall be produced to have a maximum slump at the point of placement of 4 inches with a tolerance of one inch. This maximum slump may not be exceeded except by the job site addition of high-range water-reducer (superplasticizer). In those portions of the structure where member dimensions or congestion due to reinforcing steel prevent the

proper placement and consolidation of the concrete at the maximum slump specified, superplasticizer shall be used by the Contractor in lieu of increasing the slump of non-superplasticized concrete by the addition of water. Approved mix designs, with smaller size aggregates, may also be used in congested areas to facilitate concrete placement.

1. When superplasticizer is used, the maximum pre-adjusted slump shall be 4", and the maximum superplasticized slump shall be 8".

- 4.2.2.4(c)1 For pumped concrete, air content shall be periodically tested at both the truck discharge and end of hose. The required air content for acceptance at the truck discharge shall be adjusted, if necessary, to account for loss of air content during pumping.
- 4.2.2.4(d)1 Tolerance on air content for slabs that receive a trowel finish shall be +0.5%, -1.5%.
- 4.2.2.5(b) Maximum concrete temperature at time of discharge shall not exceed 95 °F. If necessary, use nitrogen cooling to maintain concrete temperature.
- 4.2.2.7(d)1 Chloride ion concentration - Maximum water-soluble chloride ion concentrations in hardened concrete at an age of 28 to 42 days contributed from all ingredients, including water, aggregates, cementitious materials and admixtures shall not exceed the limits indicated in Table 4.2.2.8(b). Immediately after receipt of contract, Contractor shall test proposed individual concrete ingredients for total chloride ion content. If the total chloride ion content calculated on the basis of the proposed concrete mix proportions exceeds the specified limits, it will be necessary to test hardened concrete samples of the proposed mix for water-soluble chloride ion content. If these test results exceed the specified limits, it will be necessary to vary ingredients and material sources and retest until specified limits are met.
- a. Testing shall be performed by an independent testing laboratory employed and paid by the Contractor following ASTM C1218 test procedures.
- 4.2.2.8(b) Strength - Minimum concrete strengths shall be in accordance with Table 4.2.2.8(b). Note that some mixes may be specified with compressive strength requirements at other than 28 days.

Table 4.2.2.8(b) - Mixes and Locations

MIX TYPE	LOCATION	SPECIFIED STRENGTH (psi at days) (1)	MIN. PORTLAND CEMENT (lb. / cu. yd.) (2)	MAX % OF CHLORIDE BY WEIGHT OF CEMENT	MAX W/CM RATIO	AIR % (1,3)	AGG. SIZE (4)
A	Foundations: Footings and grade beams	3000 at 28	480	0.30	0.55	-	No. 57, 1 in.
B	Drilled Piers	4000 at 28	520	0.30	0.50	-	No. 57, 1 in
C	Exterior Concrete	5000 at 28	600 (5)	0.15	0.40	6 +/- 1.5	No. 57, 1 in.
D	Typical Concrete (U.N.O.)	4000 at 28	520	0.30	0.50	-	No. 57, 1 in.
E	Stair pan fills	3000 at 28	500	0.30	0.50	-	No. 8, 3/8 in.
F	Backfill concrete	1500 at 28	280	1.0	-	-	No. 57, 1 in.

NOTES:

- Concrete which is placed and does not meet strength or air content requirements shall be removed and replaced at no cost to the Owner.
- Including fly ash or ground granulated blast-furnace (GGBF) slag in mixes where permitted. Not applicable if a specified minimum amount of fly ash or GGBF slag is listed with the mix. The minimum cement requirement may be met by substituting 1.33 lb. of fly ash for each 1.0 lb. of portland cement replaced, or 1.0 lb. of GGBF slag for each 1.0 lb. of portland cement replaced. The ratio of fly ash to total cementitious materials shall be no less than 15% and no greater than 25%; the ratio of GGBF slag to total cementitious materials shall be no greater than 40%; and the total of fly ash and GGBF slag shall be no greater than 50% of total cementitious materials.
- Tolerance on entrained air content shall be as delivered.
- Normal weight aggregate unless indicated lightweight (LW) concrete at 117 lb. / cu. ft.

4.2.3.5(a) Mix designs incorporating superplasticizer must be accompanied by test results from cylinders made from trial batches or field test data in which the superplasticizer was added to a minimum 8 cu. yd. batch in a truck mixer.

4.3.1.1(a) Site produced concrete is prohibited.

- 4.3.1.4 When a high-range water-reducer (superplasticizer) is added at the site it shall be premeasured and added in accordance with the manufacturer's written instructions and specifications, using truck-mounted power injection equipment capable of rapidly and uniformly distributing the admixture to the concrete. The concrete shall be mixed for a minimum of six minutes after addition of the superplasticizer prior to discharge.
- 4.3.2.1(a) Slump adjustment: When concrete arrives at the project with slump below that suitable for placing, and below the slump specified, water may be added only if neither the maximum water-cementitious materials ratio nor the maximum slump is exceeded, provided that:
1. The approved mix design has allowed for the addition of water on site.
  2. The amount of water added at the site is accurately measured to plus or minus 1 gallon of the desired added amount.
  3. The water addition is followed by 3 minutes of mixing at mixing speed prior to discharge.
  4. Standard cylinder samples as required by these Specifications are taken after addition of water.
  5. The person authorized to add water shall be mutually approved by Architect/Engineer, Contractor, Construction Manager and Ready-Mix Producer.
- 4.3.2.1(b) Do not add water to concrete after high-range water-reducing admixtures have been added.
- 4.3.2.1(c) The maximum water-cementitious materials ratio is defined as that of the mix design furnished by the ready-mix producer. (Not to exceed values noted in Table 4.2.2.8(b)).
- 4.3.2.1(d) Concrete arriving at the site above the maximum slump shall be rejected.
- 4.3.2.1(e) Addition of cement, except as part of initial batching at the plant in accordance with an approved mix design, is prohibited.
- 4.3.2.2(a) The concrete must be discharged from the ready-mix trucks within 1-1/2 hours after the introduction of mixing water to the cement and aggregates.
1. During hot weather or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required. When air temperature is between 85 °F (30 °C) and 90 °F (32 °C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 °F (32 °C) reduce mixing and delivery time to 60 minutes.
- 4.3.2.3 Furnish to the Project Superintendent 2 delivery tickets with each load of concrete. Tickets shall contain the following information.
- (a) Date.
  - (b) Producer and plant.
  - (c) Job.
  - (d) Contractor.

- (e) Truck No. and time dispatched.
- (f) Concrete designation and cement type.
- (g) Admixtures description and content.
- (h) Time discharge started and completed.
- (i) Amount of concrete in load.
- (j) Amount of water in mix at plant.
- (k) Amount of any material added at the site and authorized signature.

Section 5 (ACI 301) - Handling, Placing and Constructing

- 5.1.2.1(d)1 Notify the Architect/Engineer at least two working days prior to placing concrete.
- 5.1.2.1(d)2 No concrete shall be placed without Owner's Testing Agency being present. Give due notice to the Architect/Engineer and all Contractors affected before placing concrete. Allow adequate time for installation of all necessary parts.
- 5.2.1.1(a) Water used for curing exposed surfaces shall be free of substances that will stain or discolor concrete.
- 5.2.1.2 Curing Compounds:
  - (a) Curing Compound for unformed surfaces that will not receive a coating or bonded floor covering shall conform to the requirements of ASTM C1315, Type I, Class A.
  - (b) Curing Compound for formed surfaces, and unformed surfaces that will receive a coating or bonded floor covering, shall be a dissipating or removable curing compound that conforms to ASTM C309. Furthermore, the curing compound shall be approved in writing by the manufacturers of all coatings, floor coverings and surface treatments used on the project. Confirm types and locations of coatings, flooring, and surface treatments with Architect.
  - (c) Curing compound(s) shall comply with all applicable environmental and clean air regulations for the community in which this Project is located.
- 5.2.1.3 Waterproof curing sheets shall comply with ASTM C171. Prior approved materials:
  - (a) Orange Label Sisalkraft paper manufactured by the Fortifiber Building Systems Group.
  - (b) Polyethylene film, minimum 8 mils thickness. Except do not use on surfaces that will be left exposed to view when the project is complete.
  - (c) BurLene curing blankets manufactured by the Max Katz Bag Company, Inc.
- 5.2.1.7(a) Epoxy bonding agent shall comply with ASTM C881, Type V, Grade 2, with Class corresponding to temperature at time of pour.

- 5.2.1.7(b) Latex bonding agent shall comply with ASTM C1059, Type II.
- 5.2.1.10 Related materials for concrete construction shall be as follows:
- 5.2.1.10(a) Vapor retarder under interior slabs-on-grade: Minimum 10 mils, puncture resistant, high tensile strength plastic sheet material meeting ASTM E1745, Class A requirements. Include manufacturer's pressure sensitive tape and mastic.
- 5.2.1.10(b) Non-slip Aggregate used as the abrasive aggregate for a non-slip floor finish shall be fused aluminum oxide grits, or crushed emery. Emery aggregate shall contain not less than 40% aluminum oxide nor less than 24% ferric oxide. Use material that is factory-graded, packaged, rustproof and non-glazing, and is unaffected by freezing, moisture and cleaning materials.
- 5.2.1.10(c) A floor sealer shall be used where shown on the architectural contract documents. The compound shall be a V.O.C. compliant water-based, non-yellowing acrylic sealer. Apply according to manufacturer's recommendations.
- 5.2.1.10(d) Non-shrink grout shall have a minimum compression strength of 7000 psi at 28 days and be a non-shrink, non-metallic, non-staining, non-corrosive, premixed grout. Comply with ASTM C1107.
- Prior approved grouts:
1. Dayton Superior Sure-Grip High Performance Grout
  2. Euclid Hi Flow or NS Grout
  3. Master Builders MasterFlow 713 or MasterFlow 928 grout
- 5.2.1.10(e) Neoprene bearing pads shown on drawings shall be 100% virgin chloroprene (Neoprene) and shall meet AASHTO specifications. Shore "A" hardness shall be 60 unless otherwise noted. Submit certification and test reports for the actual production run of these pads as part of the shop drawing submittal procedure.
- 2 or 5.2.1.10(g) Construction and Control Joint Sealant:
- Performance and physical properties shall be comparable to the following pre-approved products.
1. Epolith-P or Epolith-G epoxy joint fillers by BASF Constuction Chemicals, LLC.
  2. EUCO 700 or 800 by The Euclid Chemical Company.
  3. MM-80 by Metzger/McGuire Company.
- 5.2.1.10(h) Dovetail Anchor Slots: 22 gauge minimum, G60 galvanized. Provide where masonry is backed by concrete. Maximum horizontal slot spacing is 16 in. c/c. Refer to architectural drawings.
- 5.2.1.10(i) Epoxy Adhesive:
1. Two-component, high modulus, high strength, structural epoxy adhesive for use in installing reinforcing steel dowels into hardened concrete.
  2. ASTM C 881, Type IV, Grade 3 with class corresponding to temperature at time of placement.

- 5.3.1.3(d) Verify position and securement of embedded items before placing concrete.
- 5.3.1.4(a)1 Following approval of prepared subgrades by Soils Technician, spread and compact granular base course to 100% maximum dry density as determined by standard Proctor Method ASTM D698.
- 5.3.1.4(c) At all interior slabs-on-grade install vapor retarder over base in accordance with ASTM E1643 with all joints lapped 6 inches minimum and taped. Protect from damage during subsequent operations until concrete is placed. If surface of base is rough, place 1/2 in. of fine graded, compacted material over base before installation of vapor retarder. Vapor retarder to be continuous at turned down slabs from lower to higher slab elevations. Do not place vapor retarder under exterior slabs-on-grade.
- 5.3.1.5(a) Make provisions in advance for wind-breaks, shading, fogging, sprinkling, ponding, or wet curing as dictated by conditions at time of concrete placement.
- 5.3.1.7 Discharge of concrete from ready-mix trucks shall not begin until testing agency has made preliminary checks of slump (and air content - if required).
- 5.3.2.1(a)1 Adequate protection against rain, sleet or snow shall be defined as protection that prevents any and all adverse affects of the rain, sleet or snow on the appearance, strength or durability of the concrete.
- 5.3.2.1(b)1 Placement of concrete in cold weather shall also comply with Article 1.9 of this specification, titled Cold Weather Concreting.
- 5.3.2.1(c)1 Placement of concrete in hot weather shall also comply with Article 1.10 of this specification, titled Hot Weather Concreting.
- 5.3.2.1(d) Evaporation Retarder - When low humidity and/or dry winds create conditions suitable for plastic cracking, evaporation retarder may be required to be applied by spray one or more times during the finishing operation. Evaporation retarder shall not be used as a finishing aid.
- 5.3.2.3(c)1 Pumping pipes and hoses shall be supported above in-place reinforcing on plywood or tires to cushion impacts, prevent abrasions of epoxy coatings and PT sheathing, and prevent displacement of reinforcement.
- 5.3.2.4(i) Assume 1/2 in. average extra concrete will be required to account for deflection of metal deck.
- 5.3.2.4(j) Concrete is not permitted to be placed in standing water or under water without approval of Architect/Engineer.
- 5.3.2.6(d) Bond is required for vertical construction joints in horizontal members, except for slabs on grade.

- 5.3.3.3(a) *Surface finish-1.0 (SF-1.0):*
1. No formwork facing material is specified.
  2. Patch voids larger than 1-1/2 in. wide or 1/2 in. deep.
  3. Remove projections larger than 1/2 in.
  4. Tie holes need not be patched.
  5. Surface tolerance Class C as specified in ACI 117.
  6. Mockup not required.
- 5.3.3.3(b) *Surface finish-2.0 (SF-2.0):*
1. Patch voids larger than 3/4 in. wide or 1/2 in. deep.
  2. Remove projections larger than 1/8 in.
  3. Patch tie holes unless indicated otherwise in Contract Documents.
  4. Surface tolerance Class A as specified in ACI 117.
  5. Mockup not required.
- 5.3.3.3(c) *Surface finish-3.0 (SF-3.0):*
1. Patch voids larger than 3/4 in. wide or 1/2 in. deep.
  2. Remove projections larger than 1/8 in.
  3. Patch tie holes unless indicated otherwise in Contract Documents.
  4. Surface tolerance Class A as specified in ACI 117.
  5. Provide mockup of concrete surface appearance and texture.
- 5.3.3.4(b)1 Where a grout-cleaned rubbed finish is indicated, grout color shall match color of concrete surface to which the grout is applied. When the color of the grout lightens due to drying, rub the surface and keep the surface damp for 36 hours afterward.
- 5.3.3.4(c)1 Where a cork-floated finish is specified, grout color shall match color of concrete surface to which the grout is applied.
- 5.3.3.7 Specified Finishes of Formed Surfaces:
- (a) NON-EXPOSED SURFACES shall be SF-1.0 per 5.3.3.3(a). This includes all non-exposed flat surface and ribbed slabs. Metal pans shall be new or factory reconditioned, with stiffeners to support concrete without sags and bulges in order to satisfy a Class D surface tolerance per ACI 117.
- (b) EXPOSED SURFACES shall be SF-2.0 per 5.3.3.3(b). Vertical surfaces to be cast against Class 1 High Density Overlaid Plyform (HDO – Concrete Form) true to line. Slab and beam soffits to be cast against Class 1 HDO Plyform or Class 1 Medium Density Overlaid Plyform (MDO – Concrete Form).
1. Formwork shall be in 8-foot lengths and 4-foot widths unless otherwise noted.
- 5.3.3.8 In the case of disagreement regarding use of damaged or worn formwork impairing the concrete surface the Architect's decision shall be final.



- 5.3.4.2.1 Slabs shall be finished in accordance with 5.3.4.2(i) 'Unspecified unformed surface finishes' (as described in ACI 301), unless indicated otherwise on the architectural drawings or in 5.3.4.2(j).
- 5.3.4.2(c)1 Do not apply a 'hard-troweled' finish to air-entrained concrete specified to receive a 'trowel' finish.
- 5.3.4.2(c)2 Rider-operated floats and trowels shall not be used on air-entrained concrete specified to receive a trowel finish.
- 5.3.4.2(c)3 Rider-operated motorized screeds cannot be used on long-span slab on metal decks without the use of temporary shoring. Coordinate shoring requirements with the deck manufacturer and Construction Manager.
- 5.3.4.2(j) Specified Finishes of Unformed Surfaces:
- Type A Exterior areas exposed to vehicular or pedestrian traffic to receive a floated or light broom finish per the Architect's direction. Finish slabs to a manual straightedge 'conventional' tolerance per ACI 117 (1/2 in. in 10 feet) and provide positive drainage with no "ponds" greater than 6 in. in diameter. Do not "over finish" slabs.
- Type B Building interior slabs-on-grade and supported decks and all other slabs not specifically indicated shall receive a steel trowel finish in accordance with 5.3.4.2(c). Finish slabs to a 'flat' tolerance ( $SOF_F=35$ ,  $MLF_F=28$ ,  $SOF_L=25$ ,  $MLF_L=20$ ) in accordance with ACI 117. Measure floor finish tolerance within 72 hours after floor finishing and before removal of supporting formwork or shoring. Levelness tolerance ( $SOF_L$ ) is not applicable to un-shored suspended floors.
- Type C Slabs to receive future waterproofing membrane or insulation with topping slabs shall have a floated finish in accordance with 5.3.4.2(b).
- Type D Slabs to receive future topping slabs bonded to base slab shall be finished in accordance with 5.3.4.2(f).
- Type E Stair treads and landings, interior or exterior, shall receive a non-slip floated finish with a non-slip aggregate finished to a manual straightedge 'flat' tolerance per ACI 117 (1/4 in. in 10 feet).
- 5.3.4.2(j)1 Unformed surfaces which do not comply with the specified tolerances, and are deemed unacceptable by the Architect or installer of subsequent floor covering(s), shall be remedied by the Contractor in a manner acceptable to the Architect at no additional cost to the Owner.

- 5.3.5.1 Where not otherwise shown on Drawings, provide control joints in slabs on grade at column centerlines and at the following maximum spacing:
- (a) Slabs less than 8 in. thick – 10 ft. c/c
  - (b) Topping slabs – 8 ft. c/c
  - (c) Maximum panel width-to-length ratio: 1.5.
- 5.3.6.4(a) When forms are removed prior to 7 days, apply one coat of liquid curing compound to all formed surfaces within an hour of formwork removal.
- 5.3.6.5(e)1 A thin layer of water shall be applied to the slab surface just prior to placement of the waterproof sheet. The sheet shall remain in place for a minimum of 7 days. All edges and laps of the waterproof sheet shall be weighted down. All tears in the sheet shall be immediately repaired and the concrete surface re-wetted so that no portion of the concrete surface remains uncovered and all portions of the concrete surface remain continuously moist.
- 5.3.6.5(f)1 Apply curing compound to flatwork in two coats at right angles to each other per manufacturer's recommendations. Total application rate shall be in accordance with manufacturer's recommendations, but not less than 1 gal./200 ft<sup>2</sup>. For rough surfaces, such as broom or scratch finishes, increase application rate per manufacturer's recommendations, but by not less than 50%.
- a. Correct coverage shall be maintained by the applicator and determined through accurate measurement of the material and the number of square feet to which it is applied.
  - b. Curing compound shall also be applied to formed surfaces, including beam and slab soffits, per manufacturer's recommendations when forms are removed sooner than 7 days after concrete is cast.
- 5.3.6.5(g) Unless otherwise noted, preservation of moisture in concrete shall be by application of a curing compound satisfying the requirements of 5.2.1.2. Apply the curing compound in accordance with 5.3.6.5(f)1.
- 5.3.6.5(h) Where curing compound will not be compatible with applied finishes or is not permitted because of proximate occupancy, application of water-retention sheeting materials per 5.3.6.5(e) or a continuous wet cure per 5.3.6.5(a), 5.3.6.5(b), 5.3.6.5(c) or 5.3.6.5(d) is required. Apply water-retention sheeting materials or wet cure all slabs to receive a bonded topping or bonded waterproof membrane. Wet cure slabs shown on the architectural drawings as requiring a wet cure.
- 5.3.7.1(a) All voids, damaged places, fins, projections, and honeycomb areas shall be removed down to sound concrete and repaired immediately after form removal. Any concrete that is not formed as shown on the contract drawings, is out of alignment or level, or indicates a defective surface or unsoundness of any nature shall be removed and replaced to the limits required by the Architect/Engineer unless permission is granted to patch or otherwise correct the defective work. Permission to patch or attempt

the correction shall not be construed as a waiver of the Architect/Engineer's right to require complete removal of the defective work should the patching or correction prove to be, in the opinion of the Architect/Engineer, unsatisfactory either as to structure or appearance.

- 5.3.7.2(a) Grout tie holes with non-shrink grout in below-grade walls. Coat the applied area with the specified bonding agent per the manufacturer's instructions. **Do not grout tie holes in exposed to view walls unless otherwise noted.**
- 5.3.7.5(a) Repair materials other than site-mixed portland-cement mortar shall be submitted for approval.
- 5.3.7.7 All patching materials shall be proportioned to match color of surrounding material after patch material has cured. Prior to starting patching operation, test different techniques, grout mixes, and curing procedures on concealed areas to best match cast concrete. Obtain approval from the Architect/Engineer of patching material and methods prior to proceeding with patching.

#### Section 6 (ACI 301) – Architectural Concrete

- 6.1.1.1 There is no concrete work designated as Architectural Concrete.

#### Section 8 (ACI 301) – Mass Concrete

- 8.1.1.1 Concrete which is thicker than 4 feet in its minimum dimension for foundation concrete and thicker than 3 feet in its minimum dimension for concrete above grade, shall be subject to the provisions of this section.
- 8.2.1.2 Where necessary, use a retarding admixture conforming to ASTM C494, pretested with project materials under project conditions, to prevent cold joints or to help reduce the maximum temperature and rate of temperature rise of the concrete.
- 8.2.1.3 Do not use accelerating admixtures in mass concrete.

#### Section 9 (ACI 301) – Post-Tensioned Concrete

- 9.1.1 Delete this section of ACI 301.

#### Section 10 (ACI 301) – Shrinkage-Compensating Concrete for Interior Slabs

- 10.1.1 Delete this section of ACI 301.

#### Section 11 (ACI 301) – Industrial Floor Slabs

- 11.1.1 Delete this section of ACI 301.

#### Section 12 (ACI 301) – Tilt-Up Construction

- 12.1.1 Delete this section of ACI 301.

Section 13 (ACI 301) – Precast Structural Concrete

13.1.1 Delete this section of ACI 301.

Section 14 (ACI 301) – Precast Architectural Concrete

14.1.1 Delete this section of ACI 301.

END OF FOREGOING PARAGRAPH 1.8 ENTITLED “SUPPLEMENTAL REQUIREMENTS AND MODIFICATIONS TO ACI 301-16”.

1.9 COLD WEATHER CONCRETING

- A. The provisions of ACI 306.1 shall be followed for all concrete placed or cured when the average daily temperature is below 40 °F. The methods of protection to be used for cold weather concrete, including preservation of moisture for curing of the concrete, shall be submitted in writing to the Architect/Engineer for review at least one week prior to cold weather placement.
- B. Plan construction schedule and obtain needed materials and equipment on the job site in advance of cold weather.
- C. All reinforcement, formwork and top 12 inches of the subgrade shall be clear of ice and snow and be not less than 40 °F at time of placement of concrete. The temperature of large embedded items, such as weld plate assemblies for structural steel framing, shall be no less than 35 °F at time of placement.
- D. The concrete temperature as placed shall not be less than specified in column (2) of Table 3.2.1 in ACI 306.1, and shall not exceed these values by more than 20 °F. The temperature of the concrete being discharged shall be tested by the testing agency whenever cylinders are cast, and hourly by the Contractor. The Contractor shall maintain and submit same to the Architect/Engineer weekly.
- E. Any covering, insulation or housing shall be extended to protect projecting reinforcement and embedments.
- F. The Contractor shall install and read maximum/minimum thermometers twice daily during the construction and curing of all structural slabs in cold weather. Provide one thermometer for each 3000 square feet of slab. Place the thermometers near slab perimeter. The Contractor shall submit those temperature readings to the Architect/Engineer weekly.
- G. Concrete shall be exposed to ambient temperature in a gradual manner after being cured. Refer to ACI 306.1, Table 3.2.1.

1.10 HOT WEATHER CONCRETING

- A. The provisions of ACI 305.1 shall be followed for all concrete placed when the ambient air temperature is greater than 80 °F. Note: Concrete protection during windy conditions combined with heat or low humidity shall also conform to ACI 305.1. The methods of protection used for hot weather concreting shall be submitted in writing to the Architect/Engineer for review at least one week prior to hot weather placement.

- B. Plan construction schedule and obtain needed materials and equipment on the job site in advance of hot weather.
- C. The Contractor and ready-mix supplier shall review concrete mixes for use in hot weather with respect to placing requirements, strength and durability.
- D. Concrete temperatures as discharged from the truck shall not exceed 95 °F. Ice, if used, shall be considered part of the total mix water (50 lbs. ice = 6 gallons of water). (Retarders in low slump superplasticized mixes may be required to comply with this requirement.)
- E. The temperature of the concrete being discharged shall be tested by the testing agency whenever cylinders are cast, and hourly by the Contractor. The Contractor shall maintain a written record of these temperatures and submit same to the Architect/Engineer weekly.
- F. Cool and moisten formwork and subgrade by sprinkling with water prior to placing concrete.
- G. Placement and Finishing:
  - 1. Concrete shall be discharged from the truck a maximum of one hour after the introduction of mix water to cement and aggregates.
  - 2. Do not add water to mix to increase slump. Use the approved superplasticizer to maintain a placeable concrete mix.
  - 3. Strike off and screed slabs immediately. Protect slab's surface against moisture loss prior to final finishing.
  - 4. Thoroughly vibrate through all wall and column lift lines and adjacent slab placements to prevent cold joints.
  - 5. Immediately apply liquid curing compound as specified in Section 5 (ACI 301) after final finishing. Follow with continuous wet curing as specified in paragraphs 5.3.6.5(a), 5.3.6.5(b), 5.3.6.5(c) or 5.3.6.5(d) (ACI 301) for a minimum of three days.

## **PART 2 PRODUCTS**

- 2.1 PRODUCT REQUIREMENTS ARE INCLUDED IN ARTICLES 1.8 THROUGH 1.10 ABOVE.

## **PART 3 EXECUTION**

- 3.1 EXECUTION REQUIREMENTS ARE INCLUDED IN ARTICLES 1.8 THROUGH 1.10 ABOVE.

**END OF SECTION**

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SECTION 03 35 11 - CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface treatments for concrete floors and slabs.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

1.04 MOCK-UP

- A. For coatings, construct mock-up area under conditions similar to those that will exist during application, with coatings applied.
- B. Mock-Up Size: 10 feet square.
- C. Locate where directed.
- D. Mock-up may remain as part of the work.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.06 FIELD CONDITIONS

- A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.
- B. Do not finish floors until interior heating system is operational.
- C. Maintain ambient temperature of 50 degrees F minimum.

PART 2 PRODUCTS

2.01 CONCRETE FLOOR FINISH APPLICATIONS

- A. Penetrating Clear Sealer:
  - 1. Use at following locations: All exposed concrete floors.
- B. High Gloss Clear Sealer:
  - 1. Use at following locations: As noted on the drawings.
- C. Slip Resistant Coating: High gloss clear sealer with plastic aggregate.
  - 1. Use at following locations: As noted on the drawings.
- D. Polished Finish:
  - 1. Use at following locations: As noted on the drawings.

2.02 COATINGS

- A. High Gloss Clear Coating: Transparent, non-yellowing, water- or solvent-based coating.
  - 1. Composition: Acrylic polymer-based.
  - 2. Nonvolatile Content: 35 percent, minimum, when measured by volume.
  - 3. Products:
    - a. BRICKFORM; BRICKFORM Gem-Seal 100 VOC: [www.brickform.com/#sle](http://www.brickform.com/#sle).
    - b. L&M Construction Chemicals, Inc, a subsidiary of Laticrete International, Inc; \_\_\_\_: [www.lmcc.com/#sle](http://www.lmcc.com/#sle).
    - c. PROSOCO, Inc; LSGuard: [www.prosoco.com/consolideck/#sle](http://www.prosoco.com/consolideck/#sle).

- d. Substitutions: See Section 01 60 00 - Product Requirements.
  - B. Clear Coating: Clear coating recommended by manufacturer for finishing concrete floors and slabs.
    - 1. Type: High solids polyurethane; two-component.
    - 2. Gloss: Satin.
    - 3. Products:
      - a. SureCrete Design Products; DK 500: [www.surecretedesign.com/#sle](http://www.surecretedesign.com/#sle).
      - b. Approved Equal.
  - C. Penetrating Sealer: Transparent, non-yellowing, water- or solvent-based coating.
    - 1. Products:
      - a. Ameripolish, Inc; 3D SP Concrete Sealer: [www.ameripolish.com/#sle](http://www.ameripolish.com/#sle).
      - b. Ameripolish, Inc; SR2 Concrete Sealer: [www.ameripolish.com/#sle](http://www.ameripolish.com/#sle).
      - c. SureCrete Design Products; Siloxane Dye: [www.surecretedesign.com/#sle](http://www.surecretedesign.com/#sle).
      - d. Approved Equal.
  - D. Plastic Aggregate: Finely ground polymer for addition to coatings for slip resistance.
- 2.03 POLISHED CONCRETE SYSTEM
- A. Polished Concrete System: Materials, equipment, and procedures designed and furnished by a single manufacturer to produce dense polished concrete of the specified sheen.
    - 1. Acceptable Systems:
      - a. ARDEX Engineered Cements; \_\_\_\_\_: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
      - b. L&M Construction Chemicals, Inc., a subsidiary of Laticrete International, Inc; FGS Permashine Concrete Polishing System: [www.lmcc.com/#sle](http://www.lmcc.com/#sle).
      - c. PROSOCO, Inc; Consolideck Polished Concrete System: [www.prosoco.com/consolideck/#sle](http://www.prosoco.com/consolideck/#sle).

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

### 3.02 GENERAL

- A. Apply materials in accordance with manufacturer's instructions.

### 3.03 COATING APPLICATION

- A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
- C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

### 3.04 CONCRETE POLISHING

- A. Execute using materials, equipment, and procedures specified by manufacturer, using manufacturer approved installer.
  - 1. Final Polished Sheen: Satin finish; other sheens are included as comparison to illustrate required sheen; final sheen is before addition of any sealer or coating, regardless of whether that is also specified or not.
  - 2. Satin Finish: Reflecting images from side lighting.



B. Protect finished surface as required and as recommended by manufacturer of polishing system.

END OF SECTION 03 35 11



## **SECTION 04 00 00**

### **MASONRY**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

###### **A. Provide the following:**

1. Face brick.
2. Concrete masonry units.
  - a. Standard
  - b. Fire-rated
3. Ground face concrete masonry units; standard and acoustic.
4. Masonry lintels and setting of steel angles furnished under Section 05 12 00.
5. Setting bearing plates supported and embedded with masonry furnished under Section 05 12 00.
6. Provide masonry fill concrete and reinforcing steel where indicated on drawings. See Section 03 30 00.
7. Wall reinforcing and accessories.
8. Built-in collars, sleeves, inserts, anchors, ties, sockets, bolts, blocking, miscellaneous metal work, etc., in contact with, supported on or enclosed by masonry. When these items are furnished by others, they shall include information for setting.
9. Through-wall flashing.
10. Includes grouting solid all hollow metal door frames in masonry.
11. Mortar and grout.
12. Concrete block vents.

##### **1.02 RELATED SECTIONS**

- A. Sustainable Design Requirements: Section 01 81 13.
- B. VOC Limits: Section 01 81 16.

##### **1.03 DEFINITIONS**

- A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

##### **1.04 SUBMITTALS**

- A. Product Data: For each different masonry unit, accessory and other manufactured products specified.
- B. Shop Drawings: Show fabrication and installation details for the following:

1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement". Show elevations of reinforced walls.
  2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples: Provide samples of items specified herein to be used in the work.
- D. Submit certification that fire resistant concrete units conform to the requirements specified herein for Fire Resistant Concrete Block.
- E. Brick Cleaner
1. Applicator Qualifications: Submit qualifications of applicator.
    - a. Certification stating applicator is experienced in the application of the specified products.
    - b. List of recently completed masonry cleaning projects, including project name and location, names of owner and Architect, description of cleaning products used and substrates, applicable local environmental regulations, and application procedures.
  2. Environmental Regulations: Submit description for testing, handling, treatment, containment, collection, transport, disposal, and discharge of hazardous wastes and cleaning effluents. Describe any hazardous materials to be cleaned from substrates. Submit applicable local environmental regulations.
  3. Protection: Submit description for protecting surrounding areas, landscaping, building occupants, pedestrians, vehicles, and nonmasonry surfaces during the work from contact with masonry cleaners, stain removers, residues, rinse water, fumes, wastes, and cleaning effluents.
  4. Surface Preparation: Submit description for surface preparation of substrates to be completed before application of masonry cleaners and stain removers.
  5. Application: Submit description for application procedures of masonry cleaners.
- F. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated.
1. Each type of masonry unit required.
    - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
    - b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units.
  2. Mortar complying with property requirements of ASTM C270.
  3. Grout mixes complying with compressive strength requirements of ASTM C476. Include description of type and proportions of grout ingredients.

- G. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
  - 1. Each type of masonry unit required.
    - a. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.
  - 2. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
  - 3. Each material and grade indicated for reinforcing bars.
  - 4. Each type and size of joint reinforcement.
  - 5. Each type and size of anchor, tie, and metal accessory.
- H. Cold-Weather Procedures: Detailed description of methods, materials and equipment to be used to comply with cold-weather requirements.
- I. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
  - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.]

1.05 QUALITY ASSURANCE

- A. Supervisor: A supervisory journeyman mason shall be appointed for the project and shall be present at all times masonry work is being performed and:
  - 1. have a minimum of 5 years experience on masonry projects of this type and size.
  - 2. be thoroughly familiar with the design requirements, types of materials being installed, referenced standards and other requirements.
- B. Use only skilled journeyman masons for cutting and placing of masonry; no allowance shall be made for lack of skill on the part of the workmen.
- C. Consult other trades and make provisions that shall permit the installation of their work in a manner to avoid cutting and patching. Build-in work under other sections, as necessary, and as the work progresses.
- D. Unit Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602, 2013 Edition "Specifications for Masonry Structures". Maintain one copy of the standard in project field office at all times during construction. Contractor's supervisory personnel shall be thoroughly familiar with the material as it applies to this Project.
- E. Concrete Unit Masonry Construction: Comply with the National Concrete Masonry Association (NCMA) "TEK Bulletins", and other requirements specified.
  - 1. NCMA TEK Bulletin 3-02A "Grouting for Concrete Masonry Walls".
  - 2. NCMA TEK Bulletin 8-02A "Removal of Stains from Concrete Masonry

Walls”.

4. NCMA TEK Bulletin 10-01A “Crack Control in Concrete Masonry Walls”.
5. NCMA TEK Bulletin 10-02C “Control Joints for Concrete Masonry Walls”.
6. NCMA TEK Bulletin 14-2 “Reinforced Concrete Masonry”.
7. NCMA TEK Bulletin 19-04A “Flashing Concrete Masonry”.
8. NCMA TEK Bulletin 19-05A “Use of Flashing in Concrete Masonry Walls”.

F. Brick Industry Association (BIA)

1. BIA Technical Notes No. 8 and 8B: Mortar for Brickwork.
2. BIA Technical Notes No. 20: Cleaning Brick Masonry.
3. BIA Technical Notes No. 28B: Brick Veneer.

G. Sample Panels

1. Construct where approved by Architect.
2. Panel shall be at least 6 feet long by 6 feet high and shall show full color range, joint detail, reinforcement, air barrier, insulations, through-wall flashing and drips, cavity drainage material, weeps and all other details of construction that will be used in the completed work. Include at least one 90° corner.
  - a. Include ground faced, concrete masonry.
  - b. Clean sample panel using the same methods and materials that will be utilized for cleaning the building masonry.
3. Construct additional panels as required by Architect if original panel construction is not acceptable.
4. Do not start masonry construction until the sample panel is approved by the Architect.
5. Retain acceptable sample as reference standard for the project.
6. Demolish and remove panel from site after acceptance of work.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store cement and lime materials and masonry units off the ground, under cover and protected from weather damage. If units become wet, do not install until they are dry. Do not use cementitious materials that have become damp.
- C. Stockpile and store aggregates to prevent contamination from foreign materials, in locations where grading and other required characteristics can be maintained.
- D. Use care in handling units to avoid chipping and breakage.
- E. Locate storage areas where they will not be disturbed or damaged by construction operations.
- F. Protect finished floor areas from damage.

1.07 COLD WEATHER CONSTRUCTION

- A. Comply with recommended practices for cold weather construction of the International Masonry Industry All-Weather Council and requirements contained in ACI 530.1/ASCE 6/TMS 602.
- B. Do not build on frozen or snow covered work. Remove and replace masonry work damaged by frost or freezing.
- C. Requirements During Construction: Provide the following minimum requirements for the air temperatures listed:
  - 1. Above 40° F: Normal masonry procedures.
  - 2. 40° F to 32° F: Heat mixing water to produce mortar temperatures between 40° F and 120° F. Produce consecutive batches of mortar with the same temperatures falling within this range. Do not heat mortar to greater than 120° F.
  - 3. Below 32° F to 25° F: Heat sufficient mortar ingredients to produce mortar temperatures between 40° F and 120° F. Produce consecutive batches of mortar with the same temperatures falling within this range. Maintain mortar temperatures after mixing above 40° F. Do not heat mortar to greater than 120° F.
  - 4. Below 25° F to 20° F: Heat sufficient mortar ingredients to produce mortar temperatures between 40° F and 120° F. Produce consecutive batches of mortar with the same temperatures falling within this range. Maintain mortar temperatures after mixing above 40° F. Do not heat mortar to greater than 120° F. Maintain masonry above freezing using auxiliary heat. Provide enclosure when wind is in excess of 15 mph.
  - 5. Below 20° F: Heat sufficient mortar ingredients to produce mortar temperatures between 40° F and 120° F. Produce consecutive batches of mortar with the same temperatures falling within this range. Maintain mortar temperatures after mixing above 40° F. Do not heat mortar to greater than 120° F. Maintain masonry above freezing using enclosure and auxiliary heat.
- D. Protection Requirements for Completed Masonry (and masonry not being worked on): Provide the following minimum requirements for the mean daily air temperatures listed:
  - 1. Above 40° F: Normal masonry procedures.
  - 2. 40° F to 32° F: Protect from rain or snow for 24 hours with weather-resistive membrane.
  - 3. Below 32° F to 20° F: Completely cover with weather-resistive membrane and maintain above freezing for 24 hours.
  - 4. Below 20° F: Provide weather-resistant enclosure and auxiliary heat to maintain above freezing for 24 hours.
- E. Requirements During Grouting Operations (Vertically Reinforced Walls): Provide the following minimum requirements for the air temperatures listed:

1. Above 32° F: Normal masonry procedures. Cover at end of work day with weather-resistive membrane.
2. 32° F to 20° F: Heat grout materials to 90° F so grout has in-place temperature of 70° F at end of work day. Cover at end of work day with weather-resistive membrane and 1/2" thick insulating blanket.
3. Below 20° F: Heat grout materials to 90° F so grout has in-place temperature of 70° F at end of work day. Cover at end of work day with weather-resistive membrane and 1" thick insulating blanket or maintain heated enclosure to 40° F for a period of 48 hours.
  - a. Grout Containing Type III Cement: Maintain 40° F temperature for 24 hours.

1.08 HOT WEATHER CONSTRUCTION

- A. Protect masonry construction from direct exposure to wind and sun when erected in an ambient air temperature of 90° F., or greater in shade with relative humidity less than 50%. Provide artificial shade and wind breaks and use cooled materials as required. Provide artificial shade, wind breaks, use cooled materials and other procedures outlined in BIA Tech Notes #1.

1.09 PROJECT CONDITIONS

- A. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
  1. Brace unsupported and newly laid masonry walls. Maintain bracing in place until building structure provides permanent bracing.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar and soil that become in contact with such masonry.
  1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread 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 on completed masonry.

**PART 2 PRODUCTS**

2.01 CONCRETE MASONRY UNITS

- A. General
  1. Curing: Cure for at least 7 days and units must be at least 28 days old when used in the work.



2. Corners (Interior Walls): Provide bullnose edges at all outside corners unless otherwise indicated or directed.
  3. Colors
    - a. Concealed and Interior Exposure (not indicated to be colored): Natural color.
  4. Integral Water Repellents: Use in units exposed to weather. Amount as recommended by water repellent manufacturer as approved by concrete block manufacturer.
    - a. Type: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514 as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
    - b. Products/Manufacturers: Subject to compliance with requirements, provide W. R. GRACE Dry-Block; MASTER BUILDERS' INC. Rheomix-Rheopel; ACME-HARDESTY CO. Acme-Shield; KRETE INDUSTRIES KreteControl 202 Internal Water Repellent; EUCLID CHEMICAL Hydrapel System.
- B. Hollow Load Bearing, Solid Load Bearing (75%) and Fire Resistant Concrete Masonry Units
1. Type: Hollow, load bearing, standard modular size and shapes, thoroughly cured and dried.
  2. References: ASTM C90.
  3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
  4. Weight Classification: Normal weight, unless otherwise indicated.
  5. Linear Shrinkage: Not to exceed 0.065 percent, ASTM C426.
  6. Aggregate: ASTM C33 normal weight aggregates. Cinder aggregates not permitted.
  7. Fire Resistant
    - a. Rating: Design for fire ratings indicated on drawings.
    - b. Manufacturer
      - 1) Listed in the Building Materials List published by the Underwriters' Laboratories, Inc.
      - 2) In lieu of above, provide a report from a nationally recognized testing agency stating that the units are equivalent in fire rating to those furnished by the producers as listed above.
    - c. Location: Where indicated.
- C. Ground Face Concrete Units
1. Type: Ground face, hollow, load bearing, thoroughly cured and dried.
  2. References of Block for Grinding: ASTM C90.

3. Manufacturer: Trendstone Plus , filled units by TRENWYTH INDUSTRIES; NEW HOLLAND CONCRETE, READING ROCK or PREMIER.
4. Surface: Fill ground surfaces with cementitious grout with minimum cured strength and durability equal to basic block unit. After polishing filled surfaces, field apply heat treated acrylic coating.
5. Colors: As selected by Architect. Two colors will be selected. Layout as indicated.
6. Special Shapes
  - a. Provide special corner, jamb, and other special conditions where shown and required.
  - b. Provide coved base course where indicated

D. Concrete Brick

1. Type: Solid, standard sizes and shapes, thoroughly cured and dried and cast with normal weight aggregates.
2. References: ASTM C55, Grade N.
3. Use as necessary to close openings in areas where concrete masonry is not exposed to view (i.e. close-off cavity of cavity walls at openings, work concealed behind drywall, etc.).

2.02 MORTAR

A. Materials

1. Portland Cement: ASTM C150, 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 or selected.
2. Masonry Cement: ASTM C91, provide non-staining type for stonework.
3. Hydrated Lime: ASTM C207, Type S.
4. Aggregate: ASTM C144, clean masonry sand, not over 10% to pass No. 100 sieve for general use.
5. Water: Clean, fresh and free of deleterious amounts of acids, alkalis and foreign organic matter.
6. Water Repellent Admixture: W. R. GRACE Dry-Block, RHEOMIX - Rheopel Mortar Admixture; MASTER BUILDERS, INC., KRETE INDUSTRIES KreteGuard 390. Manufacturer must submit certification that water repellent admixture meets or exceeds requirements specified herein.
  - a. Conformance: ASTM E514.
  - b. Type: Integral polymeric water-repellents (IPWR).
7. Color Additive: Inorganic pigments as required to produce colored mortar as selected by Architect. SGS Colors by SOLOMON GRIND CHEM SERVICE; DAVIS COLORS or equal.
  - a. Resistant to alkali, light and weather
  - b. Unaffected by cement and free of water soluble salts.
8. Cold Weather Additive: Non-chloride, non-corrosive, accelerating admixture complying with ASTM C494, Type C or ASTM C1384 and

recommended by the manufacturer for use in masonry mortar of composition indicated.

B. Proprietary Mortar Cement: Conform to ASTM C91, containing hydrated lime.

1. Certification: Submit certified laboratory data substantiating conformance with structural requirements for mortars as specified; and that no adverse chemical reaction will occur with the specified masonry accessories and reinforcing. Certification must be received and approved by Architect prior to mortar use.
2. Suitable products are acceptable from the following manufacturers:
  - a. MIAMI
  - b. LEHIGH HANSON
  - c. ESSROC MATERIALS, INC. (Brixment)
  - d. QUIKRETE

C. Mixes - Unit Masonry

1. Provide water repellent admixture in all mortar used for exterior CMU masonry work. Add to mix in accordance with manufacturer's recommendations.
2. Type M Mortar
  - a. Use: Provide for CMU work below grade or in contact with earth.
  - b. Proportions: ASTM C270 proportions by volume. Minimum average compressive strength at 28 days of 2,500 psi.
  - c. Color: Natural color.
3. Type S Mortar
  - a. Use: Provide for all CMU work.
  - b. Proportions: ASTM C270 proportions by volume. Minimum average compressive strength at 28 days of 1,800 psi.
  - c. Colors
    - 1) Concealed work and natural colored concrete masonry units: Natural color.
    - 2) Colored concrete masonry units: As selected by Architect.
4. Type N Mortar
  - a. Use: Provide for [brick veneer] [and cast stone].
  - b. Proportions: ASTM C270 proportions by volume. Minimum average compressive strength at 28 days of 750 psi.
  - c. Colors: As selected by Architect.

2.03 GROUT

A. Masonry Grout - Mix

1. Fine Grout for Reinforced Masonry: Mix with mechanical mixer with sufficient water to the desired consistency in accordance with ASTM C476 Proportion Specifications.
  - a. Portland Cement: 1 part
  - b. Hydrated Lime: 0 to 1/10 part

- c. Fine Aggregate: 2-1/4 to 3 times the sum of the volumes of the cementitious materials
- 2. Coarse Grout for Reinforced Masonry: Mix with mechanical mixer with sufficient water to the desired consistency in accordance with ASTM C476 Proportion Specifications.
  - a. Portland Cement: 1 part
  - b. Hydrated Lime: 0 to 1/10 part
  - c. Fine Aggregate: 2-1/4 to 3 times the sum of the volumes of the cementitious materials.
  - d. Coarse Aggregate: 1 to 2 times the sum of the volumes of the cementitious materials.
- 3. Hand Mixing: Not acceptable.

## 2.04 REINFORCING

- A. Manufacturers: DUR-O-WALL; HECKMANN BUILDING PRODUCTS; HOHMANN & BARNARD; MASONRY REINFORCING CORPORATION OF AMERICA (WIREBOND). Where products are specified referencing a particular manufacturer, equal products from the manufacturers listed are acceptable providing the product meets the requirements indicated.
  - 1. Where a manufacturer is listed below for a specific product, it is to establish a level of quality. Similar products of equal quality from the above listed manufacturers are acceptable.
- B. Horizontal Joint Reinforcement
  - 1. General
    - a. Type: Ladder type, standard weight, galvanized.
    - b. Width: Approximately 2 in. less than nominal wall thickness.
    - c. Spacing: Continuous along horizontal joint, spaced 16 inches on center vertically, unless otherwise indicated.
  - 2. Longitudinal Wire
    - a. Single Wythe Walls: 2 wires.
    - b. Multi-wythe Walls:
      - 1) Each wythe less than 6 inches wide: 1 wire.
      - 2) Each wythe 6 inches and wider: 2 wires.
- C. Metal "Z" Ties: 3/16" galvanized steel "Z" shaped wire ties, 2" narrower than wall width. For use in block wythes at control joints.
- D. Adjustable Veneer Anchor
  - 1. Steel Stud or Structural Steel Back-Up: Two piece, adjustable loop type anchor and tie. Anchors and ties shall be carbon steel, devices, hot dip galvanized after fabrication, coating conforming to ASTM A153, Class B2, 1.5 ounce coating per square foot. Manufacturer to provide oversized hole as required to accommodate diameter of screws without abrasion of zinc coating.

- a. Anchor
    - 1) Steel Stud Back-Up: Screw-on galvanized steel strap anchor, 12 gage by 3/4" wide by 9" long with 3/8" offset and 4" adjustment. Provide strap with 3/8" hole at each end for fasteners. Provide self-tapping carbon steel screws with minimum 0.0005" of zinc coating. HECKMANN 315-C.
    - 2) Steel Stud/ Sheathing Back-Up: Screw-on galvanized steel strap anchor with stand-off legs for insulation sheathing board in depths required. X-SEAL by HOHMANN & BARNARD or similar type design manufactured by HECKMANN, AA WIRE PRODUCTS, DUR-O-WAL, INC., NATIONAL WIRE PRODUCTS INDUSTRIES. Seal insulation face with reinforced polyolefin base, laminated to a polypropylene layer tape. Alternate design attachment must be specifically designed for insulated sheathing in depths required.
    - 3) Structural Steel Back-Up: Weld-on steel strap anchors. Field prime after welding. 12 gage by 1/2" wide by 8' long with six 3/8" offsets to provide 7-3/4" vertical adjustment. HECKMANN 317-B.
    - 4) Fasteners: Hot-dipped galvanized steel bolt, nut and washer.
  - b. Ties: Triangular tie, fabricated from 3/16" diameter galvanized cold drawn steel wire. Provide ties long enough to engage the anchor and be embedded not less than 2" into the bed joint of the masonry veneer. HECKMANN 316 Series.
2. [Concrete Masonry Back-Up (Tie and Anchor): Ladder type reinforcing with double eye ties welded at each cross wire 15" o.c. to extend into cavity of the two wythe wall. A two pronged hook tie shall be inserted into the eye holes creating a positive connection to restrain compression and tension. Lox All Adjustable Eye Wire HOHMANN & BARNARD. ]
- E. Wire Mesh: Wire Mesh: 1/4" mesh of galvanized steel wire (min. 16 gage) or galvanized metal lath, cut into strips 1-1/2" narrower than wall width where used. For use at intersection of masonry walls.
- F. Dovetail Anchors
- 1. Anchor Slots: 1 in. wide, 1 in. deep, 5/8 in. throat, 24 ga. galvanized steel. HECKMAN No. 100, HOHMANN & BARNARD, or equal.
  - 2. Anchors: Brick, minimum 1 in. wide by 3-1/2 in long, flat or corrugated. HECKMAN No. 103 or 104; HOHMANN & BARNARD, or equal.
- G. Reinforcing Steel - Bond Beam and Wall Reinforcement: Uncoated steel reinforcing bars; ASTM A615/A; ASTM A616, including Supplement 1; or ASTM A617/A, Grade 60.

- H. Partition Top Anchors: 12 gage galvanized steel plate with 7/16-inch diameter holes. HOHMANN & BARNARD PTA 422 or equal.

2.05 MISCELLANEOUS ITEMS

- A. Through-Wall Flashing: [Provide one of the following types:]
  - 1. Stainless Steel Core Flexible Flashing with Drainage Fabric (SSCFF).
    - a. Material: Composite with stainless steel with adhesive polymer fabric laminated to one stainless steel and non-woven drainage fabric laminated to opposing face with adhesive.
      - 1) Stainless steel: type 304, ASTM A240
      - 2) Polymer fabric; laminated back face to stainless steel core.
      - 3) Non-woven drainage fabric: Fabric laminated to front face stainless steel core.
    - b. Manufacturer: YORK MANUFACTURING, INC.; York Flash-Vent SS, STS COATINGS, INC.; Wall Guardian Venting Stainless Steel TWF, BUILDING MATERIALS WEST COMPANY, INC.; Evacu-Flash SS
    - c. Note: Eliminate cavity protection material if SSCFF used.
    - d. Note: Eliminate drip edge by terminating at brick face and sealing down the flashing if SSCFF used. However, provide drip edges above windows and doors for replacement ease.
- B. Sheet Metal Drip Edge: Fabricated from 0.015" thick by minimum 3" wide stainless steel with hemmed edge. Comply with requirements specified in Section 07 62 00 - Flashing and Sheet Metal.
  - 1. Product: HECKMAN BUILDING PRODUCTS, IPCO stainless steel drip edge, ILLINOIS PRODUCTS CORPORATION or HOHMANN & BARNARD, INC.
- C. Preformed Masonry Control Joint Filler
  - 1. General: Extruded rubber complying with ASTM D2240, general purpose grade.
  - 2. Flange: Where applicable, locate as required for the particular joint configuration.
  - 3. Manufacturer: Rapid Regular Control Joint by DUR-O-WALL; HOHMANN & BARNARD, or equal.
- D. Brick Cleaning Compound: PROSOCO Sure Klean 600 Detergent; or equal commercial cleaning solution by NATIONAL CHEMSEARCH or AMERICAN CALMAL that will not harm masonry or adjacent materials and is acceptable to the masonry manufacturer. Cleaners containing muriatic acid are not acceptable.
- E. Cell Vent: Polypropylene Model #QV Quadro Vent by HOHMANN & BARNARD; Model D/A 1006 by DUR-O-WALL or equal by HECKMANN. Color as selected by

Architect.

- F. Isolation Liners: Locate between steel columns and masonry. Asphalt impregnated cellular paper, similar to WILLIAMS PRODUCTS Columns Boxboard, 1/4" single thickness or 1/2" double thickness. Use double thickness except where wall dimensions do not permit, then use single thickness.
- G. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142" steel wire, hot-dipped galvanized after fabrication.
  - 1. D/A 811 DUR-O-WALL
  - 2. D/A 816 DUR-O-WALL
  - 3. No. 376 Rebar Positioner HECKMAN
  - 4. #RB Rebar Positioner HOHMANN & BARNARD
  - 5. #RB-Twin Rebar Positioner HOHMANN & BARNARD
  - 6. Double O-Ring Rebar Positioner MASONRY REINFORCING CORPORATION OF AMERICA
  - 7. O-Ring Rebar Positioner MASONRY REINFORCING CORPORATION OF AMERICA
- H. Adhesive Anchor Bolts
  - 1. In hollow CMU: Adhesive anchor systems with nylon or stainless steel screen inserts. Use 1/2 inch diameter anchors with 4-1/4 inch embedment. (Minimum allowable shear 900 pounds; minimum allowable tension 250 pounds/anchor.)
  - 2. In solid grouted CMU: Adhesive anchor systems. Use 1/2 inch diameter anchors with 4-1/4 inch embedment; (minimum allowable shear 2600 pounds; minimum allowable tension 2000 pounds/anchor).
- I. Cavity Protection Material: Minimum 1" thick, reticulated, nonabsorbent mesh, made from polyethylene strands and shaped to maintain drainage at weep holes without being clogged by mortar droppings.
  - 1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Mortar Net; MORTAR NET USA, LTD.
    - b. Mortar Break; ADVANCE BUILDING PRODUCTS
    - c. Mortar Net; MASONRY REINFORCING CORPORATION OF AMERICA.
    - d. Mortar Net; HOHMANN & BARNARD, INC.
    - e. CavClear Masonry Mat; ARCHOVATIONS
    - f. Mortar Stop; POLYTITE MANUFACTURING CORP.
    - g. Mortar Grab; IPCO PRODUCTS.

- J. Concrete Block Vents: Extruded aluminum; nominal 8" high x 16" long x 4" deep; clear aluminum finish. SUNVENT INDUSTRIES Model EX or equal by AIROLITE or INDUSTRIAL LOUVERS, INC.

**PART 3 EXECUTION**

**3.01 INSPECTION**

- A. Examine the substrates, structure, and installation conditions. Do not proceed with unit masonry work until unsatisfactory conditions are corrected.

**3.02 PREPARATION**

- A. Concrete Masonry Units: Lay masonry units dry. Do not wet concrete masonry units.
- B. Establish lines, levels, and coursing.
- C. Coordination: Identify items that are to be built-in to masonry wall as specified in other section of these specifications. Verify that these items are available prior to commencing masonry work in these areas. Coordinate sizes of required openings. Items include, but are not necessarily limited too:
  - 1. Access doors
  - 2. Recessed fire extinguisher cabinets
  - 3. Recessed toilet accessories

**3.03 INSTALLATION - GENERAL**

- A. Build walls to the full thickness shown. Build single wythe walls to the actual thickness of the masonry units, using units of nominal thickness shown or specified.
- B. Cut masonry units using motor-driven masonry saws to provide clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full-size units without cutting wherever possible. Provide 100% solid units where webs would be exposed.
- C. Construction Tolerance: Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:
  - 1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4" in 20 feet, nor 1/2" maximum.
  - 2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4" in 10 feet, nor 1/2" maximum.
  - 3. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4" in 20 feet, nor 1/2" maximum.



4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not vary from bed-joint thickness of adjacent courses by more than 1/8".
  5. For exposed head joints, do not vary from thickness by more than plus or minus 1/8". Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8".
- D. Openings: Form all chases and openings required for piping and other trades. After work is completed, close openings with masonry and seal around penetration.
- E. Seal all anchor penetrations and tears in the vapor barrier as a result of the work installed under this section.

### 3.04 ERECTION - CONCRETE MASONRY

#### A. Masonry

1. Layout walls in advance for accurate spacing of surface bond patterns, with uniform joint widths, and to properly locate returns and offsets. Avoid the use of less than half-size units at corners, jambs and other locations.
2. Lay up walls plumb and true to comply with specified tolerance. Provide courses level, accurately spaced and coordinated with other work.
3. Pattern Bond: Lay exposed concrete masonry in pattern indicated on drawings. Bond and interlock each course of each wythe at corners. Do not use units with less than 4" of horizontal face dimensions at corners.
4. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and slabs. Maintain 3/8" joint widths, except for minor variations required to maintain bond alignment.
5. Joints
  - a. Exposed: Cut flush and finish (tool) with hardened metal tool to form a concave compressed joint. Same methods and types of tools to be used by all masons working on project.
  - b. Concealed: Cut flush and trowel point.
6. Compress and cut joints flush for masonry foundation walls.

#### B. Horizontal Wall Reinforcement: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
  - a. Reinforcement above is in addition to continuous reinforcement.
4. Cut or interrupt joint reinforcement at control and expansion joints, unless

- otherwise indicated.
5. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
  6. Provide additional reinforcement continuous in first joint above openings and in first joint below openings not extending to floor. Extend additional reinforcement a minimum of 4'-0" beyond opening.
- C. Ground Faced CMU/ Veneer/Metal Stud Wall Ties: Install in accordance with manufacturer's instructions. Locate one tie per every two square feet of wall surface and in accordance to BIA Technical Notes No. 44B.
- D. Veneer/Cavity Wall Construction
1. Keep the air space clear and clean of all mortar droppings and other debris.
  2. Provide weeps spaced 24 inches apart.
  3. Provide cavity drainage protection or similar methods to ensure that weeps are clear of mortar droppings and drain to the building exterior.
  4. Make weep holes by methods subject to Architect's approval
    - a. Gray Mortar: Louvered PVC weep, similar to HOHMANN & BARNARD #343 located in brick head joints.
    - b. Colored Mortar: Cellular weep vents located in brick head joints.
    - c. Tube and Cotton Wick: Medium Density Polyethylene
  5. Provide top of wall weep ventilation with cellular vent.
- E. Door Frames: Fill all frames installed in masonry with mortar.
- F. Bearing Points: Where a lintel, bar joist or similar member bears directly on concrete masonry, fill the cores of the two blocks courses directly under the member with grout to a limit of 16 inches beyond the end of the member.
- F. Bearing Points
1. Lintels and Bar Joists: Where a lintel, bar joist or similar member bears directly on concrete masonry, fill the cores of the two blocks courses directly under the member with grout to a limit of 16 inches beyond the end of the member.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
- H. Control and Expansion Joints: Provide control joints for exterior and interior masonry construction in accordance with NCMA-TEK Bulletins 10-1A and 10-2B and BIA Technical Notes 18B.
1. Unless otherwise indicated, provide control joints in masonry walls at maximum 24 foot intervals for exterior walls, maximum 30 foot intervals for interior walls, and at intersections of walls, except corners.

- a. Exact locations as determined by the Architect if not specifically dimensioned.
- b. If drawings do not indicate all control joints based on these maximums, allow for additional joints to be determined by the Architect prior to commencement of masonry work.
- c. Locate control at steel columns.
2. Provide 3/8" wide control joints, unless otherwise indicated. For joints in exterior walls, build in control joint filler strips as masonry wall is laid up allowing 3/4" for sealant and backup on each side of wall. For interior control joints, no filler is required; rake joint approximately 3/4" deep and install sealant and backup. See Section 07 92 00, Sealants.
3. Do not carry horizontal joint reinforcement through control joint.
4. Maintain lateral support of continuous wall at control joint in concrete block backup walls by using control joint filler, tongue and groove type control joint block, or similar type approved method. In cavity walls, place metal "Z" wall ties 16" on-center vertically in brick on each side of control joint.
5. Maintain lateral support of intersecting interior masonry walls with wire mesh ties placed across joint between walls, spaced 16" on-center vertically.

I. Thru-Wall Flashing

1. Provide at the following locations:
  - a. In first course above steel supports and shelf angles.
  - b. In first course above lintels at louvers, windows and doors.
  - c. In first course above grade around entire building perimeter.
  - d. In exterior walls that project above adjacent lower roof.
  - e. Below sills of window, louver and similar type wall openings.
  - f. Below parapet wall caps.
  - g. Other through wall flashing conditions where indicated.
2. Ensure that flashings drain to exterior.
3. Prepare masonry surfaces smooth and free of projections which could puncture flashing.
4. Lay on slurry of fresh mortar and cover with mortar.
5. End Dams: Provide end dams at all locations where flashing terminates within a wall. Over openings, carry minimum 6" beyond end of steel lintel and turn up edges to form pan. All corners folded, not cut.
6. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
7. Top Edge Concealed Terminations: 8 inch minimum above drainage plane.
8. Seal around all penetrations with mastic before covering with mortar.
9. Joints
  - a. Install in longest lengths and with fewest joints possible but not less than 20 feet between joints.
  - b. Lap ends minimum 6 inches and seal with full bed of mastic.
10. Continue flashings around corners and other gaps in shelf angles to prevent discontinuity.
11. Continue flashing through expansion joints.

12. Provide weeps at all thru-wall flashing locations. Space weeps as specified hereinbefore.
  - J. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material specified herein.
  - K. Masonry, non-bearing walls carried to structure above: Terminate at normal joint width below surface and leave joint open for sealants.
    1. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Section 07 84 00, Firestopping.
  - L. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
  - M. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
  - N. Steel Lintels: Install steel lintels at all masonry opening, whether indicated on the drawings or not. Provide minimum bearing of 8" on each jamb, unless otherwise indicated.
- 3.05 MORTAR
- A. General
    1. Batch Size: Controlled so that all material used within two (2) hours.
    2. Mortar on Board
      - a. Keep well tempered with water so long as its cementing material has not started to set.
      - b. Do not retemper if initial set of cementing material has been reached, or if mortar has stiffened greatly.
    3. Anti-freeze Admixture: Not permitted.
    4. Water Repellent Admixture: Use with brick and concrete block exposed to exterior, mix as recommended by manufacturer.
  - B. Mixing
    1. Machine mix dry in a batch mixer with care taken in adding water to mix to avoid overwetting.
    2. Do not retamper in mixer at any time.
    3. Continue mixing for a minimum of five (5) minutes after all materials are in mixer.

- C. Recharging: Completely empty and clean mixer before recharging.

### 3.06 PROTECTION

- A. Brace all walls while in green condition.
- B. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
  - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

### 3.07 REINFORCED MASONRY INSTALLATION

- A. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.
  - 1. General: Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.
- B. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
  - 1. Comply with requirements of ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
  - 2. Use "Fine Grout" per ASTM C 476 for filling spaces less than 4" in one or both horizontal directions.
  - 3. Use "Coarse Grout" per ASTM C 476 for filling spaces 4" to 10" in both horizontal directions.
  - 4. Use 3000 psi concrete for filling spaces 10" or larger in both horizontal directions.
- C. Bond Beams: Reinforce as indicated and fill with grout. Position reinforcement accurately at the spacing indicated. Place horizontal reinforcement as the masonry work progresses.
- D. Reinforced Concrete Masonry Walls: Install and align grout block units to provide continuous vertical voids in walls. Install reinforcing steel as work progresses. Use horizontal bars to position vertical bars. Fill grout block units cores solid with concrete fill.

1. Place concrete fill in maximum 4'-0" vertical lifts. Recess top of fill minimum 1-1/2" below top of course to form a key with the following lift. Comply with NCMA TEK Bulletins 3-2, 3-3A and 14-2 recommendations.
2. Coordinate placement of reinforcement and concrete fill with cast-in-place concrete and precast concrete work to provide continuous vertical and horizontal reinforcement full height of indicated walls.

3.09 FIELD QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform source quality-control testing indicated below:
  1. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.
  1. Testing agency must be approved by Architect prior to their hiring.
- B. Testing Frequency: Tests and Evaluations listed in this Article will be performed during construction for each 5000 sq. ft. of wall area or portion thereof.
- C. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.
- D. Grout will be sampled and tested for compressive strength per ASTM C1019.
- E. Brick Tests: For each type and grade of brick indicated, units will be tested according to ASTM C67.
- F. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, units will be tested according to ASTM C140.
- G. Prism-Test Method: For each type of wall construction indicated, masonry prisms will be tested per ASTM C1314, and as follows:
  1. Prepare 1 set of prisms for testing at 7 days and 1 set for testing at 28 days.

3.10 REPAIR, POINTING AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged. Provide new units to match adjoining units and install in fresh mortar pointed to eliminate evidence of replacement.
- B. During the tooling of joints, enlarge all voids or holes, and completely fill with mortar. Point up all joints at corners to provide a neat, uniform appearance.
- C. Cleaning - Brick Masonry: Clean all exposed brick masonry. Cleaning agents and methods subject to Architect's approval. Protect all stone. Damaged materials and work replaced at Contractor's expense.

1. Before full-scale application, review manufacturer's product data sheets to determine the suitability of each product for the specific surfaces. Apply each masonry cleaner to test panel areas to determine dilution rates, dwell times, number of applications, compatibility, effectiveness, application procedures, effects of pressure rinsing, and desired results.
  2. Apply masonry cleaners and stain removers to test panels in accordance with manufacturer's written instructions. Allow 48 hours or until test panels are thoroughly dry before evaluating final appearance and results. Do not begin full-scale application until test panels are inspected and approved by the Architect.
  3. Test Area Requirements:
    - a. Size: Minimum 5 feet by 4 feet each.
    - b. Locations: As determined by the Architect.
    - c. Masonry Cleaners: Number of test panels as required to completely test each masonry cleaner with each type of substrate to be cleaned.
  4. Test all cleaning effluents generated by the masonry cleaning of the test panels to determine any hazardous characteristics. Comply with applicable federal, state, and local environmental regulations including testing, handling, treatment, containment, collection, transport, disposal, and discharge of hazardous wastes.
  5. Muratic acid cleaning of brick masonry not permitted. Install and protect installed brick masonry so that acid cleaning is not required at completion of the work.
- D. Cleaning – Concrete Masonry: During construction of exposed CMU, minimize mortar and grout smears on exposed surfaces. Dry brush CMU surfaces at the end of each days work and after final pointing. Remove mortar stains and dirt from exposed surfaces.
1. Cleaning Solutions: Where cleaning solutions are required, they shall be provided at no additional cost to the Owner. Cleaning solutions must be approved by Architect and spot tested prior to use.
- E. Area Cleaning: Clean floors of all mortar droppings, including floor surfaces of accessible chases.

### 3.11 MASONRY WASTE DISPOSAL

- A. Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Disposal as Fill Material: When approved by Geotechnical Engineer, dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.
  1. Crush masonry waste to less than 4 inches in each dimension.

2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 31 30 00, Earthwork. All fill material must be approved by Geotechnical Engineer.
  3. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- C. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

3.12 REPOINTING EXISTING WALLS

- A. Remove mortar to a depth of at least 1/2" with hand or power tool.
- B. When cutting is complete, remove all loose material with a brush or hose stream.
- C. Point joints with prehydrated Type N mortar consisting of 1 part Portland cement, 1 part Type S hydrated lime, 6 parts sand.
- D. Wet raked mortar joints thoroughly before applying fresh mortar. Allow water to soak into wall so no free-standing water is visible.
- E. Pack mortar tightly in thin layers until joint is filled, then tool to a smooth concave surface.

**END OF SECTION**



## **SECTION 05 12 00**

### **STRUCTURAL STEEL**

#### **PART 1 GENERAL**

##### **1.1 RELATED DOCUMENTS**

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

##### **1.2 SUMMARY**

- A. Section includes all labor, materials, equipment, special tools and services to complete Structural Steel and Other Steel work required for the Project, as herein specified, and as indicated on the Drawings, including but not limited to:
  - 1. All Structural Steel indicated, including design of connections not shown on the Drawings.
  - 2. All accessories, attachments, anchors and rough hardware for structural steel work. Accessories include anchor bolts, embed plates, deck support angles, etc.
  - 3. Other Steel indicated on the Structural Drawings (S series), including steel stud shear connectors, metal deck, stairs, treads, railings, floor plates, brick relief angles, masonry anchors to steel framing, wall girts, screen wall framing, elevator rail supports, sill angles, sump pit embeds and covers, partition supports and door frames of structural steel are included under this Section.
  - 4. Prime painting and galvanizing where indicated on the Drawings.
  - 5. Quality control, testing and inspection specified to be performed by the Contractor.
  - 6. Coordination with related and adjacent work shown on the Drawings.
  - 7. Setting of items built into cast-in-place concrete or unit masonry and grouting of base plates is not included in this section.
  - 8. Provide temporary guards on the steel frame at the perimeter of each floor and all floor and roof openings; verify scope with CM
- B. The Contract Documents do not differentiate between fabrication and erection work. Should fabrication and erection be performed by separate contractors, the fabricator is responsible for the scope of work of erector and is responsible for resolution of any disputes that may arise.
- C. Metal Deck work is to be performed by the Contractor of this Section, including submittals, erection, quality control, testing and inspection specified herein. See the related sections for additional requirements specific to joists and deck.
- D. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete.
  - 2. Section 04 00 00 - Unit Masonry.
  - 3. Section 05 30 00 - Metal Decking.
  - 4. Section 05 40 00 - Cold Formed Metal Framing.
  - 5. ~~Section 05 50 00 - Metal Fabrication.~~

6. Section **09 91 00 – Paints and Coatings**

1.3 REFERENCES

- A. Comply with the provisions of the following codes, specifications and standards; use the latest edition unless date is indicated. Modifications in this specification, when in conflict with the referenced codes, specifications and standards, shall take precedence.
1. "Kentucky Building Code" (KBC).
  2. American Institute of Steel Construction (AISC) ANSI/AISC 303-16: "Code of Standard Practice for Steel Buildings and Bridges," June 15, 2016, as modified by the project drawings and this specification; and modifications in Part 4 at the end of this section.
  3. ANSI/AISC 360-16: "Specification for Structural Steel Buildings" and including the "Commentary on the Specification for Structural Steel Buildings", July 7, 2016.
  4. Research Council on Structural Connections (RCSC): "Specification for Structural Joints using High-Strength Bolts", August 1, 2014.
  5. ASTM International (ASTM) Specifications and references as noted in this Section.
  6. American Welding Society (AWS) D1.1/D1.1M-2010: "Structural Welding Code – Steel."
  7. AWS-C5.4-93: "Recommended Practices for Stud Welding".
  8. ASTM A6/A6M-17: "Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling".
  9. International Code Council Evaluation Service (ICC-ES) AC193: "Acceptance Criteria for Mechanical Anchors in Concrete Elements".
  10. ICC-ES AC308: "Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements".
  11. Steel Structures Painting Council (SSPC) "SSPC Painting Manual": "Systems and Specifications" and "Good Painting Practice"
  12. American Galvanizer's Association (AGA) Recommendations and Suggested Specifications for Hot-Dip Galvanizing.
  13. OSHA Regulations, current edition.

1.4 QUALIFICATIONS

- A. Contractor must have a minimum of 5 years of successful experience in the type of work required and submit with his Bid evidence of qualifications required herein.
- B. Steel Fabricator:
1. 10 years of successful experience in the fabrication of structural steel.
  2. Completion of 10 projects of similar size and complexity within the last 5 years. Submit a list of projects and their locations. Each project listed is to have at least 70 percent of the steel quantity of the work being bid.
  3. The steel fabricator must be certified under the AISC Certification Program for Structural Steel Fabricators – Standard for Steel Building Structures. Evidence of current auditing by an independent, approved inspection agency that the fabricator has established quality control procedures comparable to the AISC program may be considered in lieu of AISC certification.
  4. Steel fabricator must have an established in-house quality control program for shop drawing production, material tracking, material inspection, welder certification, weld quality, and fabrication accuracy. Fabricator shall be registered

and approved per Section 1704.2.5 of the Building Code, and submit required certificate of compliance. Failure to meet these qualifications will require additional inspections prescribed in Building Code Chapter 17 to be performed by the Owner's inspection agency at the Contractor's expense.

C. Steel Erector:

1. 5 years of successful experience in the erection of structural steel.
2. Submit a list of 6 similar completed projects; include key personnel, and equipment.
3. The steel erector must be certified under the AISC Certification Program for Structural Steel Erectors – Standard for Structural Steel Erectors. Evidence by an independent, approved inspection agency that the erector has established quality control procedures, including weld testing, comparable to the AISC program may be considered in lieu of AISC certification.

1.5 SUBMITTALS

- A. The Contractor shall review submittals for compliance with the Contract Documents, accuracy, dimensions, fit-up, construct-ability, and coordination with other work. The structural engineer's review will be for general intent of strength and serviceability only.
- B. Submit for record with Bid evidence of Contractor's, Fabricator's and Erector's qualifications.
- C. Submit for record evidence of Steel Fabricator's and Erector's quality control programs, procedures and certifications showing conformance with Chapter 17 of the Building Code.
- D. Prior to preparing shop drawings, submit for record calculations of connections designed by the contractor, prepared, signed and sealed by a Professional Engineer registered in the state in which this project is located.
- E. Submit detailed drawings, include:
  1. Complete details and schedules for fabrication and shop assembly of all members.
  2. Complete details, schedules, procedures and diagrams for field erection.
  3. Limits of prime painted surfaces vs. bare steel, show also on overall plans.
  4. Evidence that shop drawings (piece and erection drawings) have been reviewed by the Fabricator's Professional Engineer prior to submittal.
  5. Layout and installation drawings for all anchor bolts and other items to be embedded in concrete or masonry work by others. Drawings shall dimension the locations of all embedded items noting pertinent tolerances for the installation.
- F. Prior to fabrication, submit for record two copies of producer's or manufacturer's specifications and installation instructions for the following items. Include laboratory test reports and other data for evidence as required to show compliance with these specifications (including specified standards). Indicate by transmittal form that copies of each applicable instruction have been distributed to fabricators, installers and erectors.
  1. Structural steel: Submit the mill report for each heat of steel used prior to the start of fabrication. Mill reports shall show chemical analysis to include C, Mn, Cr, Mo,

- V, Ni, Cu and full mechanical properties of the structural steel provided. For unsatisfactory mill test report, retest or reject steel.
2. High-strength bolts, including nuts and washers: Submit certification of inspection test report for each production lot indicating proof load, tensile strength and hardness of high strength bolts. For unsatisfactory test reports, retest or reject bolts.
  3. Welding materials and procedures: Submit written welding procedures for all welding on the project, both shop and field. Procedures for complete penetration welds shall include test records to verify the heat-affected zone and show that parent metal for the test meets the grade specified for the project. Welding sequence and procedures are to minimize the effect of weld shrinkage, residual stresses, and to maintain erection tolerances.
  4. Mechanical and adhesive anchors, include manufacturer's evaluation reports (ESR) and specific project locations and conditions where proposed for use.
  5. Primer paint and surface preparation procedures.
  6. Hot-dip galvanizing and surface preparation procedures
- G. During fabrication and construction, Contractor shall submit quality control, inspection and test reports immediately to the Owner's representative and inspector, with a copy to the structural engineer within one week. Include:
1. Welder certification for shop and field welders.
  2. Welding, fabrication and erection inspection reports.
  3. Welding verification inspection and test reports for all shop and field welds.
  4. Shear stud tests and installation reports.
  5. Bolt and anchor tests and installation reports.
  6. Contractor's weekly inspection report summary.
- H. Submit record drawings of the erected steel members to the Owner's representative.
- I. Submittals for record, informational submittals, compliance reports and inspection reports will not be reviewed or returned.

#### 1.6 CONTRACTOR DESIGNED CONNECTIONS

- A. The Contractor shall be responsible for the structural design and detailing of all connections not shown on the Drawings, in addition to detailing those connections shown on the Drawings. The structural design and detailing of connections shall be in accordance with the following provisions and those identified on the drawings.
- B. Design of all connections shall be under the direct supervision of a suitably qualified and experienced structural Professional Engineer, registered in the state in which this project is located, who shall sign and seal the shop drawings of the work for which he is responsible.
- C. The Contractor shall design connections using the concepts, specific configuration details, and typical connection notes indicated on the Drawings as minimum requirements.
- D. The Contractor shall prepare sketches of all connection details, with locations clearly marked on plans and elevations, and submit these in conjunction with pertinent design

notes and calculations for review by the Owner's structural engineer, prior to preparing and submitting related shop drawings.

- E. All beam connections shall be simple beam connections unless indicated otherwise on the drawings. Simple beam connections shall be designed for the reaction noted on the Drawings, or where no reaction is called out, for the reaction from the maximum uniform load capacity of the beam. Connections shall also meet the minimum requirements indicated on the Drawings.
- F. All gusset and brace member connections shall be designed for the member forces shown on the drawings, or full capacity of the members' flanges if no forces are shown. Connections shall also meet the minimum requirements indicated on the Drawings.
- G. Design of connections includes the analysis and design of connected material to determine requirements for stiffeners, doubler plates, etc. Even if doubler plates and stiffeners are not shown on the contract documents they may be required based on the Contractor's connection design and shall be included in the work.
- H. All member splices shall be designed to develop the full capacity of the smaller member.
- I. The Contractor may propose alternate connections to those shown on the Drawings by submitting sketches, design notes and calculations of all alternate connection details, with locations clearly marked on plans and elevations, at the beginning of the project. Acceptance is at the discretion and judgment of the Owner's structural engineer. Shop drawings submitted by the Contractor showing either details or alternate connections not previously reviewed in accordance with these provisions shall be subject to rejection.

#### 1.7 QUALITY CONTROL

- A. Personnel performing the work shall have experience relevant to anticipated conditions, materials, installation requirements and all special techniques involved. Contractor shall have an experienced foreman or superintendent who will be present while work is performed.
- B. The Contractor is responsible for and shall perform quality control, testing and inspection of all work as required by the Contract Documents, referenced codes, specifications and standards. Contractor shall employ qualified inspectors to perform inspections, tests and quality control daily. Submit reports weekly.
- C. The Contractor shall reject and replace work that is not in conformance.
- D. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure". All welding shall be performed by operators who are qualified for the types of welds used. Verify each operator's qualifications with Owner's inspector prior to using in production.
  - 1. Welders shall retake qualification test if, as determined by the Owner's representative, there is a reasonable doubt as to the proficiency of the welder. If the welder does not requalify he/she shall not perform welding on this project.
  - 2. The Contractor shall pay all costs associated with welder qualification.

- E. Qualify mechanical fasteners, mechanical anchors, adhesive anchors and installation processes in accordance with manufacturer's engineering reports and code recognized approval procedure. Installers shall be certified by the manufacturer or an independent organization. Verify each installer's qualifications with the Owner's inspector prior to using in production.
- F. Source quality control: All materials shall be Identifiable. Unidentifiable materials shall be tested or rejected.
  - 1. Materials delivered with certificate are classified as Identifiable; those without certificates are classified as Unidentifiable.
  - 2. Test material not identifiable by heat number and mill test, or another acceptable manufacturer's identification per ASTM A370-17. Testing to be performed by Contractor's testing agency as follows:
    - a. Shear connectors: Each lot of 100 studs; tensile tests on 3 finished studs per AWS.
    - b. Structural shapes and plates: From coupons taken from material; one tensile test and one bend test per 5 tons of each shape.
    - c. High strength bolts: Each lot of 100 bolts; tensile tests on 2 bolts in full size and one tensile test on a 1/2" diameter machined specimen.
    - d. Other materials: Test as directed.
- G. The Contractor shall arrange for review by the Owner's inspection agency. The Contractor shall not rely on the Owner's inspector for the Contractor's quality control. Contractor shall furnish Owner's inspector with the following:
  - 1. One complete set of fabrication and erection drawings.
  - 2. Material bills and mill test reports.
  - 3. Information regarding time, place of rolling and shipment of materials to shop.
  - 4. If requested, representative sample pieces for testing.
  - 5. Full and ample means and assistance for testing materials.
  - 6. Complete set of welding procedures.
  - 7. Welder qualifications.
  - 8. All manufacturers' installation instructions.
  - 9. Anchor installer qualifications.
  - 10. AISC fabricator certification documents QA/QC manual and most recent AISC audit.
  - 11. AISC erector certification documents QA/QC manual and most recent AISC audit.
  - 12. Qualifications for Contractor's quality control personnel and independent testing agency.
  - 13. Reports for all quality control, tests and inspection by Contractor.
- H. Structural inspections required by Chapter 17 of the Building Code shall be performed by an approved inspector retained by the Owner.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Material storage: Protect structural steel members and packaged materials from corrosion and deterioration. Store off ground and pitched to drain off water.

- B. Do not store materials on the structure in a manner that might cause distortion or damage to the members or the supporting structures. Repair or replace damaged materials or structures as directed.
- C. Deliver welding electrodes to job in unbroken packages bearing name of manufacturer. Special handling for electrodes is required per AWS. Provide and use an oven for electrodes requiring continuous drying prior to use.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

#### **A. Structural steel:**

- 1. Wide flange shapes: ASTM A992 (Fy 50ksi).
- 2. Steel pipes: ASTM A53, Type E or S, Grade B (Fy 35ksi). Spiral Pipe is not permitted.
- 3. Hollow structural sections (HSS): ASTM A500, Grade C (Round Fy 46ksi; Square and rectangular Fy 50ksi).
- 4. Other rolled shapes, plates and bars: ASTM A36 (Fy 36ksi) unless noted otherwise.
- 5. Plates and bars noted Grade 50: ASTM A572 (Fy 50ksi).
- 6. All steel to be welded shall conform to chemical and metallurgical limitations specified in AWS D1.1 and D1.3.

#### **B. Threaded fasteners:**

- 1. Anchor rods: ASTM F1554, Fy 36ksi, minimum. Supply all anchor rods with two heavy-hex nuts, one nut to be used for base plate leveling, unless otherwise shown.
- 2. High strength anchor rods (where noted): Dywidag Thread bar (Grade 160) conforming to ASTM A722. Threads shall be deformed, not cut, conforming to ASTM A615. Couplers and nuts, including spherical washer and nuts, shall be supplied from a single manufacturer. Alternative supplier is Williams Form Anchor High Strength Anchor Bolts (Grade 150) only one size larger to give equal or greater strength than specified Dywidag. All material, whether Dywidag or Williams', shall be designed for cyclic loading, to temperature extremes of (-20) degrees F.
- 3. Structural bolts: ASTM A325 heavy-hex structural bolts, heavy-hex nuts and hardened washers, quenched and tempered type 1 medium-carbon steel. Use tension control assemblies conforming to ASTM F1852 everywhere access permits. For all bolts unless noted otherwise.
- 4. Structural bolts noted A490: ASTM A490 heavy-hex structural bolts, heavy-hex nuts and hardened washers, quenched and tempered type 1 alloy steel. Use tension control assemblies conforming to ASTM F2280 where access permits. Use only where A490 bolts are noted on the drawings or acceptable to the engineer of record by written request.
- 5. Where access prevents the use of a tension control bolt, install bolt(s) with load indicator washer conforming to ASTM F959, in accordance with "Specification for Structural Joints Using High-Strength Bolts" (12-31-09), paragraph 8.2.4, and mark bolt(s) for inspection. Load indicator washers shall be self-indicating to allow

visual observation, and provided with 1 or more additional flat washers, based on hole type, as required by the manufacturer.

C. Welding electrodes:

1. Use electrodes as required by AISC "Specification for Structural Steel Buildings" and the AWS Code. As minimum use E70 XX electrodes, low hydrogen.
2. For complete penetration welds of beams and columns, use E70TG-K2 electrodes or better.

D. Steel stud shear connectors: ASTM A108 or A29, Grades 1010 - 1020, Type B, and AWS D1.1.

E. Mechanical and adhesive anchors: ICC-ES approved with current ESR for cracked concrete, zinc coat unless noted otherwise, galvanize, sherardized or use stainless steel where exposed to weather. Type and embedment depth into concrete as indicated on the drawings, if not shown embed 8 x diameter, but never less than the manufacturer's recommended standard embedment. Manufacturers may include:

1. Hilti, Inc.
2. Powers Fasteners, Inc.
3. Simpson Strong-Tie Company, Inc.

F. Galvanizing: ASTM A123. Galvanize bolts and washers connecting galvanized members per ASTM A153, Class C. Touch up with galvanizing repair compound.

G. Galvanizing repair: Zinc rich galvanize repair compound containing 90% minimum zinc by weight in the dried film. Comply with DOD-P-21035 or The Society for Protective Coatings, Paint Specifications No. 20 (SSPC-PS 20).

H. Structural steel primer paint: One coat rust inhibitive primer, gray. Paint shall be weldable with negligible effect on weld integrity. Where steel is AESS or field painted: One coat of zinc rich primer, refer to Specification **09 91 00 Paints and Coatings**, and verify compatibility with topcoats.

## 2.2 FABRICATION

A. The fabricator shall track materials, assemble, inspect and test the work under supervision of qualified quality control personnel, who shall ensure conformance with established written procedures to meet the design requirements. Inspector shall make written daily reports of progress, deviations, deficiencies and corrections, and confirm work is satisfactory. Submit reports weekly.

B. General:

1. Fabricate items of structural steel in accordance with this specification, the referenced codes and standards, the contract design drawings and the final reviewed shop drawings.
2. Detail and fabricate steel to allow for erection in compliance with OSHA regulations. Complete detailing for compliance, including modification of details shown on the contract drawings where required.
3. Provide camber in structural members as shown. Unless otherwise shown, fabricate beams with mill camber up.



4. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
  5. Where finishing is required, complete the assembly, including connections and welding of units, before start of finishing operations.
  6. Furnish main steel members in one piece without splicing unless otherwise shown or approved.
  7. All exterior hollow steel members shall be completely sealed air tight with welded plates.
  8. Provide holes for drainage in any exterior members that will collect and hold water, either during construction or in final structure.
  9. Seams in hollow structural shapes shall be oriented away from public view.
  10. Plates that are subjected to axial tension shall be oriented with the roll direction as shown on the Drawings. Where not shown, orient the roll direction nominally parallel to the direction of primary tensile stress in the plate.
- C. Connections:
1. Provide welded shop connections unless otherwise shown.
  2. Provide bolted field connections unless otherwise shown.
  3. Provide high-strength bolts for all bolted connections.
  4. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.
  5. Comply with AWS D1.1 Code for procedures, preheat, appearance and quality of welds, including methods used in correcting welding work. Assemble and weld built-up sections by methods that will produce true alignment of axis without warp.
- D. Provisions: Provide holes, weld nuts, welded studs, etc., required for securing other work to structural steel and for the passage of other work through steel framing members as required.

## 2.3 FINISHING

- A. Galvanize structural steel where indicated on the Drawings, including all exterior plates and shapes, mechanical support frames, ledge angles, lintels, and lintel plates.
1. Clean steel to be galvanized of foreign substances per ASTM A385. Power tool clean all welds and adjacent areas to remove flux and splatter before galvanizing.
  2. Provide 2.3-oz./sf zinc coating per ASTM A123.
- B. Prime paint structural steel where indicated on the Drawings, do not paint at field weld locations or slip critical faying surfaces. Do not paint galvanized steel or steel which is to be fireproofed, U.N.O.
1. Surface Preparation (after SSPC SP-1 Solvent Wipe):
    - a. Where standard primer indicated - SSPC SP-3 "Power Tool Cleaning."
  2. Immediately after surface preparation, apply structural steel primer paint in accordance with the manufacturer's instructions and at a rate to provide a uniform dry film thickness of 2.0 mils. Use painting methods that will result in full coverage of joints, corners, edges and all exposed surfaces. No sags or runs permitted on steel that will be exposed in the finished work.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Establish permanent benchmarks, in addition to those provided, as needed for accurate erection of structural steel.
- B. Field survey and measure all existing conditions prior to preparation of shop drawings. Employ a licensed land surveyor for all steel erection work.
- C. Check elevations of concrete bearing surfaces and locations of anchor bolts and similar devices before fabrication work and report dimensional discrepancies to the Owner's representative. Do not proceed with fabrication until corrections have been made or until compensating adjustments to structural steel have been approved by the Owner's structural engineer.
- D. Furnish templates and detailed setting drawings as needed to ensure accurate positions of anchors.
- E. Verify positions of anchor bolts before fabrication of steel. Report deviations from design locations and submit written recommendations for corrections.
- F. Notify the Owner's representative in writing of conditions that would hinder proper and timely installation, or impair performance of finished work.

#### **3.2 INSPECTION BY CONTRACTOR**

- A. Quality control, testing and inspection by Contractor for fabrication and erection shall conform to requirements of the Contract Documents, referenced codes, specifications and standards; and the following:
  - 1. Inspection by Contractor shall be at Contractor's expense, by a testing agency or qualified inspector other than that employed by Owner, and shall be performed before Owner's inspection of material involved.
  - 2. Contractor shall submit weekly written inspection report summaries to the Owner's representative, inspector, and structural engineer. In general, these reports shall:
    - a. Verify that welders are certified.
    - b. Confirm use of qualified welding procedures and:
      - 1) Welding equipment is used per manufacturer's recommendations.
      - 2) Proper use of drying oven and preheating.
      - 3) Fit-up and structural steel compliance with the specified dimensional standard.
      - 4) Proper use of run-out plates.
    - c. Inspect every weld for quality and conformance. Systematically record welds, include:
      - 1) Location and type of weld.
      - 2) Weather conditions during welding.
      - 3) Identification marks of welders.
    - d. Include shear studs, bolts, anchors and other items.
    - e. Report all defects and deficiencies.
    - f. Report and describe how corrections were made.

3. Acceptance criteria used for the inspection of welds shall be as specified in AWS D1.1.
- B. Visually inspect all material for defects before and after cleaning. Material with visible defects shall be rejected.
- C. Penetration welds: Inspect all (100%) complete and partial penetration welds visually. Inspect all (100%) complete penetration welds by ultrasonic or radiographic tests for entire length of weld. All inspections to occur a minimum of 24 hours after completion of welding.
  1. Material that fails testing shall be corrected and re-tested over entire length of weld until satisfactory results are achieved.
  2. Ultrasonic testing shall be performed by a specially trained, qualified technician to operate equipment, examine welds, and maintain a record of welds examined, defects found, and dispositions of defects.
  3. When ultrasonic indications arising from weld root can be interpreted as either a weld defect or backing strip, the backing strip shall be removed and the weld shall be re-tested.
  4. Ultrasonic instrumentation shall be calibrated by technician to evaluate the quality of welds per AWS D1.1.
  5. Other methods of inspection, for example, x-ray, gamma ray, magnetic particle, or dye penetrant, may be used on welds if acceptable to the Owner's structural engineer.
- D. Fillet welds: Inspect all (100%) shop and field fillet welds visually for proper size, quality of weld and placement per reviewed shop drawings. Inspect 5% of a mix of field and shop welds by magnetic particle method, ASTM 109.
- E. Shear studs: Test and install as specified in AWS D1.1 requirements for stud welding.
- F. High strength bolted connections: At beginning of bolting operations, verify bolt installation techniques and test bolts in field conditions for proper pretension per manufacturer's requirements. Retest when changes in bolt lots, lubrication and weather exposure conditions occur. Inspect all bolted connections for bolt size, quantity, type, and tension.
- G. Mechanical and adhesive anchors: Verify installers are certified and materials are used in conformance with manufacturer's recommendations. Observe hole preparation and installation technique at all anchors as work progresses. Proof test 5% of all anchors in each condition, distributed throughout the project, and at least 1 anchor in each steel framing connection. Amount of testing shall be increased if failures occur.

### 3.3 INSPECTION BY OWNER

- A. The Owner will engage an independent inspection agency to perform shop and field verification inspection services in accordance with referenced standards. The Contractor shall schedule and coordinate inspections.
  1. The Owner will pay costs of initial inspection.
  2. Material that fails inspection shall be corrected by Contractor and re-inspected until satisfactory results are achieved.

3. The Contractor shall pay costs incurred by Owner's inspection agency, architect, and/or engineer for re-inspection of corrections made because of failed initial tests.
  4. Inspection may be performed in shop or field.
  5. Contractor shall perform all necessary preparatory work for inspection such as cleaning, marking and removal of back-up bars, if needed, without additional costs.
  6. Acceptance criteria used for the inspection of welds shall be as specified in AWS D1.1.
- B. Inspections do not relieve Contractor of responsibility for contract compliance. The Owner's representative shall have the right to inspect or test work and reject faulty materials of workmanship at any time before final acceptance.
- C. General:
1. Review Contractor's quality control program.
  2. Review Contractor's fabrication and erection inspection reports for compliance with the requirements of AWS D1.1 and Inspection by Contractor, above.
  3. Verify welder's certifications.
  4. Provide required verification inspections.
  5. Record types and locations of all defects discovered, report such discoveries to Contractor, and record corrections performed. Reports will be made not less than weekly to the Owner's representative.
- D. Penetration welds: All (100%) complete and partial penetration welds shall be visually inspected. Twenty percent (20%) of complete penetration welds shall be inspected ultrasonically for the entire length of weld. Columns, beams and plate material perpendicular in connections with penetration welds will be checked for lamellar tears. Further inspection may be required if unacceptable welds or material are found. Contractor shall pay cost of such additional inspection. Rejection of any portion of a weld shall require re-inspection of 100% of that weld after repair.
- E. Fillet welds: Twenty percent (20%) of the field-placed fillet welds shall be visually inspected. Five percent (5%) of shop-placed welds shall be visually inspected to verify fabrication quality control. Inspector is to verify placement of welds per reviewed shop drawings, as well as proper size and quality of weld.
- F. Shear studs: At start of shear stud installation, Owner's inspector shall observe construction installation and the Contractor's quality control, specified in AWS D1.1, (requirements for stud welding) and perform the following additional requirements:
1. 100% of the first 100 studs and 50% of the next 200 studs installed shall be bend tested to a 15-degree angle. If more than 4 studs fail, installation shall cease until installation procedures have been adjusted to achieve satisfactory results, and Contractor shall bend test all studs installed to date.
  2. For balance of job, bend tests at least 10% of all field-applied shear studs. A failure rate of not more than 2% of studs tested will be acceptable.
  3. Contractor shall correct failed stud installations.
  4. Owner's inspector shall check stud installation using the contract drawings and reviewed shop drawings to verify quantity and location of studs.
  5. If operators or equipment are changed or the deck becomes wet, testing shall revert to that at the beginning of the project.
- G. High strength bolted connections:

1. Observe Contractor's testing and installation techniques meet manufacturer requirements.
  2. Visually inspect all bolted connections for bolt size, quantity, type, and tension. Inspection shall also confirm that bolts' threads are not in the shear plane where required.
- H. Mechanical and adhesive anchors: Verify installer certification. As work progresses, observe installation for conformance with manufacturer's recommendations and witness Contractor's proof testing.
- I. Remedies: Defective material shall be removed and replaced by the Contractor unless corrective procedures are permitted by the engineer. Corrections shall be tested at Contractor's expense until satisfactory results are achieved.

### 3.4 OXYGEN (FLAME) CUTTING

- A. Manual oxygen cutting shall be done in the shop only and only with a mechanically guided torch. Alternatively, an unguided torch may be used provided the cut is not within 0.5 inches, of the finished dimension and the final removal is completed by chipping or grinding to produce a surface quality equal to that of the base metal at cut edges.
- B. Control process to prevent excessive hardening of edges of steel where material is to be welded or is subject to axial tension.
- C. Clean and repair all cut edges by welding and/or grinding to remove all gouges, cuts, burrs, and jags to meet the requirements of AWS D1.1.
- D. Re-entrant cuts shall have as large a radius as possible without over cutting.
- E. The use of oxygen-cut holes for bolted connections is not permitted under any circumstances. Violation will be cause for the rejection of any pieces in which oxygen cut bolt holes exist.
- F. Oxygen cutting of structural steel in the field is not allowed except with the written consent and approval of the Owner's structural engineer.

### 3.5 BASE PLATES AND ANCHORS

- A. Furnish anchor rods, and other items built into cast-in-place concrete or unit masonry to appropriate installer, together with template and detailed setting drawings required to assure accurate positioning of the items.
- B. Templates, furnished by the Contractor for all anchor rods, shall be used to set the anchors. Templates shall be fabricated from steel plate, minimum thickness 1/8". The installer is to check carefully the setting of the bolts to the proper position prior to placement of concrete. Anchor bolts shall have nuts and washers. Damaged threads shall be repaired or re-cut to permit full tightening of nuts.
- C. Anchors, embed plates and other items shall not be welded to reinforcing steel.

- D. Base plates supported on concrete, whether shop attached or shipped loose, shall be furnished with and set upon leveling nuts. Base plates shall have holes for bleeding off air during grouting.
- E. Setting base plates;
  - 1. Prior to setting, clean existing and new concrete surfaces and roughen with bush hammer to improve bond. Clean the bottom surface of the base plates. Chip out any areas required to set shear lugs, making sure that the reinforcing steel is not damaged.
  - 2. Tighten anchor bolts after the base plates have been positioned and leveled. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the base plate.

### 3.6 BOLTS

- A. Assemble joint using drifts to obtain correct alignment.
- B. Fit bolts. Use hardened washers under the turned part. Lubricate bolts to prevent nuts seizing on the bolts. Lubricate with a liquid high-pressure lubricant and apply only to the outstanding threads after the bolts have been inserted through the steel work, taking care to prevent lubricant getting between the plies of the joint.
- C. Tighten bolts sufficiently in an appropriate sequence to bring joint surfaces into uniformly close contact.
- D. Pretension all high strength bolts to the appropriate levels using tension control bolts or load indicator washers.
- E. Mark each bolted connection when all bolts in the connection are prestensioned. Do not touch-up paint or cover until bolts have been inspected. The inspector shall mark connections that have been inspected.

### 3.7 MECHANICAL AND ADHESIVE ANCHORS

- A. Post-installed anchors into concrete shall only be used as shown in the structural details, and only as submitted and reviewed. They shall not be used where cast-in-place anchors are required.
- B. Adhesive anchoring shall not be used in overhead or upward conditions. Adhesive anchors in near horizontal positions shall use a hybrid adhesive.
- C. Anchors shall be ICC-ES approved with current ESR for cracked concrete, zinc coat unless noted otherwise, galvanize, sherardized or use stainless steel where exposed to weather.
- D. Anchor size, type, embedment depth into concrete, edge distances and spacing are crucial, and shall be as indicated on the structural drawings. If not shown, embed 8 x diameter, but never less than the manufacturer's recommended standard embedment, with edge distances at least 8 x diameter and spacing at least 12 x diameter.
- E. The Contractor shall arrange for a representative of the manufacturer to provide onsite installation training for their products. Adhesive anchor installers shall also be certified

by a recognized program, such as by ACI and CRSI. Submit documentation of training and certification of personnel prior to performing such work. Provide copy to the Owner's inspector.

- F. Holes into concrete must not interfere with reinforcing bars. The Contractor shall review the structural drawings and use ferro-scan, chipping or other means to locate reinforcing bars in the area. Space holes to fit around rebar and fabricate fixture to match.
- G. Install in strict accordance with the manufacturer's ESR, written instructions and recommendations. Holes in concrete shall be the proper size and thoroughly cleaned with all dust removed. Drill holes using a hollow bit and functioning vacuum system, then brush and blowout with compressed air.
- H. Install into dry concrete in clean, dust free holes using method and procedure that meets manufacturer's recommendations including temperature range, humidity, installation time and cure time. Follow the manufacturer's printed installation instructions. Instructions must be included in the anchor packaging.
- I. Provide standard size holes in the fastened steel element (1/16" larger than anchor diameter). Mark and drill all holes in the concrete before setting steel. Some anchors may be set after steel is in place to allow some alignment. Do not oversize holes. Use washers beneath nuts.
- J. Contractor shall perform quality control, inspect and test anchors.
- K. When exposed to view in the final structure, bolts shall be of a length that will extend entirely through but not more than 1/4-inch beyond the nuts unless otherwise shown on the drawings.

### 3.8 WELDING (APPLIES TO BOTH SHOP AND FIELD WELDS)

- A. Weld using only qualified and approved AWS procedures. Use drying oven for electrodes and preheat steel per AWS requirements.
- B. Weld in manner to prevent warping or distortion of finished product. Use jigs that will not restrain piece from moving during welding or cooling after welding. Sequence weld passes at a joint to prevent excessive heat build-up or cause shrinkage cracks to form. Adequately peen and brush joint after successive passes to prevent slag inclusions, open pockets, and inadequate fusion.
- C. Provisions shall be made in detailing of lengths of members for dimensional changes as a result of shrinkage stresses so as to provide required finished dimension.
- D. During assembling and welding, hold components with adequate clamps or other means to keep parts straight, accurately aligned and positioned, and in close contact. Plan sequence of field welding to minimize locked-in stresses and distortion.
- E. Provide adequate screening from wind for field welding.
- F. Cut out defective welds or parts of welds with a chisel or air arc, and re-weld.

- G. Tack welds and temporary welds made in material that will be subject to tension or exposed-to-view in the final structure shall be removed and ground smooth.
- H. Fillet weld sizes shall comply with the minimum requirements of the AWS D1.1 Code regardless of smaller sizes being noted on the contract design drawings.
- I. Where structural steel members are to remain exposed in the finished work, welds exposed to view shall be uniform and smooth. Penetration welds shall not project more than 1/16" above the adjacent surfaces where exposed to view. Grind welds if necessary to meet this provision.
- J. Remove run-off tabs and grind surfaces smooth where the tabs interfere with architectural treatment or are exposed-to-view in the final structure. Remove backup bars where exposed to public view in the completed structure.
- K. All exposed to public view or to weather welds shall be continuous. In the event that an intermittent weld is specified, provide seal welds between.
- L. Heavy sections and those weldments having a high degree of restraint must be welded in a sequence with the proper preheat such that no permanent distortion occurs. Submit a welding sequence for review for these types of connections.
- M. Splices of members in tension, all members of moment frames, and all bracing members of braced frames that are made from plates more than 1½" thick or ASTM A6 Group 4 or 5 rolled shapes shall develop the force due to the design load, but not less than 50% of the effective strength of the member. A smaller percentage may be used only if it is justified by engineering analysis that considers other factors including handling, shipping and erection.

### 3.9 ERECTION

- A. Comply with this specification, the referenced codes and standards, the contract design drawings, and the final shop drawings. Comply with requirements of governing authorities, including requirements for work above public streets and sidewalks.
- B. Provide all temporary shoring and bracing members as required, with connections of sufficient strength to bear imposed loads, including all construction loads and Building Code wind loads. Comply with FM bulletin I-7:
  - 1. The structural steel framework is "non-self-supporting" and therefore requires temporary support bracing. Do not remove temporary support members and connections until the structure is complete and functioning as the designed unit. The unit is complete when all structural steel and metal deck is completed, and supporting concrete, including walls, floor diaphragms and slabs on metal deck are placed and cured.
  - 2. Members and connections shown and reviewed via the shop drawing process are analyzed only for loads due to the final structure. Loads imposed on the connections and members during the erection process, and safety of erection of same, shall be responsibility of the structural steel Contractor.
- C. Provide temporary planking and working platforms as needed for the work. Provide temporary guards on the steel frame at the perimeter of each floor and all floor and roof openings.



D. Field assembly:

1. Set structural frames accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignments.
2. Level and plumb individual members of the structure within specified AISC tolerances, unless more restrictive tolerances are specified on the drawings.
3. Splice members only where shown or specified.
4. On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth.
5. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignments and the removal of paint on surfaces adjacent to field welds.
6. Do not enlarge unfair holes in members by burning or by use of drift pins except in secondary bracing members. Ream holes that must be enlarged to admit bolts. Where a hole is required to be enlarged by more than 3/32-inch ream to and use the next larger bolt size.
7. Do not use gas cutting torches in the field for correcting fabrication errors, except on secondary members that are not under stress. Finish gas-cut sections equal to a sheared appearance.

E. Shear connectors: Inspect composite deck installation before installation of shear studs and report adverse conditions to the Owner's representative. Deck shall be in continuous contact with top of beam flanges, embossing flattened or removed, and no lap joints. Do not start work until such conditions are corrected. Start of work is acceptance of conditions and responsibility for corrections.

1. Areas of beams to which studs are welded directly shall be free of loose mill scale, and heavy rust that would adversely affect welding. Where studs are to be welded through metal deck, top flanges of beam shall be free of dirt, moisture and debris before installation of deck. Remove water in deck flutes so that it is not trapped between deck and beam.
2. Field weld studs to structural members after steel framing and metal deck are in place.
3. Workmanship shall be in accordance with the AWS D1.1 Code. Quality control, including inspection and testing, shall be in accordance with this specification and AWS D1.1 Code.

3.10 CLEANING

- A. Following erection, clean all steel work of mud and dirt accumulated during erection. Thoroughly clean and remove dirt, debris, oil, water, and other foreign material from steel and leave ready for painting or fireproofing.
- B. Field coat all damaged and abraded areas of galvanized steel with galvanizing repair compound applied per manufacturer's instructions.
- C. Field prime paint all welded, damaged and abraded areas and previously unprimed steel at welds, slip critical connections, etc. with same material used for shop painting.

## **PART 4 ADDITIONAL REQUIREMENTS**

### **4.1 MODIFICATIONS TO THE AISC CODE OF STANDARD PRACTICE**

- A. Modifications to the AISC Code of Standard Practice are described throughout the Contract Documents and within this Section. Requirements of the Contract Documents that modify or conflict with referenced standards shall take precedence over the standard. Where a numbered paragraph is noted below, the requirements of said paragraph in the AISC "Code of Standard Practice for Steel Buildings and Bridges", June 15, 2016, and its Commentary are deleted and the requirements noted herein shall apply.

1.4.1 Contract documents for structural work shall be issued as printed or printable contract documents. Requirements shall be the plain text and drawings printed on the documents. Digital information in any electronic file or model shall not be used in lieu of or for augmentation of the printed contract documents.

1.8.1 (a) Steel Contractor shall provide, install and remove any shoring necessary for the installation of new structural steel.

1.8.3 Fabricator shall survey and determine existing dimensions and elevations required for structural steel work or arrange for field verification through the CM, with no additional cost to the Owner.

3.1 (j) Dimensions and elevations for structural steel may require coordination with architectural components, mechanical requirements, and existing conditions and may not be completely shown on the structural drawings.

3.1.1.1 Connections shall be as indicated in the design documents with engineering design and detailing of all parts, copes, stiffeners and welds completed by the Fabricator using option 2 and option 3.

3.1.1.2 Should connection configurations differing from the design documents be needed, Fabricator shall propose and submit details prior to shop drawing preparation. The submittal shall clearly define the location of all connections submitted for review. See Section 4.2.3.

3.1.1.3 If additional information or clarifications regarding connections is desired, the Fabricator shall contact the structural engineer of record.

3.1.2.1 Connection design shall account for concentrated forces using option 3B. Even if reinforcement details and quantities are not shown on the design documents, reinforcement may be required by connection design and shall be included in the work and bid.

### **3.2 Architectural, Electrical and Mechanical Design Drawings and Specifications**

Architectural, Electrical and Mechanical Drawings may be used as a supplement to the Structural Drawings to define detail configurations and construction information, including dimensions and locations.

### **3.5 Revisions to Design Drawings and Specifications**

Revisions are addressed in Section 9.3

### 3.6 Fast-Track Project Delivery

When it is required that a project be bid before the requirements of Section 3.1 can be met, the Owner may provide sufficient information in the form of scope, drawings, weights, outline specifications, and other descriptive data to enable the fabricator and erector to prepare a knowledgeable bid. Construction shall not commence until drawings are issued for construction, any adjustments to the bid is made and written notice to proceed is given by the Owner.

#### 4.2.4 Legibility of Drawings

Drawings shall be clearly legible and drawn to an identifiable scale that is appropriate to clearly convey the information, but not less than 1/8" to the foot, unless a smaller scale is approved by the Owner's representative.

### 4.4 Review of Shop Drawings

Shop drawings shall be made by the Contractor and shall be submitted for review. The architect and engineer will endeavor to complete their review of shop drawing submittals within 14 days of engineer's receipt of submittals for those shop drawings deemed critical; other shop drawings, 28 days. Shop drawings shall be returned noted: "No exceptions noted," or "Exceptions noted," or "Exceptions noted, revise and resubmit." Fabrication of material prior to the receipt of shop drawings for that material noted "No exceptions noted" or "Exceptions noted" shall be at the Contractor's risk.

4.4.1 Review of shop drawings does not relieve the Contractor of the responsibility for accuracy of detail dimensions; the general fit-up of parts to be assembled in the field; the ability to erect the material; the adequacy of any members or connections designed by the Contractor; or the Contractor's safety measures.

4.4.2 Any notations made on the shop drawings or answers to a Request For Information (RFI) do not authorize additional compensation for the Contractor without the issuance of a formal change order.

### 4.5 Fabrication and/or Erection Drawings Not Furnished by the Fabricator

Fabrication and erection drawings shall be made by the Fabricator or his subcontractor and shall be the responsibility of the Fabricator.

9.3.1 Revisions to the structural steel requirements are made by issuance of new documents, reissuance of existing documents, answers to RFIs, or by annotation of shop or erection drawings.

9.3.2 A revision to the contract price is made by formal change order.

## END OF SECTION

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## **SECTION 05 30 00**

### **METAL DECKING**

#### **PART 1 GENERAL**

##### **1.1 RELATED DOCUMENTS**

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

##### **1.2 SUMMARY**

- A. Metal Deck work shall be performed by or under the Contractor of Section 05 12 00 - Structural Steel, and as specified in Section 05 12 00, with the additional requirements herein.
- B. Section includes all labor, materials, equipment, special tools and services to complete Metal Deck Work required for the Project, as herein specified, and as indicated on the Drawings, including but not limited to:
  - 1. The extent of metal decking, including basic layout and type of deck units is indicated on the Drawings.
  - 2. Performance requirements.
  - 3. All floor decks.
  - 4. All roof decks.
  - 5. All fasteners and accessory items required to make a complete installation.
  - 6. Detailing of metal deck and accessories.
  - 7. Installation of all metal deck and accessories including roof sump pans and reinforcing for all openings up to but not exceeding 12 inches by 12 inches.
  - 8. Repair of deck finishes.
- C. Metal deck serves other functions in addition to resisting directly applied loads. The manufacturer shall review the use, details and method of installation of his product as indicated and shall disclose to the Owner's representative any and all deviations from his recommended use and method of installation and shall also make recommendations for the use and method of installation of his product to achieve the intended purpose and result. Such disclosures shall be made within the time stipulated for the submission of shop drawings.
- D. Related Sections:
  - 1. Section 03 30 00 - Cast-in-Place Concrete.
  - 2. Section 05 12 00 - Structural Steel
  - 3. Section 05 40 00 - Cold Formed Metal Framing.
  - 4. ~~Section 05 50 00 - Metal Fabrications.~~
  - 5. Section 09 91 00 - Paints and Coatings.
  - 6. Roofing and Insulation.

### 1.3 REFERENCES

- A. Comply with the provisions of the following codes, specifications and standards; use the latest edition unless date is indicated. Modifications in this specification, when in conflict with the referenced codes, specifications and standards, shall take precedence.
1. "Kentucky Building Code" (KBC).
  2. American Iron and Steel Institute, AISI S100-16: "North American Specification for the Design of Cold-Formed Steel Structural Members", October 2016.
  3. American Welding Society (AWS) D1.1/D1.1M 2010: "Structural Welding Code - Steel".
  4. AWS D1.3/D1.3M 2008: "Structural Welding Code - Sheet Steel".
  5. Steel Deck Institute (SDI), ANSI/SDI C-2017: "Standard for Composite Steel Floor Deck – Slabs".
  6. ANSI/SDI T-CD-2017: "Test Standard for Composite Steel Deck – Slabs".
  7. ANSI/SDI RD-2017: "Standard for Steel Roof Deck".
  8. ANSI/SDI NC-2017: "Standard for Non-Composite Steel Floor Deck".
  9. ANSI/SDI QA/QC-2017: "Standard for Quality Control and Quality Assurance for Installation of Steel Deck".
  10. SDI: "Diaphragm Design Manual, Fourth Edition" - DDM04, September 2015.
  11. SDI: "Floor Deck Design Manual First Edition" - FDDM, March 2014.
  12. SDI: "Roof Deck Design Manual First Edition" - RDDM, May 2013.
  13. SDI: "Manual of Construction with Steel Deck" - MOC3, October 2016.
  14. SDI: "Standard Practice Details" - SPD2, May 2001.
  15. SDI: "Code of Standard Practice" - COSP-2017, May 2017, as modified herein.
  16. International Code Council Evaluation Service (ICC-ES) AC43: "Acceptance Criteria for Steel Deck Roof and Floor Systems".
  17. Underwriters Laboratories (UL) Online Certifications Directory – Fire Resistance Ratings, [www.UL.com](http://www.UL.com).
  18. OSHA Regulations, current.

### 1.4 QUALIFICATIONS

- A. Deck manufacturer shall be a member of the Steel Deck Institute and shall have an established quality control program with current auditing by an approved inspection agency in conformance with Chapter 17 of the Building Code. Failure to meet these qualifications will require additional inspections prescribed in Building Code Chapter 17 to be performed by the Owner's inspection agency at the Contractor's expense.
- B. The deck manufacturer shall have been regularly engaged in the production of roof deck and ceiling systems with all of the required features for a period of at least ten years.
- C. Deck detailer and deck supplier shall be approved by the deck manufacturer.
- D. Superimposed Load and Diaphragm Shear Capacities: Shall be computed in accordance with the requirements of the Steel Deck Institute (SDI).

- E. Noise Reduction Coefficients: Shall be verified by the results of sound absorption tests conducted in accordance with ASTM C423 and E795.

#### 1.5 SUBMITTALS

- A. Submit for record evidence of deck manufacturer's qualifications.
- B. Submit for record evidence of deck manufacturer's quality control programs, procedures and certifications showing conformance with Chapter 17 of the Building Code.
- C. Submit detailed drawings, include:
  - 1. Unit dimensions, section properties and finish of all types of deck.
  - 2. Drawings to scale indicating layout, panel placement and types of deck panels, supplementary framing, reinforcement, cut openings, accessories, and sequence of installation.
  - 3. Type and location of welds and other fasteners, and anchorage details.
  - 4. Manufacturer's load tables and diaphragm shear tables.
  - 5. Manufacturer's noise reduction coefficients.
  - 6. Details of accessories, pour stops, closure strips, plates, and their attachment.
  - 7. Primer paint and color where painted, or surfaces treated for fireproofing, with extent shown on plan.
- D. Prior to fabrication, submit for record two copies of manufacturer's evaluation report (ESR), product data, load and diaphragm capacities, specifications, and installation instructions for each type of decking, surface treatment, finish, fire resistance ratings, U.L. full scale slab fire test reports, fasteners and accessories showing compliance with all requirements of the specifications. Indicate by transmittal form that copies of all applicable instruction have been provided to steel fabricator and erector.
- E. Submit for record galvanizing repair and touch up paint product data.
- F. A full width sample shall be submitted as requested for review and acceptance by the Owner's representative. Samples may be used for bond tests of subsequent coatings.
- G. Submittals for record, informational submittals, compliance reports and inspection reports will not be reviewed or returned.

#### 1.6 QUALITY CONTROL

- A. The Contractor is responsible for and shall perform quality control, inspection, and testing of all metal deck work as required by the Contract Documents, referenced codes, specifications and standards. The Contractor shall reject and replace work that is not in conformance.
- B. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure". All welding shall be performed by operators who are qualified for the types of welds used. Verify each operator's qualifications with Owner's inspector prior to using in production.

- C. Qualify mechanical fasteners and installation processes in accordance with manufacturer's engineering reports and code recognized approval procedure. Installers shall be certified by the manufacturer or an independent organization. Verify each installer's qualifications with the Owner's inspector prior to using in production.
- D. Decking in place is subject to inspection and testing. Expense of removing and replacing portions of decking for testing purposes will be borne by Owner if satisfactory; expense shall be paid by Contractor if unsatisfactory. Remove defective work and replace with new acceptable work.

#### 1.7 DELIVERY, STORAGE AND HANDLING

- A. Do not bend or mar deck. Protect deck and packaged materials from corrosion and deterioration. Store off ground and pitched to drain off water. Cover deck with waterproof covering and ventilate.
- B. Do not handle or store deck bundles on the structure in a manner that might cause distortion or damage to the deck or the supporting structures. Repair or replace damaged materials or structures as directed. Bent and damaged deck will be rejected.
- C. Deliver welding electrodes to job in unbroken packages bearing name of manufacturer. Special handling for electrodes is required per AWS. Provide and use an oven for electrodes requiring continuous drying prior to use.
- D. Coordinate installation of the acoustic insulation with the roofing contractor prior to installing roofing.

### **PART 2 PRODUCTS**

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Metal deck serves other functions in addition to resisting directly applied gravity loads. Metal decks are horizontal shear diaphragms that provide local bracing and transfer horizontal loads as part of the overall lateral force resisting system of the structure. The deck must be fastened at regular intervals to all supporting steel and be capable of these functions.
  - 1. Floor metal deck is required to brace the compression flanges of all supporting members during construction, particularly under the load of the floor concrete prior to the concrete setting up.
  - 2. Floor composite metal deck must bond with the concrete floor to develop a composite slab, and is part of the composite framing system of the supporting steel and concrete.
  - 3. Roof metal deck is required to permanently brace the compression flanges of all supporting members, including miscellaneous framing, and act as a shear diaphragm as an essential part of the lateral force resisting system of the structure.
- B. Provide deck capable of supporting construction loads, including wet concrete, if applicable, without shoring, unless specifically noted otherwise. Construction loading shall be 20 psf live load or 150 pound/foot concentrated load (see SDI for



loading diagrams) in addition to wet weight of concrete plus 1" deflection added concrete.

1. At long-span composite metal floor deck, deck shoring is required and must be designed by the contractor based on construction loading requirements and concrete finishing equipment used. Coordinate shoring requirements with the Construction Manager.
- C. Compute properties of deck sections based on effective design width as limited by AISI Specifications. All data shall be derived from tests certified by an independent testing agency.
- D. Provide decking tested and listed in the UL Fire Resistance Directory for specific UL designs indicated on the Architectural Documents. Assemblies above the first floor common space shall provide a 2-hour floor rating and assemblies at the residential rooms shall provide a 1-hour floor rating. Assemblies shall provide a 1-hour roof rating, unless noted otherwise. Units for those assemblies shall bear the UL label.
- E. Provide and fasten deck capable of supporting a diaphragm load as noted on the drawings, but not less than 280 pounds per linear foot, working stress load. Apply manufacturer's recommended safety factor, but not less than  $SF = 2.5$ . Space attachments no farther apart than the minimum attachments indicated on the drawings and specified herein.
- F. Composite deck: Design and fabricate deck with the combined steel deck and concrete section capable of supporting a minimum superimposed live load of 200 psf, working stress load (ignore strength of any concrete reinforcing steel).
- G. Roof deck: Design and fabricate deck capable of supporting total dead and live loads of 60 psf. Deflection shall not exceed  $1/360$  of the span under a live load of 25 psf. Anchor roof deck units to resist net uplift of 30 psf, working stress loads, or as required by the contract documents, whichever is greater.
- H. Deck shall have wide ribs suitable for shear stud placement where studs are required. The configuration of the metal deck shall allow studs to develop the full shear value for the particular weights of the concrete as listed in the AISI Specifications, latest edition. The Contractor shall provide written verification of the stud values with a specific deck type and stud spacing.
- I. Accessories for a complete installation, including:
  1. Provide continuous sheet metal closures, screeds and pour stops at all slab openings, slab edges and deck ends without gaps or voids, of adequate thickness to support concrete and construction loads without distortion.
  2. Provide continuous sheet metal plates at all ridges, valleys, change of roof deck direction and areas where roof deck is not nested, lapped or interlocked.
  3. Provide roof sump pans for all roof drains.

## 2.2 MANUFACTURERS

- A. Manufacturer of steel deck products shall be a current member of the Steel Deck Institute. Manufacturers may include:
1. Bushwick Metals, LLC.
  2. Canam.
  3. Cordeck.
  4. DACS, Inc.
  5. Epic Metals Corp.
  6. Gooder-Henrichsen Co.
  7. Marlyn Steel Decks, Inc.
  8. Miami Metal Deck.
  9. NY Metal Supply, Inc.
  10. New Millennium Building Systems.
  11. OEG Building Materials.
  12. Roof Deck Inc.
  13. Sloan Supply Company, Inc.
  14. Tri-State Decking, Inc.
  15. Valley Joist, Div. Ebsco Industries, Inc.
  16. Vulcraft Group, Nucor Corporation.

## 2.3 MATERIALS

- A. Steel for metal deck units and accessories: ASTM A653, SQ33 or higher. Conform to AISI Specification for Design of Cold-Formed Steel Structural Members, with a minimum yield strength of 40 ksi.
- B. Miscellaneous steel shapes: ASTM A 36.
- C. Shop finish: ASTM A 924, Class G60, hot-dip galvanizing.
- D. Galvanizing repair: Zinc rich galvanize repair compound containing 90% minimum zinc by weight in the dried film. Comply with DOD-P-21035 or The Society for Protective Coatings, Paint Specifications No. 20 (SSPC-PS 20).
- E. Welding materials: comply with AWS D1.1 and D1.3.
- F. Deck fasteners, subject to compliance with all requirements of the drawings, specifications, and manufacturer:
1. All deck shall be fastened to the supporting steel by either welds, screws, or powder or air actuated pin fasteners. All fasteners must be recognized by the Steel Deck Institute, the ICC-ES International Code Council Evaluation Service, Factory Mutual and Underwriters Laboratory.
  2. Fastener spacing indicated on the drawings or in this specification is based on welding to steel supports. Where manufactured fasteners are used, fastener spacing may need to be reduced and is to be designed by the Contractor's engineer and submitted for review.

3. The following manufacturers supply products that generally comply with these requirements:
  - a. HILTI Corporation, PO Box 21148, Tulsa, OK, 74121.
  - b. ITW Buildex, 1349 West Bryn Mawr Ave., Itasca, Illinois 60143.
  - c. PNEUTEK, Inc., 17 Friars Drive, Hudson, NH, 03051.
  - d. Simpson Strong-Tie®, 5956 W Las Positias Blvd., Pleasanton CA, 94588.
4. Powder actuated or pneumatic fasteners shall be a minimum of 0.157" diameter. Screws to supports shall be minimum #12. Fasteners shall be zinc coated or galvanized.

## 2.4 FABRICATION

- A. Provide all deck of each type from a single manufacturer.
- B. Supply deck units in lengths for 3 or more spans on 4 or more supports, where possible, with interlocking or nested side laps. Where ends are lapped, detail fastening to penetrate through all adjacent sheets and secure deck to supporting steel, especially at 4 corner laps.
- C. Long span deck panels shall have full nested type sidelaps that from the underside present a uniform appearance without joints.
- D. Deck to receive concrete shall be vented or formed with punched hanger slots in each rib at a maximum of 18" o.c.
- E. Minimum thickness of material as fabricated shall be within 5% of the design thickness.
- F. Deck gage noted is minimum thickness and may have to be increased based on design considering design loads, steel strength, concrete slab thickness, and span variations. Each deck sheet shall be clearly marked as to location if deck gage or strength varies on the structure.
- G. Composite floor deck: G60 galvanized units with depth and minimum thickness as shown on the drawings and as required by design, but not thinner than 20 gage.
- H. Roof deck: G60 galvanized units with depth and minimum thickness as shown on the drawings and as required by design. Provide deck configurations complying with SDI roof deck requirements. Top surfaces shall not have stiffening ribs.
- I. Roof sump pans: 14 gage minimum thickness, galvanized sheet steel with level bottoms, sloped sides, recessed 1-1/2" below deck surface. Size to receive roof drains, with bearing flanges not less than 3" wide. Cut holes for drains in the field.
- J. Sheet metal plate: closures, screeds and pour stops, not thinner than 18 gage.
- K. For long span deck to be left exposed, the deck shall have interlocking and vertically self-aligning sidelaps that present a flush appearance with tight fitting joints from the underside.
- L. Shallow stiffening ribs shall be roll-formed into the bottom plates of exposed to view long span acoustical deck. The ribs shall be located in the area between the webs to enhance flatness of the bottom plate.

- M. For acoustic type deck panels, the bottom plates in the area located between the webs shall be perforated for enhanced acoustic performance with uniform rows of holes. Acoustic elements shall be provided for the cells of the panels. These shall be factory installed. The acoustic elements shall be supported above the bottom plate by either individual push pins or continuous mesh to avoid plugging the perforations when field painting. Refer to the architectural drawings and specifications for minimum NRC values required. This value shall be established by sound absorption tests without the use of insulation above the panels.
- N. For long span deck to be left exposed, sidelaps shall be the fully nested type that from the underside present a uniform appearance without joints.

## 2.5 FINISHING

- A. The bottom surfaces of all deck to be left exposed to view shall be prime painted at the factory. Before painting, the galvanized steel shall be chemically cleaned and coated with an acid wash pretreatment primer followed by a coat of manufacturer's standard prime paint and then oven cured. Compatibility of field-applied finish paint with factory-applied prime paint shall be the responsibility of the painting contractor.
- B. For metal deck that is to be coated after fabrication and installation, refer to specification 09 91 00 – Painting for painting and special coating requirements.

## **PART 3 EXECUTION**

### 3.1 EXAMINATION

- A. Installer shall examine the area and conditions under which metal decking is to be installed.
- B. Notify Owner's representative in writing of conditions detrimental to proper and timely completion of the work.
- C. Do not proceed with work until unsatisfactory conditions have been corrected.
- D. If storage at the jobsite is required, bundles or packages of deck shall be elevated above the ground, sloped to provide drainage, and protected from the elements with a ventilated, waterproof covering.

### 3.2 INSTALLATION, GENERAL

- A. Install deck units and accessories in accordance with manufacturer's recommendations and final reviewed shop drawings, referenced standards and as specified herein.
  - 1. Place deck units in straight alignment, flat and square without warp or excessive deflection, and adjust to final position with proper end bearing on supports before permanently fastening.
  - 2. Place deck units as shown on reviewed installation drawings.
  - 3. Do not stretch or contract side lap interlocks.

4. Fasten as work progresses, do not leave material unsecured.
  5. Coordinate with the manufacturer and structural steel erector in sizing and locating decking bundles to prevent overloading structural members.
  6. Do not use deck units for storage or working platforms until permanently secured. Do not overload deck in any case.
- B. Provide complete, continuous coverage of entire floor and roof areas without gaps or voids other than specifically indicated openings. Include pour stops and other closures to form concrete at edges, openings, and as needed to contain concrete fill without leaks or migrations.
1. Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.
  2. Provide neat, square and trim cuts.
  3. Cut openings in deck true to dimensions using metal saws, drills, or cutting torch.
  4. Do not use cutting torch where decking is to be permanently exposed to view.
  5. Where concrete or other fill is to be placed on deck, seal joints and gaps wider than 1/8" with sheet steel or tape.
- C. Attachment of standard composite metal deck.
1. Attachment to supports shall be with fusion welds (puddle welds) with a diameter of 5/8" minimum; or an elongated weld of 3/8" minimum width and 3/4" minimum length; or an approved mechanical fastener.
  2. Mechanically fasten side laps between supports.
  3. Fasten accessories to steel supports at 12" o.c. and to deck at 6" o.c.
- D. Attachment of long span deck.
1. Panels shall be fastened to all supporting members with 3/4" diameter puddles welds 12" on center or as indicated on the manufacturer's erection drawings.
  2. The sides of panels located at the perimeter of the building shall be fastened to supporting members at a maximum spacing of 36" o.c. or less as indicated on the manufacturer's erection drawings.
  3. Mechanically fasten side laps between supports. Sidelaps shall be fastened together by #12 x 3/4" maximum length screws or 1" x 3/8" seam welds at a maximum spacing of 36" on center or less as indicated on the manufacturer's erection drawings.
  4. Fasten accessories to steel supports at 12" o.c. and to deck at 6" o.c.
- E. Welds shall comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work. Weld metal shall penetrate all layers of deck material at end laps and have adequate fusion to the supporting members.
- F. Mechanical fasteners to steel supporting members shall be ICC-ES approved with current ESR and submitted for review prior to use. The Contractor shall arrange for a representative of the manufacturer to provide onsite installation training for their products. Submit documentation of training of personnel prior to performing such work. Provide copy to the Owner's inspector.
- G. Avoid concentrated loads and impact loads during erection and construction. Plank the deck in all traffic areas to prevent damage to units.

- H. Metal deck to receive spray-on finish, insulation, or fireproofing (see architectural contract documents) shall be cleaned of all grease, mill oil, paraffin, dirt, salt and other contaminants which would impair adhesion. All required cleaning shall be done prior to metal deck installation using a cleaning method that is compatible with finish application.

### 3.3 INSTALLATION, COMPOSITE DECK

- A. At long-span composite floor deck, provide temporary intermediate shoring of all deck as required by the manufacturer. At areas of deck to be exposed, provide adequate protection between the deck and shoring members to prevent damage to the deck. Coordinate with the deck manufacturer.
- B. Installed deck shall be suitable for installation of shear studs with 1" minimum lateral concrete cover typically, and 2" lateral concrete cover at deck mid-height in the load direction. Coordinate installation of deck with installer of shear studs. Shear stud installer shall inspect deck installation.
- C. Shear studs may be substituted for puddle welds to permanently fasten the composite deck to steel supporting members.
- D. Provide minimum 2" bearing over steel supports and install deck with butted joints, maximum 1/8" gap and with flutes aligned.
- E. Bottoms of flutes shall be in full, continuous contact with steel supports. Flatten or remove embossings or ribs as needed to achieve this condition.
- F. Attach composite deck to all supports at 12" o.c. Mechanically fasten side laps with #10 screws or button punch, space not to exceed 36" o.c.
- G. The determination of the time for removal of supporting shores may be controlled by the presence of construction loads or deflection limitations. The manufacturer is responsible for determining the appropriate time for the removal of shores. The strength and stiffness of the concrete during various stages of construction should be substantiated by job-cured test specimens (cylinders).

### 3.4 INSTALLATION, ROOF DECK

- A. Provide a minimum of 2" bearing and lap ends not less than 2". Do not extend bottom sheet past the support.
- B. Minimum attachment.
  - 1. Attach roof deck to all supports at 6" o.c. at all ends and end laps. Attach at 12" o.c. at all intermediate supports and edges that are not perpendicular to deck span. Secure deck to each supporting member in ribs in which side laps occur.
  - 2. Mechanically fasten side laps with minimum #10 screws, space not to exceed 24" o.c.
  - 3. Fasteners may need to be larger and/or spaced closer for F.M. and U.L. ratings, diaphragm loading specified, or other requirements. Contractor shall verify fasteners and spacing with manufacturer for the specific deck product and show on the installation drawings.

- C. Reinforce deck at openings.
  - 1. Reinforce deck at openings and penetrations with dimensions less than 12" with minimum 18 gage galvanized steel sheet at least 12" wider and longer than the opening. Fusion weld reinforcement to the top of deck at each corner and 6" o.c. along each side.
  - 2. Reinforcing may be omitted for penetrations 4" and smaller that fit between deck ribs.
  - 3. Where deck penetration exceeds 12", frame the opening with a welded angle frame or structural members spanning between joists or beams.
  - 4. Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.
- D. Place roof sump pans over openings provided in roof decking and weld to top of deck at each corner, at each deck flute and not more than 6" o.c. Cut opening in roof sump bottom to accommodate drain size.
- E. Provide continuous sheet metal plates at all ridges, valleys, change of roof deck direction and areas where roof deck is not nested, lapped or interlocked. Attach directly to the steel deck at 6" o.c. each side as a finished surface for the application of insulation and roofing.

### 3.5 INSTALLATION, LONG SPAN ROOF DECK

- A. Construction loads shall not be applied to the long span roof deck until after the panels are permanently fastened to supporting members, and sidelaps are attached. The construction loads shall not exceed the capacity of the panels.
- B. Items such as ceilings, light fixtures, conduit, pipe and ductwork shall not be suspended from the long span roof deck without specific approval of the structural engineer.
- C. Sump pans, ridge plates, valley plates, transition plates, eave plates, and supplied reinforcement for small openings shall be fastened as indicated on the manufacturer's erection drawings.

### 3.6 INSPECTION

- A. Contractor's inspector shall inspect all metal deck work, fasteners and welds as part of the required quality control. Inspect as work proceeds and areas are completed, but ahead of concrete or roof placement. Confirm in reports:
  - 1. Proper material is installed properly, including gage of material and, if gage varies, at correct locations on the structure.
  - 2. Welding qualifications and fastener certifications for deck installers.
  - 3. All (100%) deck welds and mechanical fasteners are installed and inspected, including layout, spacing, size and quality, per the Structural Drawings and project requirements.
  - 4. Galvanized finish is repaired.
- B. Owner's inspector shall review Contractor's inspections and verify the installed deck work.

3.7 FINISH REPAIR AND CLEANING

- A. Repair galvanized finish on all galvanized steel roof deck, and any deck with exterior exposure, by field coating all damaged and abraded areas with galvanizing repair compound. After decking installation and ahead of roofing, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members. Touch-up surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.
- B. Following erection, clean all steel deck of mud and dirt accumulated during erection. Thoroughly clean and remove dirt, debris, oil, water, and other foreign material from deck surfaces. Clean composite deck with detergent to remove oil and slick spots that would prevent concrete from bonding. Leave ready for concrete fill, roofing, painting or fireproofing.
- C. The bottom surface of the long span roof deck shall be cleaned for field painting by the contractor.

**END OF SECTION**



## **SECTION 05 40 00**

### **COLD-FORMED METAL FRAMING**

#### **PART 1 GENERAL**

##### **1.1 RELATED DOCUMENTS**

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

##### **1.2 SUMMARY**

- A. Section includes:
  - 1. Interior and exterior load-bearing wall framing.
  - 2. Ceiling joists.
  - 3. Shear wall Framing
- B. Related Sections:
  - 1. Section 03 30 00 – Cast-in Place Concrete.
  - 2. Section 04 00 00 – Unit Masonry.
  - 3. Section 05 12 00 – Structural Steel.
  - 4. Section 05 30 00 – Metal Decking.

##### **1.3 REFERENCES**

- A. Comply with the provisions of the following codes and standards. Modifications in this specification, when in conflict with the referenced codes and standards, shall take precedence over the referenced codes and standards.
  - 1. Kentucky Building Code (KBC).
  - 2. American Iron and Steel Institute (AISI) Specifications and Standards:
    - a. AISI S100 “North American Specification for the Design of Cold-Formed Steel Structural Members”.
    - b. AISI S200 “North American Standard for Cold-Formed Steel Framing – General Provisions”.
    - c. AISI S201 “North American Standard for Cold-Formed Steel Framing – Product Standard”.
    - d. AISI S211 “North American Standard for Cold-Formed Steel Framing – Wall Stud Design”.
    - e. AISI S212 “North American Standard for Cold-Formed Steel Framing – Header Design”.
    - f. AISI S213 “North American Standard for Cold-Formed Steel Framing – Lateral Design”.

- g. AISI "Code of Standard Practice for Cold-Formed Steel Structural Framing".
- 3. American Welding Society (AWS) Specifications and Standards:
  - a. AWS D1.1 "Structural Welding Code - Steel".
  - b. AWS D1.3 "Structural Welding Code - Sheet Steel".
- 4. ASTM International Standards referenced in this Section.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Engage a qualified professional engineer to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
  - 1. Design Loads: As indicated on drawings.
  - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
    - a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/600 of the wall height at masonry veneer and 1/360 of the wall height at other materials.
    - b. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft.
    - c. Ceiling Joist Framing: Vertical deflection of 1/360 of the span.
  - 3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
  - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
    - d. Upward and downward movement of 3/4 inch.
  - 5. Design wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

#### 1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's data sheets for each type of cold-formed steel framing product and accessory.
- B. Shop Drawings: Submit shop drawings prepared by cold-formed metal framing manufacturer.
  - 1. Include layout, spacing, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
  - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
  - 3. For cold-formed metal framing indicated to comply with design loads include seal of the qualified engineer responsible for their preparation.

- C. Structural Calculations: For cold-formed metal framing indicated to comply with design loads, include structural calculations signed and sealed by the qualified professional engineer responsible for their preparation.
  - 1. Structural calculations shall include:
    - a. Description of design criteria.
    - b. Engineering analysis depicting stress and deflection (stiffness) requirements for each framing application.
    - c. Selection of framing components, accessories, fasteners and welded connection requirements.
- D. Mill Certificates: Submit for record mill certificates signed by steel sheet producer indicating steel sheet complies with requirements.
- E. Welding Certificates: Submit for record copies of certificates for welding procedures and personnel.
- F. Qualifications: Submit for record with bid evidence of manufacturer's and installer's qualifications. Include lists of completed projects with names and addresses of corresponding owners and architects.
- G. Product Test Reports: Submit for record reports from a qualified testing agency indicating that the following products comply with requirements, based on evaluation of comprehensive tests for current products.
  - 1. Steel sheet.
  - 2. Mechanical fasteners.
  - 3. Wall stud bridging connectors.
  - 4. Miscellaneous structural clips and accessories.
- H. Evaluation/Research Reports: Submit for record manufacturer's 3rd party evaluation report for its products that are reviewed to the local building code or its model code. Include the following.
  - 1. Stud, track, and non-standard steel framing members.
  - 2. Expansion anchors.
  - 3. Anchoring adhesive.
  - 4. Power-actuated or powder actuated fasteners.
  - 5. Vertical deflection clips.
  - 6. Horizontal drift deflection clips.
  - 7. Shear wall hold downs, tension-ties, and pre-engineered systems.
- I. LEED Submittals:
  - 1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
  - 2. Product Data for Credit MR 2.1 and Credit MR 2.2: For products diverted from disposal in landfills and incinerators, and where recycled resources are directed back to the manufacturing process. Include a statement indicating percentage of materials diverted and recycled and the costs associated with each.

3. Product Data for Credit MR 5: For products where product manufacturing is within a 500 mile radius of the jobsite and the point of extraction of the raw materials. Include a statement indicating the location and distances for the manufacturing plant and the point of extraction of raw materials in relation to the jobsite location.
- J. Informational submittals, compliance reports, inspection reports, and submittals for record will not be returned.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Member in good standing of the Steel Framing Industry Association (SFIA).
  1. Products to be certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 IAS Accreditation Criteria for Inspection Agencies
- B. Engineering Responsibility: Engage a qualified Professional Engineer to prepare shop drawings, design calculations, and other structural data.
- C. Professional Engineer Qualifications: A Professional Engineer who is legally qualified to practice in jurisdiction where project is located and who has a minimum of five years of experience in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
- D. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- E. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 for testing indicated.
- F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1 and AWS D1.3.
- G. Fire-Test-Response Characteristics: Where metal framing is a part of a fire-resistance rated assembly, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- H. AISI Specifications: Comply with AISI 100 for calculating structural characteristics of cold-formed metal framing.
- I. Pre-installation Meeting:
  1. A pre-installation meeting at the Project site shall be arranged by the Construction Manager to review installation activities, inspection and testing requirements, and critical tolerances.
  2. Contractor, Construction Manager, Owner's Testing and Inspection Agency, and Architect/Engineer shall attend.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling as required in AISI's "Code of Standard Practice".
- B. Protect stored cold-formed metal framing with a waterproof covering and ventilate to avoid condensation.

## **PART 2 PRODUCTS**

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. ClarkDeitrich Building Systems, Inc.
  - 2. CEMCO
  - 3. J.N. Linrose Manufacturing, LLC.
  - 4. MBA Building Supplies, Inc.
  - 5. MRI Steel Framing, LLC.
  - 6. The Steel Network, Inc. (TSN).

### 2.2 COLD-FORMED STEEL FRAMING, GENERAL

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: As required by structural performance.
  - 2. Coating: G60
- C. Steel Sheet for Miscellaneous Connectors: ASTM A 653, structural steel, zinc coated, of grade and coating as follows:
  - 1. Grade: As required by structural performance.
  - 2. Coating: G90.

### 2.3 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, complying with ASTM C 955, and as follows:
  - 1. Minimum Base-Metal Thickness: As required by structural performance, but not less than 0.0428 inches.
  - 2. Flange Width: As required by structural performance.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, complying with ASTM C 955, and as follows:

1. Minimum Base-Metal Thickness: As required by structural performance, but not less than 0.0428 inches.
  2. Flange Width: Not less than 1-1/4 inches.
- C. U-Channel Bridging: Manufacturer's standard 1.5 inch U-shaped steel channel with straight flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0538 inch.
  2. Flange Width: Minimum 1/2 inch.
- D. Jambs: Manufacturer's standard C-shapes used to form built-up sections from manufacturer's standard punched stud and track sections.
1. Minimum Base-Metal Thickness: As required by structural performance, but not less than 0.0428 inches.
  2. Flange Width: As required by structural performance.
- E. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As required by structural performance, but not less than 0.0428 inches.
  2. Flange Width: As required by structural performance.
- F. Steel L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:
1. Minimum Base-Metal Thickness: As required by structural performance, but not less than 0.0538 inches.
  2. Top Flange Width: As required by structural performance, but not less than 1-1/2 inches.

## 2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, complying with ASTM C 955, and as follows:
1. Minimum Base-Metal Thickness: As required by structural performance, but not less than 0.0428 inches.
  2. Flange Width: As required by structural performance.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, complying with ASTM C 955, and as follows:
1. Minimum Base-Metal Thickness: As required by structural performance, but not less than 0.0428 inches.
  2. Flange Width: Not less than 1-1/4 inches.
- C. U-Channel Bridging: Manufacturer's standard 1.5 inch U-shaped steel channel with straight flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0538 inch.
  2. Flange Width: Minimum 1/2 inch.

- D. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web
- E. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
  - 1. Minimum Base-Metal Thickness: As required by structural performance, but not less than 0.0428 inches.
  - 2. Minimum Flange Width: 1 inch plus twice the design gap.
- F. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
  - 1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
    - a. Minimum Base-Metal Thickness: As required by structural performance, but not less than 0.0428 inches.
    - b. Minimum Flange Width: 1 inch plus twice the design gap
  - 2. Inner Track: Of web depth indicated, and as follows:
    - a. Minimum Base-Metal Thickness: As required by structural performance, but not less than 0.0428 inches.
    - b. Flange Width: Outer flange width plus 1 inch.
- G. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

## 2.5 CEILING JOIST FRAMING

- A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, punched with enlarged service holes, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: As required by structural performance, but not less than 0.0428 inches.
  - 2. Flange Width: Minimum 1-5/8 inches.
  - 3. Section Properties: Not less than noted on Drawings.

## 2.6 SHEAR WALL FRAMING

- A. Shear Wall Designation: Manufacturer's standard designation to include height, length, stud wall thickness, and required horizontal and vertical loads.
  - 1. Diagonal Strap: Manufacturer's standard light gage straps on both sides of wall to provide shear resistance. Strap must be continuous from corner to corner and must be installed taut and remain tight throughout building construction. Splices are not permitted unless designed by a qualified engineer.
    - a. Basis of Design: StiffWall Shear Wall System by The Steel Network.

2. Threaded Rods: High strength threaded rods within wall cavity to provide shear resistance. Rods must be continuous from corner to corner and be attached to corner brackets for transfer of load.
  - a. Basis of Design: Infinity Shear Panels (ISP) by Infinity Structures.

## 2.7 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
  1. Supplementary framing.
  2. Bracing, bridging, and solid blocking.
  3. Web stiffeners.
  4. Anchor clips.
  5. End clips.
  6. Foundation clips.
  7. Gusset plates.
  8. Stud kickers and knee braces.
  9. Joist hangers and end closures.
  10. Hole reinforcing plates.
  11. Backer plates.

## 2.8 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.
- B. Anchor Bolts: ASTM F 1554, Grade 55, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153, Class C
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency. Provide one of the following.
  1. Hilti Kwik Bolt TZ Expansion Anchors.
  2. Hilti HDA Undercut Anchors.
  3. Powers Power-Stud+ SD2 Wedge Expansion Anchors.
  4. Simpson Strong-Bolt 2 Wedge Anchors.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
  1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.



- F. Welding Electrodes: Comply with AWS standards.

## 2.9 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.
- B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.
- C. Shims: Load bearing, high-density multimonomer plastic, and nonleaching: or of cold-formed steel of same grade and coating as framing members supported by shims.
- D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

## 2.10 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  - 1. Fabricate framing assemblies using jigs or templates.
  - 2. Cut framing members by sawing or shearing; do not torch cut.
  - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
  - 4. Fasten other materials to cold-formed steel framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
  - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

#### **3.2 PREPARATION**

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

#### **3.3 INSTALLATION, GENERAL**

- A. Contractor shall provide effective, full time quality control over all fabrication and erection complying with the pertinent codes and regulations of government agencies having jurisdiction.
- B. Install cold-formed framing in accordance with ASTM C1007, AISI S200, and manufacturer's written instructions.
- C. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- D. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
  - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- E. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
  2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- F. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- G. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- H. Do not bridge building expansion and control joints with cold-formed steel framing. Independently frame both sides of joints.
- I. Install insulation specified in Division 7 Section(s) in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- J. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- K. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

### 3.4 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
1. Anchor Spacing: As shown on Shop Drawings.
- B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch (3 mm) between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity.
- E. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

- F. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
  - 1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
  - 2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- G. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
  - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- H. Install horizontal bridging in stud system, spaced vertically not more than 48 inches. Fasten at each stud intersection.
  - 1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
  - 2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- I. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure as shown in Shop Drawings.
- J. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
  - 1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  - 1. Install single deep-leg deflection tracks and anchor to building structure.

2. Install double deep-leg deflection tracks and anchor outer track to building structure.
  3. Connect vertical deflection clips to bypassing studs and anchor to building structure.
  4. Connect drift clips to cold-formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
  2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
  3. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts to provide a complete and stable wall-framing system.

### 3.6 JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
  2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.
- C. Space joists not more than 2 inches from abutting walls, and as follows:
1. Joist Spacing: As indicated.
- D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.
- E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.
1. Install web stiffeners to transfer axial loads of walls above.
- F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
  2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

- G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

### 3.7 FIELD QUALITY CONTROL

- A. Testing and Inspections: Owner will engage a qualified independent testing and inspection agency to perform field tests and inspections and prepare test reports. The Contractor shall schedule and coordinate inspections.
- B. Field and shop welds will be subject to testing and inspection. Acceptance criteria used for the inspection of welds shall be as specified in AWS D1.3 and AWS D1.1, as applicable.
- C. Contractor shall perform all necessary preparatory work for testing and inspection without additional costs.
- D. Testing agency will report test results promptly and in writing to Contractor and Architect/Engineer.
- E. Remove and replace work where test results indicate that it does not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- G. Inspections do not relieve Contractor of responsibility for contract compliance. The Owner's representative shall have the right to inspect or test work and reject faulty materials of workmanship at any time before final acceptance.

### 3.8 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to Manufacturer and Installer, to ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

### 3.9 WASTE REMOVAL

- A. Remove from site and legally dispose of waste materials resulting from or caused by work of this section.

**END OF SECTION**

## **SECTION 05 51 13**

### **METAL PAN STAIRS**

#### **PART 1      GENERAL**

##### **1.01            SECTION INCLUDES**

- A.      Shop-fabricated steel stair assemblies with concrete filled treads, nosings and landings, complete with welded handrails and guardrails.

##### **1.02            RELATED SECTIONS**

- A.      Concrete Fill: Section 03 30 00.
- B.      Sustainable Design Requirements: Section 01 81 13.

##### **1.03            REFERENCE STANDARDS**

- A.      American Society for Testing and Materials (ASTM)
  - 1.      ASTM A36 - Structural Steel.
  - 2.      ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
  - 3.      ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 4.      ASTM A307 - Specification for Bolts and Studs. 60,000 PSI Tensile Strength.
  - 5.      ASTM A325 - High Strength Bolts for Structural Steel Joints.
  - 6.      ASTM A569 – Specification for Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip, Commercial Quality.
  - 7.      ASTM A500 - Specifications for Cold-formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
  - 8.      ASTM A513 – Specification for Electrical-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
  - 9.      ASTM A570 - Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
  - 10.     ASTM A611 - Specification for Steel Sheet Carbon, Cold-Rolled, Structural Quality.
  - 11.     ASTM C1107 – Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).
  - 12.     Other ASTM standards referenced.
- B.      American Welding Society: (AWS)
  - 1.      AWS D1.1 - Structural Welding Code - Steel
  - 2.      AWS D1.3 – Structural Welding Code – Sheet Steel
  - 3.      Welding Procedure and Performance Qualification

- C. National Association of Architectural Metal Manufacturers (NAAMM): Referenced standards.
- D. National Ornamental and Miscellaneous Metals Association (NOMMA): Referenced standards.

1.04 QUALITY ASSURANCE

- A. Qualification of Fabricator: Certified by the American Institute of Steel Construction Certification Program.

1.05 SUBMITTALS

- A. Shop Drawings: Clearly indicate:
  - 1. Sizes, thicknesses, profiles of metal sections and all details required to complete the stair work.
  - 2. Elevations of stairs showing stair size, rail height and sizes.
  - 3. Type of stair treads and landing.
  - 4. Each type of connection required to fit all conditions and loading requirements specified.
  - 5. Work to be built-in or provided by other trades.
  - 6. Welded connections using AWS welding symbols.
  - 7. Method of securing stair assembly to building structure.
  - 8. A note indicating that the completed rail assembly and installation will resist loading requirements specified under Part 2.02, B.
  - 9. Type of shop primer.
- B. Calculations: Include design loads, structural calculations and material properties.
- C. All Structural Submittals: Stamped and signed by Professional Engineer licensed in the State of Kentucky.
- D. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.

1.05 DELIVERY, STORAGE, HANDLING

- A. Deliver stair anchoring devices which are to be placed in concrete and masonry in sufficient time to avoid delay to that work.
  - 1. Provide instructions for proper installation of these items.
- B. Handle and store materials off ground to prevent damage.

1.06 WARRANTY

- A. Provide manufacturer's written warranty stating that products are free from defects in material and workmanship for the life of the building and agreeing to replace or repair items, proven to be defective.



**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Manufacturers: Stair and railing assemblies manufactured by AMERICAN STAIR CORPORATION, ALFAB, PRECISION STAIR CORPORATION or CAM ARCHITECTURAL are acceptable providing they meet the requirements specified herein and conform to the layouts indicated on the drawings.

**2.02 MATERIALS**

- A. Sections, Plates, Sheet and Bars: ASTM A36.
- B. Steel Tubing: ASTM A500, Grade B, cold-formed, and A513.
- C. Steel Pipe: Seamless black pipe, ASTM A53 quality, Schedule 40.
  - 1. Size: 1.666" diameter, 0.145" wall thickness.
  - 2. Fittings: Elbows, tee-shapes, wall brackets, escutcheons, of machined steel.
- D. Standard Bolts, Nuts and Washers: ASTM 307.
- E. High Strength Bolts, Nuts, and Washers: ASTM A325.
- F. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Bolts, washers, and shims as required, hot-dip galvanized per ASTM A153.
- G. Welding Materials: AWS D1.1; type required for materials being welded.
- H. Primer: Acrylic Latex rust-inhibitive primer containing less than 1.0 lb/gal volatile organic compounds (VOC), certified to be compatible with finish coats specified in section 09 91 00.
- I. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, of consistency suitable for application, and a 30-minute working time.
  - 1. Manufacturer/Type: MASTER BUILDERS' "Masterflow 713" or equal by EUCLID CHEMICAL CO., SONNEBORN BUILDING PRODUCTS, L & M CHEMICAL.

**2.02 FABRICATION**

A. General

1. Fabricate true to line and level with accurate angles and surfaces with straight sharp edges. Use only smooth materials free from burrs, pitting and other marks.
2. Fabricate stair assemblies to support a live load of 100 lbs. per sq. ft. with stringer deflection not to exceed 1/180 of span. Fabricate in accordance with approved shop drawings.
3. Stairs shall be of welded steel construction.
  - a. Exposed Welds: Finished appearance in accordance with NOMMA "Guideline 1 – Joint Finishes" for Finish #3.
4. Verify dimensions on site prior to shop fabrication when job conditions permit.
5. Provide closures for ends of stringers.
6. Fabricate items with joints tightly fitted and secured.
7. Fit and shop-assemble sections in largest practical sizes, for handling through building openings.
8. Sections shall be marked for re-assembly and coordinated installations.

B. Stair and Landings

1. Provide complete system, including stringers, landing framing, tread and landing pans, connections and other components necessary for support and installation. Comply with NAAMM "Metal Stairs Manual" requirements for Service Class Stairs.
2. Stringers: Steel plates, tubing or channels as required for compliance with performance requirements.
3. Treads and Landings: Sheet steel pans formed for concrete fill. Factory - weld to stringers, with all welds inside pan for concealment by concrete fill.
  - a. Concrete Fill: Section 03 30 00.
  - b. Nosing Inserts:
    - 1) Use: Concrete panfilled treads and cast-in-place concrete stairs.
    - 2) Type: Extruded aluminum with aluminum oxide/silicone carbide abrasion anti-slip filler strips and integral anchor.
    - 3) Size: 3" wide by 1/4" thick by full length of tread for panfilled and 6" less than width of tread for cast-in-place (3" each end).
    - 4) Color: Concrete Gray, WOOSTER CG-1.
    - 5) Manufacturer: WOOSTER PRODUCTS, Type 231BF for panfilled and cast-in-place; AMERICAN ABRASIVE METALS COMPANY; BALCO; NYSTROM.
  - c. Reinforce landings as required for spans.
4. Risers: Sheet steel.

C. Handrail Assembly

1. Steel rail assembly shall be of welded construction, fabricated and complete

with connectors to stringers designed for a concentrated load of 200 pounds applied at any point and in any direction and in compliance with KBC.

2. Handrails shall also be designed and constructed for a load of 50 pounds per lineal foot applied in any direction and in compliance with KBC.
3. Loading conditions in 2.02, B.1 and 2.02, B.2 shall not be applied simultaneously, but each shall be applied to produce maximum stress in each of the respective components or any of the supporting components.
4. Fabricate in accordance with approved shop drawings.
5. Where pipes or tubes intersect, cope the butting ends to closely fit contour of pipe joint, and weld.
6. Close open ends of railings with steel plates welded in place and ground smooth.
7. Form simple and compound curves by bending pipes in jigs to produce uniform curves. Maintain profile of pipes throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces.

D. Connections

1. Comply with approved shop drawings.
2. Form exposed connections with hairline joints, flush and smooth.
3. Grind exposed welds flush and smooth with adjacent finished surface.
4. At locations exposed to view, use plastic filler between welds; sand flush.
5. Use concealed fasteners wherever possible.
6. For exposed fasteners, use countersunk flat-head type.

- E. Barrier Gates: Manufacturer's standard swing gate assembly with steel spring hinges and rubber bumper between barrier/gate assembly and rail post.

2.03 SHOP FINISH

- A. Shop priming shall be in compliance with quality requirements of Structural Steel Painting Council (SSPC).

1. Clean surfaces to be painted in accordance with SSPC SP-1, SP-2 and/or SP-3.

- B. Clean surfaces of rust, scale, grease and foreign matter prior to shop priming.

- C. Shop prime the completed stair assembly with one coat of primer at minimum 1.5 mil dft.

- D. Do NOT prime steel which will be in direct contact with concrete or where field-welding is required.

**PART 3 EXECUTION**

3.01 INSTALLATION

- A. Erect in accordance with manufacturer's recommendations and Shop Drawings.

- B. Erect stairs level and plumb, free from distortion or defects detrimental to appearance or performance.
- C. Do not field cut or alter members without the approval of the Architect.
- D. Connections
  - 1. Comply with approved shop drawings.
  - 2. Hide bolts and screws whenever possible.
    - a. Where not hidden, use flush countersunk fastenings, unless indicated otherwise.
  - 3. Welds: Conform to NOMMA "Guideline 1 – Joint Finishes" for Finish #3.
- E. The completed railing installations shall be able to withstand the loading requirements under Part 2.02, B.

3.02 CLEANING AND TOUCH-UP

- A. Clean the stairs and railing assembly thoroughly.
- B. Touch-up damaged shop coat with primer matching the shop coat.

**END OF SECTION**

**SECTION 06 10 00**  
**ROUGH CARPENTRY**

**PART 1      GENERAL**

1.01      WORK INCLUDED

- A.      Provide rough carpentry work as shown and specified. Work includes:
  - 1.      Wood framing, nailers, blocking, grounds and furring.
  - 2.      Roof blocking, cants and nailers.
  - 3.      Concealed blocking for support of accessories, equipment, specialty items, cabinets, fixtures, trim and facing materials.
  - 4.      Preservative and fire retardant treatment.
  - 5.      Rough hardware and accessory materials.

1.02      RELATED SECTIONS

- A.      Sustainable Design Requirements: Section 01 81 13.
- B.      VOC Limits: Section 01 81 16.
- C.      Finish Carpentry: Section 06 20 00.
- D.      Architectural Woodwork: Section 06 40 00
- E.      Exterior Gypsum Sheathing Board: Section 09 21 16.

1.03      REFERENCES

- A.      Standards
  - 1.      American Plywood Association (APA): Grades and Standards
    - a.      APA Plywood Design Specification, Form No. Y510T.
    - b.      APA Engineered Wood Construction Guide, Form No. E30R.
  - 2.      American Wood Protection Association (AWPA): Treatment Standards.
    - a.      AWPA U1 - Use Category System: User Specification for Treated Wood
  - 3.      PS - U.S. Product Standard: Softwood Lumber and Plywood Standards
    - a.      PS-1 - Construction and Industrial Plywood.
  - 4.      American Society for Testing and Materials (ASTM)
    - a.      A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
    - b.      D3498 - Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
    - c.      D2898 - Standard Practice for Accelerated Weathering of Fire-

- d. Retardant-Treated Wood for Fire Testing  
E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

#### 1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings indicating framing connection details, fastener connections and dimensions.
- B. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- C. Preservative Treated Wood: Submit certification by treating plant stating chemical and process used and conformance with applicable standards.
- D. Fire-Retardant Treatment: Submit certification by treating plant that fire retardant treatment materials comply with governing ordinances and that treatment will not bleed through finished surfaces.
- [E. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
  - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.]

#### 1.05 QUALITY ASSURANCE

- A. Softwood Lumber: Grading rules and wood species shall conform with the voluntary Product Standards PS 20 including grading rules of the following associations, as applicable:
  - 1. Southern Pine: Standard Grading Rules for Southern Pine Lumber, published by Southern Pine Inspection Bureau (SPIB).
  - 2. Douglas Fir, Western Larch and Hemlock: Western Lumber Grading Rules, published by Western Wood Products Association (WWPA), Standard Grading and Dressing Rules for West Coast Lumber Inspection Bureau (WCLIB) or National Lumber Grades Authority (NLGA).
  - 3. Western Spruce, Pine and Fir: Western Spruce-Pine-Fir Association (WSPFA) and current Canadian Grading Rules by National Grades Association, Canada.
- B. Softwood Plywood: Grading rules and wood species shall conform with Product Standard PS 1.
- C. Grade Marks
  - 1. General: Identify all lumber and plywood by official grade mark.
  - 2. Lumber: Grade stamp to contain symbol of grading agency, mill number or name, grade of lumber, species or species grouping, or combination

designation, rules under which graded, where applicable and condition of seasoning at time of manufacture.

3. Softwood Plywood: Appropriate grade trademark of the American Plywood Association.

- a. Type, grade, class and identification index.
- b. Inspection and testing agency mark.

#### 1.06 STORAGE AND HANDLING

- A. Store off the ground.
- B. Protect from direct contact with the weather.
- C. Provide proper ventilation.
- D. Adhesives
  1. Do not store adhesives with materials that have a high capacity to absorb VOC emissions (i.e., materials which are woven, fibrous or porous in nature, such as acoustical ceilings, carpets, textiles, etc.).
  2. Do not store adhesives in occupied spaces.

#### 1.07 JOB CONDITIONS

- A. Time delivery and installation of carpentry work to avoid delaying trades whose work is dependent on, or affected by, the carpentry work and to comply with protection and storage requirements.
- B. Installer must examine the surfaces and supporting structure and the conditions under which the carpentry work is to be installed, and notify the Contractor in writing of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- C. Correlate location of furring, nailers, blocking, grounds and similar supports so that attached work will comply with design requirements.

### **PART 2 PRODUCTS**

#### 2.01 MATERIALS

- A. Dimension Lumber – General: [Provide materials that comply with Project Sustainable Design Requirements and Low Emitting Material goals.]
  1. Nominal sizes are indicated, except as shown by detailed dimensions. Provide lumber complying with lumber producer's inspection agency grading rules certified as conforming to the "National Grading Rule for Dimension Lumber," by Board of Review of the American Lumber Standards Committee (ALCS), established under Section 10 of PS 20.

2. Dress dimension lumber S4S unless otherwise shown or scheduled.
  3. Provide seasoned dimension lumber with 19% maximum moisture content at time of dressing and complying with the dry size requirements of PS 20. Mark lumber "S-DRY".
    - a. 15% maximum moisture content for fire-retardant wood.
- B. Light Framing Lumber: Where framing lumber from 2" through 4" thick, and 4" or less wide is indicated, provide lumber complying with the specified requirements for dimension lumber and with the following grading, unless otherwise indicated:
1. Provide "Construction" grade light framing and mark "CONST".
  2. Where stud framing is shown, provide "Stud" grade lumber and mark "STUD".
  3. Specie: Any commercial softwood.
- C. Miscellaneous Lumber
1. Provide wood for support or attachment of other work such as cant strips, nailers, blocking, furring, grounds, bucks, stripping and similar members. Provide lumber of the sizes shown or specified, worked to shapes shown and as follows:
    - a. Specie: Any commercial softwood, construction grade.
- D. Plywood: Provide exterior grade plywood for exterior use and interior type with exterior glue for interior use. Formaldehyde free.
1. Concealed Use
    - a. Exterior: APA-CD-EXT.
    - b. Interior: APA-CD-EXPOSURE I, with exterior glue.
  2. Exposed Interior Use - Painted Finish: APA MEDIUM DENSITY OVERLAY (MDO).
  3. Roof Sheathing: APA RATED SHEATHING EXT, square edge.
  4. Subfloor: APA RATED STURD-I-FLOOR EXP 1 or 2.
  5. Backing Panels: APA CD PLUGGED INT with exterior glue, square edge.
  6. Underlayment: APA UNDERLAYMENT EXP 1, with sanded-face.

## 2.02 FIRE-RETARDANT WOOD TREATMENT

- 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.
- C. After treatment, kiln-dry lumber to maximum 19% moisture content and plywood to maximum 15% moisture content . Inspect each piece of lumber and plywood after drying and discard damaged or defective pieces.
- D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

## 2.03 PRESERVATIVE WOOD TREATMENT

- A. Preservative Treatment by Pressure Process: AWPB U1; Use Category UC3b.
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 does not comply with requirements for untreated material.
- C. Mark each piece of treated lumber with AWPB Quality Mark designation denoting conformance to the appropriate specification.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- 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 framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  4. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
  5. Wood floor plates that are installed over concrete slabs-on-grade.

2.04 ROUGH HARDWARE

- A. General: Provide all necessary spikes, screws, nails, bolts and other hardware for satisfactory erection of work. Except where noted to be stainless steel, provide hot-dipped galvanized finish complying with ASTM A153 for hardware exposed to exterior, located in toilet rooms, in contact with treated wood or in contact with roofing or flashing.
1. Nails: ASTM F1667. Common wire nails, except where noted otherwise on drawings; sizes as noted or specified herein.
    - a. Subflooring: Deformed shank nails.
  2. Attachment to Concrete or Masonry: Metal expansion type shields or inserts; sizes as required to accommodate applied fastener; spacing as indicated on drawings.
    - a. "DH" or "Ankr-Tight" by WEJ-IT or equal by RED HEAD or HILTI.
    - b. Sleeve type for masonry.
    - c. Wedge type for concrete.
  3. Adhesive Type Anchor Bolts – In Hollow CMU: Chemically grouted adhesive anchor systems with nylon or stainless steel screen inserts. Use 1/2 inch diameter anchors, unless otherwise noted.
    - a. HIT HY20 Adhesive Anchors, HILTI, INC.
    - b. EPCON System, ITW/RAMSET/RED HEAD
    - c. Chem-Stud Adhesive Anchors, RAWLPLUG COMPANY, INC.
    - d. Simpson Set Epoxy- Tie Adhesive Anchors, SIMPSON STRONG-TIE COMPANY, INC.
  4. Adhesive Type Anchor Bolts - In solid grouted CMU and Concrete: Chemically grouted adhesive anchor systems. Use 3/4 inch diameter anchors, unless otherwise noted.
    - a. HIT HY150 Adhesive Anchors, HILTI, INC.
    - b. EPCON System, ITW/RAMSET/REDHEAD
    - c. Chem-Stud Adhesive Anchors, POWERS FASTENERS, INC.
    - d. Simpson Set Epoxy-Tie Adhesive Anchors, SIMPSON STRONG-TIE COMPANY, INC.
  5. Attachment to Steel Studs: Self tapping screws of sufficient length and strength to perform the functions for which they are used.
  6. Roof Construction
    - a. Wood-to-Wood Attachment: 300 Series stainless steel, flat head.
      - 1) Plywood to Nailers: Minimum #8 x 1-3/4".
    - b. Wood-to-Metal Deck Attachment: Hot dip galvanized in accordance with ASTM A153; machine bolts, locknuts and washers; minimum 3/8" diameter.
    - c. Wood-to-Concrete Attachment: 300 Series stainless steel expansion anchors as specified above. Minimum 3/8" diameter, length as required for minimum 2" concrete embedment.
- B. Provide plates, anchors, hangers and other miscellaneous steel and iron shapes as required for framing and supporting woodwork and for anchoring or securing woodwork to concrete or wood structures.

1. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
  - a. Use for interior locations unless otherwise indicated.
2. Hot-Dip Heavy-Galvanized Steel Sheet: ASTM A653; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
  - a. Use for wood-preservative-treated lumber and where indicated.
3. Manufacturers: Provide products by one of the following:
  - a. SIMPSON STRONG-TIE COMPANY
  - b. CLEVELAND STEEL SPECIALTY COMPANY
  - c. USP STRUCTURAL CONNECTORS
  - d. PHOENIX METAL PRODUCTS

2.05 MISCELLANEOUS ITEMS

- A. Adhesives: Low VOC type. Water- and mold-resistant formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
- C. Sill Sealer: 3/8" thick by width required, self adhered close cell polyethylene foam sill sealer.

**PART 3 EXECUTION**

3.01 INSTALLATION

- A. General
  1. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate the work with a minimum of joints or the optimum jointing arrangement.
  2. Fit carpentry work to other work. Scribe and cope as required for accurate fit.
  3. Set wood framing accurately to required lines and levels.
  4. Provide framing members of sizes and at spacing shown, and frame openings as shown, or if not shown, comply with the recommendations of the "National Design Specifications for Wood Construction and Supplements" as published by the American Wood Council.
  5. Cut, join and tightly fit framing around other work.
  6. Do not splice structural members between supports unless otherwise detailed.
  7. Anchor and nail as indicated, or if not indicated to comply with the "Fastening Schedule" of the [OBC], 2304.9.

8. Fasteners
  - a. Use common wire nails, except as otherwise shown or specified herein.
  - b. Use finishing nails for exposed work.
  - c. Do not wax or lubricate fasteners that depend on friction for holding power.
  - d. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials.
  - e. Make tight connections between members.
  - f. Install fasteners without splitting of wood; predrill as required. Do not drive threaded friction type fasteners; turn into place.
  - g. Tighten bolts and lag screws at installation and retighten as required for tight connections prior to closing in or at completion of work.
  - h. Countersink nail heads on exposed carpentry work and fill holes.
  - i. Provide washers under bolt heads and nuts in contact with wood.
9. Nail plywood to comply with the recommendations of the American Plywood Association and OBC 2304.9.
10. Provide sill plates where wood framing is supported by concrete or masonry walls or piers. Anchor to embedded bolts as shown.
11. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

B. Wood Grounds, Nailers and Blocking

1. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached or screeded.
2. Coordinate location with other work; refer to shop drawings of such work, if any.
3. Attach to surfaces securely with anchor bolts or other attachment devices as shown, and as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry as work progresses, cutting to fit masonry unit size involved. Anchor to formwork before concrete placement.
4. Provide grounds of dressed, key-bevelled lumber not less than 1-1/2" wide and of the thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required. Where indicated as permanent grounds, provide treated lumber.
5. Anchor plates, blocking, nailers, etc. to masonry and concrete masonry units (units with cores grouted solid) with minimum 1/2" diameter fasteners spaced at 4' o.c., unless otherwise indicated. Situations requiring special bolting shall be with size and spacing of bolts as required.

3.02 MISCELLANEOUS INSTALLATIONS

- A. Backing Panels: Provide plywood backing panels for electrical and telephone

equipment where indicated.

1. Provide fire-retardant material at interior locations.
  2. Provide preservative treated material at exterior locations.
- B. Underlayment: Install where indicated over subflooring. Install with construction adhesive in accordance with manufacturer's recommendations, staggering all joints with subflooring joints. Supplement adhered connections with mechanical fasteners.
1. Where underlayment is being installed over existing wood subflooring, insure that existing subflooring is tight and secure. Add blocking and screws as required.

### 3.03 WOOD TREATMENT

- A. Preservative Treated Wood Products: Provide pressure treatment for all lumber and plywood as specified hereinbefore.
1. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
    - a. Use inorganic boron for items that are continuously protected from liquid water.
    - b. Use copper naphthenate for items not continuously protected from liquid water.
- B. Fire Retardant Treated Wood Products: Provide fire retardant treatment on all lumber and plywood as specified hereinbefore.

### 3.04 CLEANING

- A. Clean up debris and cuttings daily. Remove and dispose of excess materials and debris created by carpentry.
- B. Maintain the building and site free of accumulations of cutting and waste materials in a neat orderly condition acceptable to the Architect.

### 3.05 WASTE MANAGEMENT

- A. Do not burn scraps of treated wood. Do not mix treated wood scraps with untreated wood. Hazardous wastes shall be separated, stored, and disposed of according to local regulations.

**END OF SECTION**

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## **SECTION 06 16 00**

### **SHEATHING**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

A. Provide sheathing work as shown and specified. Work includes:

1. Air-barrier and water-resistant gypsum sheathing.

##### **1.02 RELATED SECTIONS**

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Rough Carpentry: Section 06 10 00.
- C. Cold Formed Framing: Section 05 40 00
- D. Fluid Applied Membrane Air Barrier (CMU locations): Section 07 27 26.

##### **1.03 REFERENCES**

A. Standards

1. American Society for Testing and Materials (ASTM)
  - a. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - b. D3498 - Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
  - c. D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
  - d. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials]
2. ASTM C1280 Standard Specification for Application of Gypsum Sheathing.
3. ICC ES AC212 Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing.
4. Provide wall sheathing products meeting requirements for water-resistive barrier in accordance with ICC-ES AC310
5. ASTM C1280 Standard Specification for Application of Gypsum Sheathing.
6. ASTM C1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.]

1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings indicating framing connection details, fastener connections and dimensions.
  - 1. Air Barrier Sheathing: Submit shop drawings indicating locations and extent of Air Barrier system, including details of typical conditions, special joint conditions, intersections with other building envelope systems and materials; counter flashings and details showing bridging of envelope at substrate changes, details of sealing penetrations, and detailed flashing around windows and doors
  - 2. Product Test Reports: For each air-barrier and water-resistant sheathing assembly, indicating compliance with specified requirements, for tests performed by a qualified testing agency.
- B. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- C. Submit manufacturer's certification that fire-rated assemblies proposed meet project requirements, including evidence of approved test reports acceptable to governing building code enforcing authorities, that assemblies when installed with proposed materials, will meet or exceed fire ratings required.
- D. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.

1.05 QUALITY ASSURANCE

- A. Air Barrier Sheathing:
  - 1. Build integrated mockups of exterior wall assembly, incorporating backup wall construction, window, storefront, door frame and sill, ties and other penetrations, and flashing to demonstrate crack and joint treatment and sealing of gaps, terminations, and penetrations of air-barrier sheathing assembly.
    - a. Subject to compliance with requirements, approved mockups may become part of the completed Work.
  - 2. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of air-barrier and water-resistant sheathing.
- B. Gypsum Board Systems: Comply with ASTM C840 "Application and Finishing of Gypsum Board", and as specified.
- C. Fire-Rated Construction: Comply with fire resistance ratings indicated on drawings and as required by governing authorities and codes. Provide materials, accessories and application procedures that have been listed by Underwriters Laboratories or tested in accordance with ASTM E119 for the type of construction



shown.

1.06 STORAGE AND HANDLING

- A. Store off the ground.
- B. Protect from direct contact with the weather.
- C. Provide proper ventilation.

1.07 JOB CONDITIONS

- A. Time delivery and installation of carpentry work to avoid delaying trades whose work is dependent on, or affected by, the carpentry work and to comply with protection and storage requirements.
- B. Installer must examine the surfaces and supporting structure and the conditions under which the carpentry work is to be installed, and notify the Contractor in writing of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- C. Correlate location of furring, nailers, blocking, grounds and similar supports so that attached work will comply with design requirements.

1.08 WARRANTY

- A. Air Barrier Sheathing Warranty: Manufacturer's standard form in which sheathing manufacturer agrees to repair or replace sheathing products that demonstrate deterioration or failure under normal use due to manufacturing defects within warranty period specified, when installed according to manufacturer's instructions.

- 1. Warranty Period: 10 years following date of Substantial Completion.

**PART 2 PRODUCTS**

2.01 EXTERIOR GYPSUM BOARD AND SHEATHING

- A. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing: ASTM C 1177/1177M, Type X, coated or treated fiberglass mat gypsum sheathing with integral weather-resistant barrier and air barrier complying with ASTM E 2178.
  - 1. Thickness: 5/8 inch (15.9 mm) thick.
  - 2. Edges: Square.
  - 3. Flashing and Transitions Strips: As acceptable to sheathing manufacturer.
  - 4. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference when tested according to ASTM E 2178.

5. Vapor Permeance: Minimum 15 perms minimum when tested according to ASTM E 96/E 96M, Desiccant Method, Procedure A.
6. Sheathing Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. when tested according to ASTM E 2357.
7. Fire Propagation Characteristics: Complies with NFPA 285 testing as part of an approved assembly.
8. Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by sheathing manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
9. Manufacturers:
  - a. Securock ExoAir 430 by USG/TREMC

## 2.02 HARDWARE AND ACCESSORIES

- A. Provide all necessary screws, nails, bolts and other hardware for satisfactory installation of work.
  1. Fasteners, General: Size and type complying with manufacturer's written instructions for Project conditions and requirements of authorities having jurisdiction.
- B. Self-Adhering Seam and Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, seam tape consisting of polyolefin film with acrylic adhesive, meeting and tested as part of an assembly meeting performance requirements.

## **PART 3 EXECUTION**

### 3.01 INSTALLATION

- A. Examine substrates and installation conditions. Do not proceed with sheathing work until unsatisfactory conditions have been corrected.
  1. Protrusions of framing, twisted framing members, or unaligned members must be repaired before installation of sheathing is started.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

### 3.02 GYPSUM EXTERIOR SHEATHING

- A. Air-Barrier and Water-Resistant Gypsum Sheathing
  1. Install and fasten sheathing according to manufacturer's installation instructions
  2. Fastener and penetration treatment: Treat all countersunk

- fasteners with specified fluid applied flashing for sealing joints.
3. Coordinate installation of sheathing with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
  4. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
  5. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip and or preformed silicone extrusion, so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
  6. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of sheathing material with foam sealant.
  7. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
  8. Seal top of through-wall flashings to sheathing with transition strip.
  9. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
  10. Repair punctures, voids, and deficient lapped seams in strips and transition strips extending 6 inches beyond repaired areas in strip direction.

**END OF SECTION**

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SECTION 06 41 00 - CUSTOM CABINETS AND WOODWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Plastic Laminate Cabinets.
- B. Cabinet Hardware.

1.02 REFERENCES

- A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
- B. ANSI A208.1 - American National Standard for Particleboard; 2009.
- C. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).
- E. BHMA A156.9 - American National Standard for Cabinet Hardware; 2015.
- F. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.03 SUBMITTALS

- A. Product Data.
- B. LEED Documentation: Submit information required by Section 01 35 31 for the following targeted credits:
  - 1. Credit MR 4: Materials and Resources - Recycled Content.
  - 2. Credit MR 5: Materials and Resources - Regional Materials.
  - 3. Credit MR 7: Materials and Resources - Certified Wood.
  - 4. Credit EQ 4.1: Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
  - 5. Credit EQ 4.4: Indoor Environmental Quality - Low-Emitting Materials - Composite Wood and Agrifiber Products.
- C. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- D. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
- E. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.

1.04 PRE-INSTALLATION MEETING

- A. Convene not less than one week before starting work of this section.

1.05 DELIVERY, STORAGE, AND PROTECTION

- A. Protect units from moisture damage.

1.06 PROJECT CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

- A. Refer to Section 01 60 00 - Product Requirements.

2.02 LEED REQUIREMENTS

- A. Materials and Resources - Recycled Content.

- B. Materials and Resources - Certified Wood: Provide wood-based materials and products which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood based building components.
- C. Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
  - 1. Multipurpose Construction Adhesives: 70 g/l.
- D. Indoor Environmental Quality - Low-Emitting Materials - Composite Wood & Agrifiber Products.
  - 1. Composite Wood and Agrifiber Products: Composite wood and agrifiber products used on the inside of the building (inside of the weatherproofing system) shall contain no added urea formaldehyde resins.
    - a. Laminating adhesives used to fabricate on-site and shop applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

#### 2.03 CABINET CONSTRUCTION

- A. Perform cabinet construction in accordance with AWI/AWMAC/WI (AWS) Section 400 as follows:
  - 1. Plastic Laminate Cabinets: Custom quality.

#### 2.04 PANEL MATERIALS

- A. Particleboard: ANSI A208.1; medium density industrial type, composed of wood chips bonded with interior grade adhesive under heat and pressure; sanded faces; thickness as required; use for components indicated on drawings.
- B. Medium Density Fiberboard (MDF): ANSI A208.2; composed of wood fibers pressure bonded with moisture resistant adhesive to suit application; sanded faces; thickness as required.
- C. Formaldehyde Free Medium Density Fiberboard (MDF): ANSI A208.2; composed of wood fibers pressure bonded with moisture resistant adhesive with no added formaldehyde, to suit application; sanded faces; thickness as required.
  - 1. Product: Medex, manufactured by Sierra Pine Composite Solutions.
- D. Hardboard: ANSI A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth two sides (S2S). Use for drawer bottoms, dust panels, and other components indicated on drawings.

#### 2.05 LAMINATE MATERIALS

- A. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications and as follows:
  - 1. Exposed Surfaces: HGS, 0.048 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
  - 2. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
  - 3. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.
- B. Manufacturers:
  - 1. Formica Corporation: [www.formica.com](http://www.formica.com).
  - 2. Nevamar: [www.nevamar.com](http://www.nevamar.com).
  - 3. WilsonArt International: [www.wilsonart.com](http://www.wilsonart.com).
  - 4. Approved Equal.
- C. Surface Color and Pattern: As listed in the Finish Schedule.

#### 2.06 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards and coordinated shelf rests, satin chrome finish, for nominal 1 inch spacing adjustments.
- C. Drawer and Door Pulls: bar pull, stainless steel with satin finish, 4 inch centers.

D. Drawer Slides:

1. Manufacturers:
  - a. Basis of Design: Accuride International, Inc.
  - b. Hafele America Co.
  - c. Knap & Vogt Manufacturing Company.
2. Light/Medium Duty Drawer Slides For Drawers 24 inches Wide or Less: Accuride 7434 with overtravel.
  - a. Overtravel: 1 inch.
  - b. Type: All ball bearing, full extension, rail-mounted, hold-in detent, smooth progressive movement.
  - c. Capacity: 100 pounds per pair for 18-inch slide length.
  - d. Finish: Clear zinc.
3. Heavy Duty Drawer Slides For Drawers 42 inches Wide or Less and Standard File Drawers: Accuride 3640.
  - a. Type: All ball bearing, full extension, rail/bracket-mounted, hold-in detent, smooth progressive movement with 1 inch overtravel.
  - b. Capacity: 200 pounds per pair for 18-inch slide length.
  - c. Finish: Clear zinc.

E. Hinges: 5 knuckle type; stainless or chromium plated steel with satin polished finish.

2.07 FABRICATION - CABINETS

- A. Cabinet Style: Flush overlay.
- B. Cabinet Doors and Drawer Fronts: Flush style.
- C. Drawer Construction Technique: Dovetail joints.
- D. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- E. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- F. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- G. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
  1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
  2. Cap exposed plastic laminate finish edges with material of same finish and pattern.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION - CABINETS

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use concealed joint fasteners to align and secure adjoining cabinet units.
- C. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- D. Secure cabinets to floor using appropriate angles and anchorages.
- E. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION 06 41 00



## **SECTION 07 10 00**

### **WATERPROOFING**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. Whether indicated on the drawings or not, provide waterproofing in the following applications and areas:
  - 1. Wall areas where floor slab is below grade: Semi-liquid or sheet membrane, Contractor's option.
  - 2. Elevator pit walls: Semi-liquid or sheet membrane, Contractor's option.
  - 3. Elevator pit bottom slab: Sheet membrane.
  - 4. Other areas where indicated.
- B. Surface preparation, primers, and protective covering.

##### **1.02 RELATED SECTIONS**

- A. Ceramic tile waterproofing membrane: Section 09 30 00.
- B. Building Insulation: Section 07 21 00.
- C. Sealants: Section 07 92 00.
- D. Sustainable Design Requirements: Section 01 81 13.
- E. VOC Limits: Section 01 81 16.

##### **1.03 SUBMITTALS**

- A. Shop Drawings: Submit details of special joint or termination conditions and conditions of interface with other materials. Edge terminations, flashing details, treatment of joint penetrations or projections at large scale. Details shall reference each material, sequence of placement and application procedure.
- B. Product Data: Submit for all items. Include construction details, material descriptions, and tested physical and performance properties of waterproofing and manufacturer's written instructions for evaluating, preparing, and treating substrate..

- C. Samples: For each exposed product and for each color and texture specified, including the following products:
  - 1. 8-by-8-inch square of waterproofing and flashing sheet.
  - 2. 8-by-8-inch square of insulation.
  - 3. 4-by-4-inch square of drainage panel.
- D. Statement of Application: Submit statement signed by Contractor and installer, stating that work complies with these specifications and that the installation methods complied with the manufacturer's printed specifications and instructions for the conditions of installation and use on this project.
- E. Applicator's License Certificate: Copy of "Certificate of License" issued to system applicator by manufacturer.
- F. Sample warranty.
- G. Contamination Profile: Manufacturer shall provide the Installer, Contractor and Owner with a tabular profile of chemicals, solutions, oils, compounds or materials which are injurious to the fluid-applied membrane system. This profile shall be established by generic (or trade name) basis, including those materials normally found to exist in the work environment or likely to occur on this work. The system should not be exposed to materials (directly or indirectly) as established by the Contamination Schedule during application or after completion of the work.
- H. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
  - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in the manufacture of specific type of waterproofing membrane systems specified with ten years minimum experience.
- B. Installer/Applicator: Company specializing in application of specified waterproofing with five years minimum experience and trained and approved by waterproofing manufacturer.
- C. Obtain primary materials for each waterproofing type required from single manufacturer. Provide secondary materials only as recommended and approved by manufacturer of primary materials.
- D. Pre-Waterproofing Conference
  - 1. Contractor: Prior to installation of waterproofing and associated work, schedule and administer a pre-installation meeting at the project site to

review the material selections, installation procedure, special details, flashings, coordination, inspection procedures, and protection and repairs.

- a. Attendance: Architect, Contractor, Installer, manufacturers' representatives and trades requiring coordination with the work.
- b. Contractor: Take minutes and provide copies to all attendees.

E. Manufacturer's Representative (primary material manufacturer): Furnish services of manufacturer's technical representative at the job site at the start of installation, periodically as work progresses and after completion as necessary to advise on every phase of the waterproofing work.

- 1. Install entire system in accordance with the manufacturer's instructions except where more stringent requirements are indicated or specified, then the more stringent requirements shall govern.

F. Contractor: Notify Architect 72 hours in advance of scheduled waterproofing work.

G. Installer to advise General Contractor of finish and curing requirements of concrete surfaces, as relates to application of the waterproofing materials, prior to installation of those substrates.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened packaging fully identified with brands, type, grade, class and other qualifying information including instruction for use and identifying numbers.
- B. Storage waterproofing materials in a dry area away from high heat, flames or sparks. Provide weatherproof covering on top and all sides, allowing for adequate ventilation.
- C. Store protection board flat and off the ground, preferably on a wood platform. Provide weatherproof covering on top and all sides.
- D. Store only as much material at point of use as required for each day's work.
- E. Handling: Handle all materials in a manner to prevent damage of any kind. Remove damaged material from the site and replace with new specified material.

#### 1.06 JOB CONDITIONS

- A. Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
  - 1. Surfaces to receive membrane shall be free of water, dew, frost, snow and ice.

- B. Ventilation: Provide positive ventilation for enclosed areas continuously throughout the application and for a minimum of 8 hours afterward or until coatings have completely cured.
- C. Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, etc.) to come in contact with the membrane. Exposures to foreign materials or chemical discharges must be presented to membrane manufacturer for evaluation to determine impact on membrane. See "Contamination Profile" specified under paragraph 1.03G herein.
- D. Special Precautions: Allow no open fires or spark-producing equipment in the application area until vapors and fumes have dissipated. Post "No Smoking" signs in area during application and maintain for at least 8 hours following application.

1.07      **WARRANTY**

- A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
  - 1. Warranty Period: Five (5) years from date of Substantial Completion.
- B. Installer's Special Warranty: Provide warranty for two (2) years against leaks, failures and defects. Upon notification of such defects, within the warranty period, make necessary repairs and replacements at the convenience of the Owner without additional cost to the Owner.

**PART 2      PRODUCTS**

2.01      **MATERIALS**

- A. Semi-Liquid Applied System
  - 1. Membrane: Elasticized rubberized asphaltic compound, self-bonding to normal substrates, hot poured, quick setting.
  - 2. Physical Properties
    - a. Water Vapor Permeability - ASTM E96, Procedure E: 0.027 perms.
    - b. Water Resistance - CGSB 37-GP-50M: No delamination, blistering, emulsification or deterioration.
    - c. Water Absorption - CGSB 37-GP-50M: Gain in weight 0.35 g maximum. Loss in weight 0.18 g maximum.
    - d. Penetration - ASTM D5329: At 77 degrees F, maximum 110; at 122 degrees F, maximum 200.
    - e. Elongation - ASTM D5329: 1000% minimum.
    - f. Low Temperature Crack Bridging Capability - CGSB 37-GP-50M:

No cracking, adhesion loss, or splitting.

3. Miscellaneous Materials: Primer, detail coatings, flashing, bonding adhesive, splicing cement, lap sealant, water cut-off mastic, pipe seals, pourable sealer, and other related items as recommended by membrane manufacturer.
  - a. Primer: Cut-back solvent type conforming to ASTM D41.
  - b. Reinforcing Sheet: EPDM/Butyl laminate sheet in uncut rolls.
    - 1) Heavy Duty: 63 mils.
    - 2) Standard Duty: 47 mils.
4. Miscellaneous: As required to complete installation.
5. Manufacturers
  - a. Liquid Membrane 6125 by AMERICAN HYDROTECH
  - b. TremProof 6100 by TREMCO
  - c. CCW-500R by CARLISLE
  - d. 790-11 by HENRY
  - e. STRATASEAL HR by CETCO

B. Sheet Membrane System

1. Membrane: Self-adhering laminated sheet comprised of rubberized asphalt and polyethylene film; minimum 60 mil thickness. Furnish in 36" wide x 60' long rolls with release paper.
2. Physical Properties
  - a. Tensile Strength, Film - ASTM D882: 5000 psi.
  - b. Tensile Strength, Membrane - ASTM D412: 325 psi.
  - c. Pliability, 180 degree bend over 1" mandrel - ASTM D1970: -25 degrees F.
  - d. Cycling over 1/4" crack, 100 cycles - ASTM C836: At -25 degrees, no effect.
  - e. Permeance - ASTM E96, Method B: 0.05 perm.
  - f. Water Absorption: ASTM D570: 0.1% (weight/72 hours).
3. Miscellaneous Materials: Primer, detail coatings, flashing, bonding adhesive, splicing cement, lap sealant, water cut-off mastic, pipe seals, pourable sealer, and other related items as recommended by membrane manufacturer.
4. Cants: At all inside corners; minimum face 3/4".
5. Miscellaneous: As required for complete installation.
6. Manufacturers
  - a. Bituthene 4000 by W.R. GRACE
  - b. Mel-Rol System by W.R. MEADOWS
  - c. CCW MiraDri 860/861 by CARLISLE
  - d. WP-200 by HENRY
  - e. Polyguard 650 by POLYGUARD PRODUCTS
  - f. ENVIROSHEET by CETCO

C. Underslab Sheet Membrane: Reinforced, composite waterproofing sheet specifically designed for pre-applied underslab waterproofing conditions.

1. Performance Properties

- a. Resistance to Puncture (1" Rod) – ASTM E154: 220 pounds.
- b. Tensile Strength – ASTM D4632: 80 pounds.
- c. Resistance to Permeance by Moisture – ASTM E96: .01 perms.
- d. Water Absorption – ASTM D570: 0.5% maximum.
- 2. Miscellaneous Materials: Primer, detail coatings, flashing, bonding adhesive, splicing cement, lap sealant, water cut-off mastic, pipe seals, pourable sealer, and other related items as recommended by membrane manufacturer.
- 3. Manufacturer: The following products are acceptable provided they meet the specified performance properties:
  - a. Polyguard Underseal Underslab by POLYGUARD PRODUCTS
  - b. Preprufe 300 Membrane by W.R. GRACE.
  - c. Mel-Rol Precon Membrane by W. R. MEADOWS.
  - d. Miraply H by CARLISLE CCW
  - e. ULTRASEAL by CETCO
- D. Accessories
  - 1. Vertical Protection Board
    - a. Vertical Protection Board - At Elevator Pit Walls: Asphaltic hardboards "Protection Course" by W.R. MEADOWS or W.R. GRACE; 1/4" thick; one layer required.
    - b. Vertical Protection/Drainage – All Other Locations
      - 1) Description: 3/8" thick high impact polystyrene drainage core with filter fabric adhered to core.
      - 2) Adhesive and Tape: Types as recommended by drainage board manufacturer.
      - 3) Manufacturer: Hydroduct HSF by W.R. GRACE; Amerdrain 650 by AMERICAN WICK DRAIN CORPORATION; CCW Miradrain 6200XL by CARLISLE; Hydrodrain by HYDROTECH; PolyFlow 15 by POLYGUARD PRODUCTS.
    - c. Insulation Protection Board: Rigid insulation. See Section 07 21 00. Provide in addition to drainage board at all location except elevator pit walls.
  - 2. Horizontal Protection/Drainage Board
    - a. Description: 3/8" thick high impact polystyrene drainage core with filter fabric adhered to core.
    - b. Adhesive and Tape: Types as recommended by drainage board manufacturer.
    - c. Manufacturer: Hydroduct HSF by W.R. GRACE; Amerdrain 650 by AMERICAN WICK DRAIN CORPORATION; CCW Miradrain 6200XL by CARLISLE; Hydrodrain by HYDROTECH; PolyFlow 18 by POLYGUARD PRODUCTS, AQUADRAIN 30H by CETCO.
  - 3. Expansion Joint Fillers: Provide membrane support and additional membrane length at joints.
    - a. Above Grade: Sponge foam tubing, size and properties as recommended by waterproofing membrane manufacturer.
    - b. Below Grade: Closed cell neoprene gaskets; ASTM D1056 Class SC (oil resistant and medium swell), 2 to 5 psi compression deflection.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the waterproofing.
  - 1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
  - 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D4263.
  - 3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.02 PREPARATION OF SUBSTRATES**

- A. Prepare, fill, prime, and treat substrates to receive waterproofing membrane, including joints, cracks, corners and penetrations according to manufacturer's written instructions and recommendations. Remove dust and dirt from joints and cracks according to ASTM D 4258.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction. Mask termination elevations to prevent application of waterproofing materials on surfaces exposed to view.
- C. Remove grease, oil, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.
- E. Semi-Liquid Membrane: Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- F. Outside Corners: Bevel or round outside corners of substrate by grinding to produce a minimum 3/4" face or radius if not provided under Division 03 or use other means to treat outside corners approved by waterproofing manufacturer.
- G. Inside Corners: Prepare and treat using methods recommended by manufacturer.
- H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to manufacturer's written instructions and recommendations and ASTM D 6135 (for

sheet membrane).

### 3.03 INSTALLATION - SEMI-LIQUID SYSTEM

#### A. General

1. Comply with manufacturer's instructions and details, except where more stringent requirements are indicated or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
2. Terminate membranes above wearing surface as indicated and where concealed by subsequent finish materials. Where concealment is not possible, terminate slightly below wearing surface (approximately  $\frac{1}{2}$ ").

#### B. Flashing

1. Install elastomeric flashing sheets at terminations of waterproofing membrane according to manufacturer's written instructions.
2. Prime substrate with surface conditioner.
3. Install elastomeric flashing sheet and adhere to deck and wall substrates in a layer of hot rubberized asphalt.
4. Extend elastomeric flashing sheet up walls or parapets a minimum of 8 inches above and 6 inches onto deck to be waterproofed.
5. Install termination bars and mechanically fasten to top of elastomeric flashing sheet at terminations and perimeter of waterproofing.

#### C. Membrane

1. Apply surface conditioner, at manufacturer's recommended rate, over prepared substrate and allow to dry.
2. Heat and apply rubberized asphalt according to manufacturer's written instructions.
  - a. Heat rubberized asphalt in an oil- or air-jacketed melter with mechanical agitator specifically designed for heating rubberized asphalt.
3. Start application with manufacturer's authorized representative present.
4. Reinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to a thickness of 90 mils; embed reinforcing fabric, overlapping sheets 2 inches; spread another 125-mil-thick layer to provide a uniform, reinforced, seamless membrane 215 mils thick.
5. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.
6. Cover waterproofing with protection course with overlapped joints while membrane is still hot to ensure good bond.

### 3.04 INSTALLATION - SHEET MEMBRANE SYSTEM

#### A. General



1. Comply with manufacturer's instructions and details, except where more stringent requirements are indicated or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
  2. Terminate membranes above wearing surface as indicated and where concealed by subsequent finish materials. Where concealment is not possible, terminate slightly below wearing surface (approximately  $\frac{1}{2}$ ").
- B. Comply with ASTM D6135.
- C. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- D. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
- E. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.
- F. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- G. Seal edges of sheet-waterproofing terminations with mastic.
- H. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.
- I. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.
- J. Immediately install protection course with butted joints over waterproofing membrane.
- 3.05 INSTALLATION – UNDER SLAB SHEET MEMBRANE
- A. Preparation: As recommended by membrane manufacturer. Compact substrate as specified in Division 31, Earthwork. Remove loose aggregate or sharp protrusions. Fill gaps or voids greater than  $\frac{1}{2}$ ". Remove standing water prior to membrane applications.

- B. Installation: In accordance with manufacturer's instructions.

### 3.06 INSTALLATION OF DRAINAGE AND PROTECTION ASSEMBLY

- A. Exposed Waterproofing System: Provide protection assemblies as follows:

1. Horizontal Surfaces: After all curing, testing and repair work is complete, install protection/drainage board assembly as follows:
  - a. Install drainage panels over membrane, with tight butt joints and completely covering membrane. Adhere with adhesive as recommended by panel manufacturer.
  - b. Overlap fabric onto previous panel. Adhere overlapped filter fabric with tape or mastic as recommended by manufacturer.
  - [c. Place pavers and pedestals over insulation and protection/drainage board.]
2. Vertical Surfaces
  - a. Elevator Pit Walls: After all curing and repair work is complete and prior to backfilling, install one layer of 1/4" thick protection board over membrane, placing boards with tight butt joints and completely covering membrane.
  - b. All Other Walls
    - 1) After all curing and repair work is complete and prior to backfilling, install one layer of drainage/protection board over membrane, placing boards as recommended by manufacturer with tight butt joints and completely covering membrane.
    - 2) Rigid Insulation: Provide rigid insulation in addition to drainage/protection board. See Section 07 21 00.

### 3.07 FIELD QUALITY CONTROL

- A. Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish daily reports to Architect.
- B. Prepare test and inspection reports.

### 3.11 CLEANING, PROTECTION AND REPAIR

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- B. Protect installed board insulation and insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after

installation.

C. Horizontal Applications

1. Do not permit foot or vehicular traffic on unprotected membrane.
2. After installation of protection board, no traffic is permitted on deck except as required to install subsequent materials and then only after additional protection is provided.
3. Provide additional (temporary) protection as follows:
  - a. Pedestrian Traffic: 3/4" plywood sheets.
  - b. Light Equipment: Minimum 2x planking over plywood.

- D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

**END OF SECTION**

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## **SECTION 07 11 13**

### **BITUMINOUS DAMPPROOFING**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. Provide bituminous dampproofing on exterior of perimeter foundation walls, turn down slabs, and concrete / masonry back-up surfaces within wall cavity from top of slab at grade down to top of footings along the subsurface perimeter that does not enclose conditioned areas of approximately 4 to 6 feet in depth.

##### **1.02 RELATED SECTIONS**

- A. Waterproofing: Section 07 10 00.
- B. Concrete Masonry: Section 04 00 00.
- C. Below Grade Vapor Retarders: Section 07 26 00.

##### **1.03 SUBMITTALS**

- A. Product Data: Submit manufacturer's specifications, application instructions and general recommendations for dampproofing. Include data substantiating that materials are recommended by manufacturer for applications indicated.
- B. Statement of Application: Submit statement signed by Contractor and installer, stating that work complies with these specifications and that the installation methods complied with the manufacturer's printed specifications and instructions for the conditions of installation and use on this project.

##### **1.04 QUALITY ASSURANCE**

- A. Manufacturer: Company specializing in the manufacture of specific type of dampproofing system specified with ten years minimum experience.
- B. Manufacturer's Representative (primary material manufacturer): When required, furnish services of manufacturer's technical representative at the job site to advise on dampproofing work.
  - 1. Install in accordance with the manufacturer's instructions except where more stringent requirements are indicated or specified, then the more stringent requirements shall govern.

##### **1.05 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials in manufacturer's original, unopened packaging fully identified with brand, type, grade, class and other qualifying information including instruction for use and identifying numbers.
- B. Storage materials in a dry area away from high heat, flames or sparks. Provide weatherproof covering on top and all sides, allowing for adequate ventilation.
- C. Store only as much material at point of use as required for each day's work.
- D. Handling: Handle all materials in a manner to prevent damage of any kind. Remove damaged material from the site and replace with new specified material.

1.06 JOB CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.
  - 1. Surfaces to receive dampproofing shall be free of water, dew, frost, snow and ice.
- B. Ventilation: Provide positive ventilation for enclosed areas continuously throughout the application and for a minimum of 8 hours afterward or until coatings have completely cured.
- C. Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, etc.) to come in contact with the material.
- D. Special Precautions: Allow no open fires or spark-producing equipment in the application area until vapors and fumes have dissipated. Post "No Smoking" signs in area during application and maintain for at least 8 hours following application.

**PART 2 PRODUCTS**

2.01 BITUMINOUS DAMPPROOFING

- A. Description: Cold-applied water based fiber reinforced asphalt compound, non-asbestos.
- B. Reference: Conform to ASTM D1227, Type II, Class 1 and ASTM D1187, Type I.
- C. Manufacturer: HE789 by HENRY, 220AF Fibrated Emulsion Dampproofing by KARNAK CORPORATION, Hydrocide 700B by BASF BUILDING SYSTEMS, Sealmastic Emulsion by W.R. MEADOWS.

**PART 3 EXECUTION**

3.01 COORDINATION

- A. Coordinate application of dampproofing with laying of concrete masonry units, rigid insulation, reinforcing and veneer work.

- 1. Contractor must obtain Architect's approval to apply dampproofing when concrete masonry and veneer work progress simultaneously.

3.02 SURFACE CONDITIONS

- A. Concrete Masonry Surfaces: Flush joints; free of loose mortar chipped or broken masonry or other irregularities.
- B. Verify surfaces are clean, dry and free of frost, dew, loose dirt, and foreign matter.

3.03 PROTECTION

- A. Mask off or otherwise protect adjoining surfaces which are not scheduled to receive dampproofing to effectively prevent spillage or overspray of materials beyond dampproofed area.

3.04 INSTALLATION

- A. Comply with manufacturer's instructions and details, except where more stringent requirements are indicated or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
- B. Apply dampproofing in a manner to completely cover wall surface and seal around reinforcing.
- C. Thickness: 1/16" to 1/8".
- D. Application Method: Brush or spray.

3.05 CLEAN-UP

- A. Clean stains from adjacent materials. Replace materials that cannot be cleaned at no additional cost to Owner.

**END OF SECTION**

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**SECTION 07 21 00**  
**THERMAL INSULATION**

**PART 1      GENERAL**

1.01      WORK INCLUDED

- A.      Perimeter and under slab insulation.
- B.      Waterproofing protection board, when used as combination protection board/perimeter insulation.
- C.      Rigid insulation in masonry cavity walls with CFMF back-up.
- D.      Rigid insulation in masonry cavity walls and rainscreen applications.
- E.      Mineral wool batt insulation in exterior stud framing walls.
- F.      Semi Rigid mineral wool insulation in masonry cavity walls with CMU back-up.

1.02      RELATED SECTIONS

- A.      Wood Nailers: Section 06 10 00.
- B.      Roof Insulation: Section 07 54 23.
- C.      Firestopping (Safing): Section 07 84 00.
- D      Sustainable Design Requirements: Section 01 81 13.
- E      VOC Limits: Section 01 81 16.

1.03      SUBMITTALS

- A.      Product Data: Submit for all items.

1.04      QUALITY ASSURANCE

- A.      Insulation Thermal Properties: Thermal conductivity k-factors and thermal resistance R-values indicated are values at 75 degrees F., mean temperature.
  - 1.      Where insulation is identified by R-value, provide thickness required to achieve indicated R-value. Foam insulation R-values are "aged" thermal values in accordance with LTTR – Long Term Thermal Resistance predicted by ASTM C1289.

- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- C. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
  - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver insulation materials in manufacturer's original, unopened, and labeled packages.
- B. Store insulation materials at the site inside storage trailers or the building in a dry, ventilated place. Exterior storage not permitted. Comply with manufacturer's recommendations for handling and protection during installation.
- C. Remove fibrous batt insulation that has become wet before or after installation. Replace with new, dry insulation.
- D. Protect plastic insulation from excessive exposure to sunlight. Protect at all times against ignition. Complete installation and covering of plastic insulation materials as rapidly as possible in each area of work.

### **PART 2 PRODUCTS**

#### 2.01 RIGID BOARD INSULATION - POLYSTYRENE

- A. Extruded-Polystyrene Board Insulation: ASTM C578, Type IV, 25 psi, 1.6 p/cf.; maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
  - 1. Plaza deck and double slab areas: ASTM C578 Type III, 60 psi, 2.2 p/cf.
- B. Thicknesses: Provide the following unless otherwise indicated on the drawings.
  - 1. Perimeter/Under Slab Application: 2 inch.
  - 2. Furred Wall Application: 1-1/2 inch.
  - 3. Waterproofing Protection Board Application: 1-1/2 inch.
- C. Adhesive: Types as recommended by insulation manufacturer for substrates and substrate coating materials where applicable.
- D. Manufacturer: Subject to compliance with requirements, provide products by DOW CHEMICAL - DUPONT Styrofoam; OWENS CORNING Foamular; KINGSPAN GreenGuard; DIVERSIFOAM PRODUCTS Certifoam

## 2.02 RIGID BOARD INSULATION - SHEATHING

- A. Material: Polyisocyanurate, foil faced, conforming to ASTM C1289, Type I, Class 2, minimum density 1.9 pcf.; foam-plastic core and facings shall have a flame-spread index of 25 or less when tested individually.
  - 1. Compressive Strength – ASTM D1621: 25 psi.
  - 2. Flexural Strength – ASTM C203: 40 psi.
  - 3. Water Absorption – ASTM C206: Maximum 0.05% by volume.
  - 4. Water Vapor Permeance – ASTM E96: <0.03 perms.
- B. Thickness: 2", unless noted otherwise.
- C. Fasteners and Adhesive: Types as recommended by insulation manufacturer.
- D. Manufacturer: Thermax DOW CHEMICAL; Energy Shield by ATLAS ROOFING; Isoshield Silver by APACHE PRODUCTS; R-MAX Ecomax: Xci by HUNTER.

## 2.03 MINERAL WOOL BATT INSULATION

- A. Manufacturer: Basis of Design ROCKWOOL COMFORTBATT. Subject to compliance with requirements, provide products by THERMAFIBER, ROXUL or FIBREX INSULATIONS INC.
- B. Unfaced: ASTM C 665 Type I; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
  - 1. Thickness: 3.5".
  - 2. R-value: 4.0 per inch.
  - 3. Facing: Unfaced.
  - 4. Density: 2 pcf.
- D. Hardware: Clip as recommended by manufacturer compatible with types of wall systems.

## 2.04 ACCESSORY MATERIALS

- A. Supplementary Support: Provide galvanized wire mesh, woven wire ties or flexible metal rods where required for supplementary support of insulation in permanent proper location.
- B. Insulation Clips
  - 1. Description: Perforated metal plates (2" x 2") with metal spindle welded and extending through center. Speed washer (1" x 1") snaps over spindle to secure insulation.

2. Adhesive: Type as recommended by clip manufacturer for adhesion to the various substrates.
3. Spacing: As recommended by manufacturer.
4. Spindle Length: As selected to ensure tight fit without compressing insulation so as to decrease insulation value.
5. Manufacturer: AGM INDUSTRIES, INC. Series T TACTOO Insul-Hangers; ECKEL INDUSTRIES OF CANADA; Stic-Klip Type N Fasteners; GEMCO; Spindle Type.

## **2.05 RIGID MINERAL WOOL INSULATION**

- A. Manufacturer: Basis of Design ROCKWOOL COMFORTBOARD 110. Subject to compliance with requirements, provide products by THERMAFIBER, ROXUL or FIBREX INSULATIONS INC.
- B. Unfaced: ASTM C 612; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
  1. Thickness: 2.0".
  2. R-value: 4.0 per inch.
  3. Facing: Unfaced.
  4. Density: 11 pcf.
- C. Hardware: Clip as recommended by manufacturer compatible with types of wall systems.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Examine substrates and installation conditions. Do not proceed with insulation work until unsatisfactory conditions have been corrected.
- B. Verify substrate surfaces are dry and free of irregularities or substances harmful to insulation. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.
- C. Verify mechanical and electrical services within walls have been installed and tested.
- D. Fill miscellaneous voids and spaces in wall framing and at window and door framing with batt insulation loosely stuffed in place.

### **3.02 WALL INSTALLATION OF RIGID MINERAL WOOL BOARD INSULATION - CAVITY**

- A. Install per manufacturer's written instructions. Fit boards tightly together and

around penetrations.

- B. Place to ensure tight joints between all insulation panels installed.
- C. Use manufacturer's suggested adhesive and or mechanical fasteners to bond the insulation panel to substrate.
- D. CMU Backup Cavity: Place insulation panels to clear wall ties, yet maintain a tight joint between the panels.

### 3.03 INSTALLATION OF RIGID BOARD INSULATION - PERIMETER INSULATION

- A. Place at all slab-on-grade conditions at building perimeter.
- B. Adhere to substrate as required to maintain insulation in final location prior to backfilling.
- C. Coordinate placement of insulation with placement of vapor barrier. See Section 07 26 00.

### 3.04 INSTALLATION OF RIGID BOARD - WATERPROOFING PROTECTION BOARD

- A. Coordinate installation of insulation (waterproofing protection board) with application of waterproofing. See Section 07 10 00.
- B. Place insulation boards with long edge horizontally on exterior waterproofed walls below grade.

### 3.05 INSTALLATION OF MINERAL WOOL RIGID BOARD INSULATION – UNDER EXTERIOR METAL PANELS AND SIDING

- A. Coordinate installation of insulation with metal panel and siding contractor.
- B. Install insulation board in accordance with manufacturer's written instructions
- C. Place insulation so as to maintain tight joints between insulation panels and between insulation panels and furring members.
- D. If required, use insulation manufacturer's suggested adhesive to bond the insulation panel to the wall.

### 3.06 INSTALLATION OF MINERAL WOOL BATT INSULATION

- A. Install in accordance with manufacturer's written recommendations.
- B. Install blanket type insulation with tight fitting butt joints. Provide supplementary support at vertical and horizontal installations when required to maintain insulation in permanent proper location..

C. Fit insulation between members. Do not over-compress.

D. Fit insulation closely around electrical boxes, pipes frames and other object in or passing through insulation.

E. Keep insulation three (3) inches from heat admitting devices such as recessed light fixtures.

3.07

**END OF SECTION**

## **SECTION 07 26 16**

### **BELOW-GRADE VAPOR RETARDERS**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. Provide membrane vapor retarders below interior concrete floor slabs-on-grade.

##### **1.02 RELATED SECTIONS**

- A. Above-Grade Vapor Retarders: Section 07 26 13.
- B. Dampproofing (Natatorium CMU Cavity Wall): Section 07 11 13.

##### **1.03 SUBMITTALS**

- A. Product Data: Submit on all items.

##### **1.04 PROJECT CONDITIONS**

- A. Do not install membrane vapor retarders until substrate construction and all penetrating items and features are completed.
- B. Obtain Architect's acceptance of installed membrane vapor retarders before installing covering materials.

##### **1.05 QUALITY ASSURANCE**

- A. Note: It is the intent of the drawings and this section to provide a complete continuous vapor retarder envelope at all [Natatorium] perimeter walls and roof. At all junction points between the two planes, lap membrane approximately 6" and seal with tape or other methods recommended by membrane manufacturers. Notify Architect of areas or situations where a continuous vapor retarder cannot be achieved. Do not cover vapor retarder with other materials until vapor retarder has been inspected by the Architect.
- B. Prior to concrete placement, receive letter from vapor barrier manufacturer verifying installation is per ASTM E164

#### **PART 2 PRODUCTS**

##### **2.01 VAPOR RETARDER MATERIALS**

- A. Slab-On-Grade – Zero Perm Application

1. Water Vapor Retarder: ASTM E1745; Class A or B.
  2. Water Vapor Transmission Rate: Maximum 0.006 gr./ft<sup>2</sup>/hr. when tested in accordance with ASTM E96.
  3. Perm Rating: Maximum 0.01 gr./ft<sup>2</sup>/hr. when tested in accordance with ASTM E96, Procedure A.
  4. Puncture Resistance: ASTM E1745, minimum 1970 grams.
  5. Tensile Strength: ASTM E1745, minimum 45.0 lbf/in.
  6. Manufacturers/Products
    - a. Premoulded Membrane Vapor Seal with Plasmatic Core by W. R. MEADOWS.
    - b. Stego Wrap (15 mil) Vapor Retarder; STEGO INDUSTRIES.
    - c. Vapor Guard; REEF INDUSTRIES.
  7. Applications: Provide under slabs indicated to receive finish materials that are critically sensitive, low permeance floor coverings requiring a moisture-emission level at 3 lbs. of water/1000 sq. ft. of slab per ASTM F1869, Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride. Includes floor coverings of rubber, sheet vinyl, carpet with vinyl backing, urethane, epoxy, methyl methacrylate, linoleum and wood.
- B. Tape: Pressure sensitive, high density polyethylene tape produced by vapor retarder manufacturer; specifically designed for sealing vapor retarder sheet joints. Single faced and double faced as required by installation conditions. Minimum 4" width.
1. Provide type recommended for below grade applications.

### **PART 3 EXECUTION**

#### **3.01 PRE-INSTALLATION CONFERENCE**

- A. Not less than two weeks before starting installation of materials in the section, the contractor will convene a meeting at project site with Architect, Owner's representative, Contractor installer foreman/superintendent, material manufacturer's representative, [Commissioning Agent] and mechanical and electrical trades.
1. Review project requirements, required submittals, status of substrate work, areas of potential conflict and interference, availability of materials, installer's personnel, equipment and facilities, construction schedule, weather and forecasted weather conditions, and coordinate methods, procedures and sequencing requirements for proper installation, integration and protection of the work.

#### **3.02 INSTALLATION**

- A. Interior concrete floor slabs-on-grade. Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions;



place sheets in position with longest dimension parallel with direction of pour.

1. Install a single layer of membrane vapor retarder material over level compacted base.
2. Secure vertical surfaces to walls and column bases; fold corners. Provide sealed contact with piping, conduit, and all other penetrating items. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments (such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier). At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab.
3. Lap joints minimum of 6" with manufacturers recommended tape. Provide sealed contact with piping, conduit, and all other penetrating items.
4. Premolded expansion joint material specified in section 03 30 00 is applied after vapor retarder is in place.
5. Seal punctures and cuts before placing concrete. Repair as recommended by manufacturer. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
6. Trim exposed vapor retarder at floor line after concrete has been cured and hardened.

### 3.02 PROTECTION

- A. Protect installed membrane vapor retarder from damage until installation of covering materials. Seal all cuts, punctures, and penetrations of membrane vapor retarders with tape.
- B. When vapor retarder is used in conjunction with perimeter insulation, the vapor retarder shall be placed in a manner to isolate the insulation from the prepared subgrade and foundation wall surfaces.

**END OF SECTION**

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## **SECTION 07 27 26**

### **FLUID-APPLIED MEMBRANE AIR BARRIERS**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. This Section includes the following for CMU backup exterior walls:

1. Type 1 - Fluid-applied vapor retarding air barrier.

##### **1.02 RELATED SECTIONS**

- A. Air-Barrier and Water-Resistant Gypsum Sheathing: Section 06 16 00.
- B. Building Insulation for foam-plastic board insulation: Section 07 21 00.
- C. Joint Sealants for joint-sealant materials and installation: Section 07 92 00.

##### **1.03 DEFINITIONS**

- A. ABAA: Air Barrier Association of America.
- B. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

##### **1.05 REFERENCES**

- A. The following standards are applicable to this section:
1. ASTM E2178: Standard Test Method for Air Permeance of Building Materials.
  2. ASTM E283: Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
  3. ASTM E1677 Specification for Air Retarder (AR) Material or System for Low-Rise Framed Building Walls
  4. ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
  5. ASTM E96: Water Vapor Transmission of Materials.
  6. CGSB 37-GP-56M: Membrane, Modified, Bituminous, Prefabricated, and Reinforced.

##### **1.06 SUBMITTALS**

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.
- B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction. Include details of interfaces with other materials that form part of air barrier. Include details of mockups.
- C. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.
- D. Qualification Data: For Applicator.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers.

1.07 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Mockups: Before beginning installation of air barrier, [apply air barrier to masonry mock-up constructed under section 04 00 00] [build mockups cold-formed metal framing and sheathing construction indicated and apply air barrier] to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.
  - 1. Coordinate construction of mockup to permit inspection by testing agency of air barrier before external insulation and cladding is installed.
  - 2. Include junction with foundation wall intersection.
  - 3. If Architect determines air barrier applications to mockups do not comply with requirements, reapply air barrier until approved.
- C. Preinstallation Conference: Conduct conference at Project site.
  - 1. Include installers of other construction connecting to air barrier, including roofing, waterproofing, architectural precast concrete, masonry, sealants, windows, glazed curtain walls, and door frames.
  - 2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.
- D. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a

liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations and where applicable, tie-ins to installed waterproofing], and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier manufacturer.
- B. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- C. Store rolls according to manufacturer's written instructions.
- D. Protect stored materials from direct sunlight.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.10 WARRANTY

- A. Submit manufacturer's 10 year material warranty.

**PART 2 PRODUCTS**

2.01 FLUID-APPLIED MEMBRANE AIR BARRIER – TYPE 1

- A. Class 1 Fluid-Applied, Vapor-Retarding Membrane Air Barrier: Cold-applied, elastomeric membrane.
  - 1. Products: Subject to compliance with requirements, provide either synthetic polymer or modified bituminous from one of the following:
    - a. HENRY COMPANY
    - b. CARLISLE COATINGS & WATERPROOFING
    - c. MEADOWS, W. R., INC.
    - d. STO CORPORATION
    - e. RUBBER POLYMER CORP.
    - f. BASF
    - g. TREMCO
    - h. Subject to compliance with the specified performance requirements, products manufactured by others are acceptable upon Architects

approval.

2. Physical and Performance Properties

- a. Air Permeability ASTM E2178: 0.004 cfm / ft<sup>2</sup> @ 1.57 lbs / ft<sup>2</sup> and have no increased air leakage when subjected to a sustained wind load of 10.5 lbs/ft<sup>2</sup> for 1 hour and gust wind load pressure of 62.8 lbs/ft<sup>2</sup> for 10 seconds when tested at 1.6 lbs/ft<sup>2</sup> to ASTM E331
- b. Water vapor permeance: 0.09 perms to ASTM E96
- c. Wet Film Thickness: Per manufacturer as required to achieve performance and code compliance.
- d. Surface Burning: ASTM E 84 Class A flame spread and smoke developed.
- e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- f. Adhesion to Substrate: Minimum 20 lbf/sq. in. when tested according to ASTM D 4541

- B. Self-adhering transition membrane: Vapor permeable air barrier membrane consisting of a microporous film laminate, backed with adhesive, which allows water vapor to permeate through while acting as a barrier to air and rain water. Membrane shall have the following physical properties:

1. Air leakage: <0.002 CFM/ft<sup>2</sup> @ 1.6 lbs/ft<sup>2</sup> to ASTM E283
2. Membrane Thickness: 17 mils
3. Low temperature flexibility -40 degrees F: Pass to ASTM D3111

2.03 AUXILIARY MATERIALS

- A. Primer and block filler: Liquid waterborne or solvent-borne primer recommended for substrate by manufacturer of air barrier material.
- B. Through-Wall Flashing and Transition Membrane (Self-Adhering): SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film. Membrane shall have the following physical properties:
1. Membrane Thickness: 0.0394 inches (40 mils)
  2. Film Thickness: 4.0 mils
  3. Flow (ASTM D5147): Pass @ 212 degrees F
  4. Puncture Resistance: 134 lbf to ASTM E154
  5. Tensile Strength (film): 5723 psi ASTM D882
  6. Tear Resistance: 13lbs. MD to ASTM D1004
  7. Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M
- C. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.
- D. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
- E. Adhesive and Tape: Air barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.
- F. Stainless-Steel Sheet: ASTM A240, Type 304, 0.0187 inch thick, and Series 300

stainless-steel fasteners.

- G. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft density; flame spread index of 25 or less according to ASTM E162; with primer and non-corrosive substrate cleaner recommended by foam sealant manufacturer.
- H. Preformed Silicone-Sealant Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
- I. Joint Sealant: ASTM C920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Section 07 92 00.
- J. Other materials as recommended by barrier manufacturer for a complete air and water tight barrier.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
  - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
  - 2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
  - 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
  - 4. Verify that masonry joints are flush and completely filled with mortar.
  - 5. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.02 SURFACE PREPARATION**

- A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.

- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

### 3.03 JOINT TREATMENT

- A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C1193 and air barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.
  - 1. Prime substrate and apply a single thickness of preparation coat strip extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of air barrier membrane and embed a joint reinforcing strip in preparation coat.
- B. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C1193 and with air barrier manufacturer's written instructions. Apply first layer of fluid air barrier membrane at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air barrier membrane over joint reinforcing strip.

### 3.04 TRANSITION STRIP INSTALLATION

- A. Install strips, transition strips, and auxiliary materials according to air barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
  - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
  - 2. Install transition strip so that a minimum of 3 inches of coverage is achieved over both substrates.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.
  - 1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- C. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction



used in exterior wall openings, using accessory materials.

- D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- E. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply manufacturer's recommended transition strip so that a minimum of 3 inches of coverage is achieved over both substrates. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
  - 1. Transition Strip: Roll firmly to enhance adhesion.
  - 2. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.
  - 3. Preformed Silicone-Sealant Extrusion: Set in full bed of silicone sealant applied to walls, frame, and membrane.
- G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.
- H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- I. Seal top of through-wall flashings [, specified in Section 04 00 00.] to air barrier with an additional 6-inch- wide, strip.
- J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

### 3.05 AIR BARRIER MEMBRANE INSTALLATION

- A. Apply air barrier membrane to form a seal with strips and transition strips and to achieve a continuous air barrier according to air barrier manufacturer's written instructions.
- B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.
- C. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas

exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- D. Apply a continuous unbroken air barrier to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties.
  1. Membrane Air Barrier: 40-mil dry film thickness or greater thickness as required to meet specified performance properties.
- E. Apply strip and transition strip a minimum of 1 inch onto cured air membrane according to air barrier manufacturer's written instructions.
- F. Do not cover air barrier until it has been tested and inspected by testing agency
- G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

### 3.06 FIELD QUALITY CONTROL

- A. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
  1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
  2. Continuous structural support of air barrier system has been provided.
  3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
  4. Site conditions for application temperature and dryness of substrates have been maintained.
  5. Maximum exposure time of materials to UV deterioration has not been exceeded.
  6. Surfaces have been primed, if applicable.
  7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
  8. Termination mastic has been applied on cut edges.
  9. Strips and transition strips have been firmly adhered to substrate.
  10. Compatible materials have been used.
  11. Transitions at changes in direction and structural support at gaps have been provided.
  12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
  13. All penetrations have been sealed.
- B. Remove and replace deficient air barrier components and retest as specified above.

3.07 CLEANING AND PROTECTION

- A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
  - 1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more than 60 days or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions..
  - 2. Protect air barrier from contact with incompatible materials and sealants not approved by air barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Remove masking materials after installation.

**END OF SECTION**

## **SECTION 07 42 44**

### **METAL COMPOSITE MATERIALS WALL PANELS**

#### **PART 1 GENERAL**

##### **1.01 SCOPE OF WORK**

- A. Provide all labor, materials, equipment, and services necessary for the installation of a preformed metal wall panel system, complete and weather tight. Work shall include but not be limited to panels, stiffeners, fasteners, and weather seals required for a complete installation of panels to the support system provided for this scope of work.
  - 1. Furnish and install a preformed, prefinished composite wall panel system
  - 2. Accessory items such as panel subgirt system, clips, flashings, sealants, and gaskets.
- B. Shop Fabricated MCM Rout and Return Dryjoint System: Incorporating a pressure equalized system on a complete air and vapor seal, allowing air and vapor which enters the panel chamber to drain to the exterior of the wall, and allowing air into the pressuring chamber to provide instantaneous pressure equalization. Vents and drain holes shall be inconspicuously located and in such positions as not to contribute to staining, streaking or marking of the panel face.

##### **1.02 RELATED SECTIONS**

- A. Miscellaneous Steel Framing: Section 05 50 00.
- B. Cold-Formed Metal Framing: Section 05 40 00.
- C. Sealant: Section 07 90 00.

##### **1.03 DESIGN AND PERFORMANCE CRITERIA**

- A. General Performance: Wall panel assemblies shall comply with performance requirements without failure due to defective manufacturing, fabrication, installation, or other defects in construction.
  - 1. Design, fabricate, and erect a pressure equalized wall panel system to meet the requirements of AAMA 508-7
- B. Metal panel system: Designed by manufacturer so that attachment allows panels to successfully accommodate seismic and thermal movement without causing "oil-canning", undue stress on fasteners, or failure of weather seals.

- C. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330.
  - 1. Wind Loads: Indicated on the drawings.
  - 2. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/180 of the span.
- D. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- E. 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: 6.24 lbf/sq. ft.
- F. 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. Provide for free and noiseless thermal movement and structure deflection of components as may be caused by a temperature variation.
- G. Individual panels shall be removable without disturbing adjacent panels.
- H. Panels shall not warp or buckle when under full design loads.
- I. All fastenings and connectors shall be concealed.
- J. Fire Performance
  - 1. ASTM E 84 Flame Spread Index must be less than 25, Smoke Developed Index must be less than 450.
  - 2. ASTM D 1929 A self ignition temperature of 650° F or greater
- K. Fire Propagation Characteristics: Metal composite material wall panel system passes NFPA 285 testing

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum of (5) years experience in the design and manufacturing of preformed metal wall panel systems with a minimum of (3) projects of similar size and scope of this project, utilizing this type of dry-joint composite panel system.
- B. Single Source Quality Control - Metal panel system manufacturer: Provide all design, engineering, panel fabrication, and assembly of panel system in manufacturing facility.

- C. Installer Qualifications: Minimum of (5) years experience in the installation of the specified panel system type, and be an authorized installer of the preformed metal panel system manufacturer.
- D. Metal Panel System Tolerances
  - 1. Maximum panel bow shall not exceed 2% of panel dimensions in width or length, with an overall maximum tolerance of .1875" within panel face.
  - 2. Face of panel shall not vary in plane to any adjacent panel greater than 1/16".
  - 3. Maximum 1/32" between mitered panel extrusions.
- E. Painted Finishes: Performed by an applicator specifically approved by the paint manufacturer. The applicator shall provide written notification of approval by paint manufacturer prior to application of the finish.
- F. Mock-Up Panels: Prior to proceeding with the composite wall panel system work, construct a mock-up of the panel system at the job site, for the Architect's review and approval, to establish the general construction and appearance of the installed system. Include horizontal and vertical joint conditions, extrusions and flashings. Provide required back-up structure representative of actual project substrate conditions.
  - 1. Size of mock-up as required accommodating elements specified above. However, mock-up must be a minimum of 6' x 6'.

#### 1.06 SUBMITTALS

- A. Manufacturer's Certification: Submit written certification that metal panel system manufacturer has a minimum of (5) years experience in the design, engineering, and manufacturing of the type of panel system specified. Submit (3) reference projects of similar size and scope utilizing the specified type of panel system.
  - 1. Qualification Data: For Installer.
- B. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- C. Samples: Submit physical samples as follows
  - 1. (4) 12" square panels mounted with specified system attachments, paint finish for composite panel and for perimeter extrusion
  - 2. (2) 12" samples of each perimeter extrusion to be used
  - 3. (6) paint samples from composite panel manufacturers and paint applicator for perimeter extrusion
  - 4. (2) 12" samples of extruded internal system gaskets
  - 5. (6) standard color charts for specified silicone sealant manufacturer
- D. Shop Drawings: Submit complete metal panel system shop drawings with keyed plans, elevations, and sections. Specific details shall be included for all panel

conditions and all interfaces with all other exterior wall systems. Included coordinated details from shop drawings for other exterior wall systems. Drawings shall also indicate method of attachment, location of internal stiffeners and weather seals, and drainage method for perimeter extrusion system.

- D. Structural Calculations: Submit structural calculations for the design and performance of the metal panel system, including specified and building code windloads, deflections, in-place stresses, and capacity of fasteners. Calculations and submittal drawings shall be stamped by a Professional Engineer licensed in the **State Of Kentucky**.
- E. Sealant Adhesion Testing: Submit sealant manufacturer's adhesion test results and recommendations for surface preparation to fluoropolymer paint finish.

#### 1.07 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal composite material panel systems that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
  - 2. Structural failures including rupturing, cracking, or puncturing.
  - 3. Deterioration of metals and other materials beyond normal weathering.
  - 4. Warranty Period: Two years from date of Substantial Completion.
- B. Panel Finishes: See Section 05 05 13.

### **PART 2 PRODUCTS**

#### 2.01 ACCEPTABLE MANUFACTURERS/FABRICATORS

- A. Panel Manufacturers: Alucobond by 3A COMPOSITES USA, Reynobond by REYNOLDS METALS COMPANY, Larson by ALUCOIL, Alpolc by MITSUBISHI, CITADEL ARCHITECTURAL PRODUCTS or CHEMICAL AMERICA.
- B. Panel System Fabricators/Installers: Provide rout and return dry-joint metal composite system designed and fabricated by the metal panel systems specified in paragraph 2.01A or by fabricators certified by the panel manufacturers. All panel fabricators' systems must meet the specified design and performance requirements and conform to the design intent indicated on the drawings.
  - 1. Basis of Design Fabricator - Panel System: ROYALTECH 3000.

#### 2.02 MATERIALS

- A. Panels: General Description: Two sheets of alloy AA3000 Series aluminum (0.019" thick) sandwiching a non-combustible core formed in a continuous process.
  - 1. Thickness: .157" nominal.
  - 2. Weight: 1.16 lbs/sf
  - 3. Core: Fire retardant



- 3. Tolerances
  - a. Panel Bow: Maximum 0.8% of any 72" panel direction.
  - b. Deviation from Flatness: Maximum 1/8" in 60" in any direction for assemblies unit; non-accumulative.

- C. Fasteners: Subgirt and panel fasteners shall be non-corrosive type as recommended by panel system manufacturer. Size and spacing shall be as required by structural calculations.
- D. Provide matching custom factory-fabricated integral companion flashing, trims, end caps and finishing components from same material as the aluminum building panels.

## 2.03 FABRICATION

- A. Machine fabricated all material in accordance with reviewed shop drawings with straight lines, square corners or smooth bends, free from twists, kinks, warps, dents, and other imperfections which may affect appearance or serviceability.
  - 1. Fabricate panels to sizes and configurations as indicated on drawings. All panel joints shall occur exactly where indicated on drawings
- B. Provide reinforced panels as required to meet the tolerances specified above.
- C. Panels shall be aligned with no lap or reveal other than joint width to permit expansion and contraction.
- D. Thickness of the metal and details of assembly and support shall provide sufficient strength and stiffness to resist distortion of finish surface. Exposed edges and ends of metal shall be dressed smooth, free from sharp edges and with no uniform minimum radius corners. Connections and joints exposed to weather shall be constructed to exclude water.
- E. All necessary holes shall be drilled and clip attachments applied before application of finish.
- F. Design and fabricate appropriate type, size, quantity and spacing of all sub-connectors, girts, fasteners and other anchorage devices as required to suit the specified standards.

H. Panel stiffeners required for flatness and deflection shall be applied to the panel with structural silicone and compatible glazing tape.

I. Field fabrication of panels is not permitted.

## 2.03 PAINT FINISHES

A. Finishes:

1. Exterior Face Sheet: Fluoropolymer finish containing not less than 70% PVDF (Kynar 500) resins.
  - a. Color: Color A, B and C - Architect to select from manufacturer's standard colors
2. Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations.
3. Strippable coating shall be clear color, 2-1/2 mils thick, applied to all exterior face sheet materials after finish painting and prior to embossing and roll forming.
4. Interior Face Sheet: White polyester paint suitable for field finish painting.
5. Trim: Extruded aluminum; finish to match panels.

B. To optimize panel finish uniformity, complete exterior panel elevations shall be finished from the same paint batch, in the same production run, utilizing directional arrows for consistency of application.

## **PART 3 EXECUTION**

### 3.01 PRE-INSTALLATION CONFERENCE

- A. Not less than two weeks before starting installation of materials in the section, the contractor will convene a meeting at project site with Architect, Construction Manager, Owner's representative, Contractor installer foreman/superintendent, material manufacturer's representative, and mechanical and electrical trades. Review project requirements, required submittals, status of substrate work, areas of potential conflict and interference, availability of materials, installer's personnel, equipment and facilities, construction schedule, weather and forecasted weather conditions, and coordinate methods, procedures and sequencing requirements for proper installation, integration and protection of the work.
- B. Examine substrates, areas, penetrations and conditions, for compliance with requirements for installation tolerances, metal composite material panel supports, and other conditions affecting performance of the Work.

### 3.02 INSTALLATION

- A. Panel system installer shall be authorized by the metal panel system manufacturer and familiar with the specific details required for this project

- B. Provide at least (1) person to be present at all times who is capable of providing layout for the metal panel system. Notify Architect of any dimensional discrepancies that may affect panel system installation.
- C. Install metal panel system in accordance with fabricator's instructions and recommendations and the approved shop drawings for the project.
- D. Install panel system to subgirt system with specified fasteners and within specified tolerances for joinery, level, and plumb.
  - 1. Maximum offset from true alignment of adjacent panels installed butting or in line shall be  $1/16"$ .
  - 2. Panel to panel joints shall not vary greater than  $1/16"$  of the joint size indicated on drawings.
- E. Where required, install sealant with proper joint backing.

**END OF SECTION**

**END OF SECTION**

## **SECTION 07 46 46**

### **MINERAL-FIBER CEMENT SIDING**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. Provide mineral-fiber cement siding planks, corner trim, fasteners, building paper and other miscellaneous items as required for a complete installation.

##### **1.02 RELATED SECTIONS**

- A. Sheathing: Section 06 16 00 .
- B. Sealant: Section 07 92 00.
- C. Wood Blocking and Framing: Section 06 10 00.

##### **1.03 REFERENCE STANDARDS**

- A. ASTM: American Society for Testing and Materials.

##### **1.04 SUBMITTALS**

- A. Product Data: Submit manufacturer's product specifications, details, drawings and installation instructions for each component required.
- B. Samples: Submit minimum 9" long by full width sample of siding and trim showing Each type of finish, pattern, color, profile, and thickness, as applicable.
- C. Shop Drawings: Submit installation drawings for all components indicating relationship with each other and with adjacent materials and construction. Where installation details deviate from drawings or specification requirements, indicated such deviations on shop drawings.

##### **1.05 DELIVERY, HANDLING AND STORAGE**

- A. Conform to manufacturer's requirements for delivery, handling and storage.
- B. Exercise care so as not to damage or deform material.
- C. Stack on platforms or pallets and cover to protect from weather.
  - 1. Install covering to allow adequate ventilation.
  - 2. Allow approximately 2 weeks acclimation to atmosphere at construction site.
  - 3. Protect edges and corners from chipping.

1.06 WARRANTY

- A. Manufacturer's Warranty: Provide Hardie HZ5 or HZ10 Reveal Panel Limited Product Warranty, with 30-year limited product warranty against manufacturing defects:
1. Substrate: Warranted against splitting, cracking and delamination.
  2. Cracking (Definition): Refers to cracking to such a degree as to render the product unsuitable for ordinary use. Cracking does not include minute fractures of the applied finish.
- B. Workmanship: Application limited warranty 3 years.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: James Hardie Building Products, Inc., which is located at: 231 South LaSalle Street Unit 2000, Chicago, IL 60606. ASD. Toll Free Tel: 866-274-3464; Tel: 312-705-6000; Email: [request info \(info@jameshardie.com\)](mailto:info@jameshardie.com); Web: <http://www.jameshardiepros.com/Products/Hardie-Reveal-Panel-System>
- B. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 01600

2.02 CLADDING AND TRIM

- A. **Cement Cladding Panels: Hardie Panel Vertical Siding with ColorPlus Technology as manufactured by James Hardie Building Products, Inc. 5/16 inches thick 4 feet wide by 8 and 10 feet long. Product shall be engineered for climate conditions.**
1. Manufacturer's Climate Zone Product: HZ5 for freezing wet climates with a green tint primer. Confirm climate zone with manufacturer.
- B. Code Compliance Requirement for Siding Materials.
1. Fiber-cement siding, complies with ASTM C 1186 Type A Grade II.
  2. Fiber-cement siding, complies with ASTM E 136 as a noncombustible material.
  3. Fiber-cement siding, complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
  4. Fiber-cement siding, complies with ASTM E 119 1 hour and 2 hour fire resistive assemblies listed with Warnock Hersey.
  5. Fiber-cement siding, tested to ASTM E330 for Transverse Loads.
  6. Intertek Warnock Hersey Product Listing

2.03. WEATHER BARRIER

- A. Weather Barrier: James Hardie HardieWrap and HardieWrap Flashing and Seam Tapes

B. Code Compliance Requirement for Weather Barrier:

1. Thickness, 11 mil sheet.
2. Breathability in accordance with ASTM E96.
3. Tear strength in accordance with ASTM D1117.
4. Water resistance in accordance with AATCC127.
5. Air Penetration in accordance with TAPPI – T460.
6. HardieWrap Weather Barrier ICC-ES Evaluation Report ESR-2258.

2.04 FURRING (STRAPPING)

- A. Rainscreen Cavity: Install Hardie Reveal Panels on a drained and vented rainscreen cavity, with a minimum 3/4 inch (19mm) air cavity. Selection of cavity vent materials shall be incorporated into the design to prevent insect and pest entry.

2.05 ACCESSORIES

- A. Trims: Trims manufactured by EasyTrim, Fry Reglet or Tamlyn.
- B. Aluminum alloy 6063-T5 with a minimum thickness of 0.050 inch. All reveal trims are 8 feet in length.

1. Surround horizontal trim.
2. Surround vertical trim.
3. Surround horizontal end cut transition trim.
4. Surround outside corner trim.
5. Surround inside corner trim.
6. Surround J channel trim.
7. Surround drainage flashing.
8. Recess horizontal trim.
9. Recess vertical trim.
10. Recess horizontal edge trim.
11. Recess vertical F-trim.
12. Recess outside corner trim.
13. Recess drainage flashing.

- C. Finishes of Trims: Clear anodized aluminum.

2.07 MISCELLANEOUS ITEMS/FASTENERS

A. Fasteners:

1. Metal Framing: 1.5 inch (38mm) [AGS-100] .100 inches by 25 inches (2540 mm by 635 mm) ET&F Pin or equivalent pneumatic fastener.
2. Color: Fastener heads to match color of panels.

- B. Sealant: Urethane type. See Section 07 92 00.

- C. Flashing: 24 ga stainless-steel.

2.08 FINISHES

- A. Factory Finish: Product: ColorPlus Technology by James Hardie.
- B. Definition: Factory applied finish; defined as a finish applied in the same facility and company that manufactures the siding substrate.
- C. Process: Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photospectrometer and verified by third party.
- D. Protection: Factory applied finish protection such as plastic laminate that is removed once siding is installed.
- E. Accessories: Complete finishing system includes pre-packaged touch-up kit provided by fiber cement manufacturer. Provide quantities as recommended by manufacturer
- F. Colors: Color A and Color B as indicated on the elevations as selected from manufacturer's Statement Collection colors.

### **PART 3      EXECUTION**

#### **3.01          INSPECTION**

- A. Commencement of siding installation implies acceptance of the substrate as suitable to accept siding.
- B. Discard materials that are chipped, unsound, improperly treated, not adequately seasoned or too small to fabricate work with a minimum number of joints, or which are of defective manufacture with respect to surfaces, sizes or patterns.

#### **3.02          COORDINATION**

- A. Coordinate installation of siding and trim with installation of exterior sheathing/weather barrier and with installation of trim.

#### **3.03          INSTALLATION**

##### **A.      Metal Framing**

Metal Framing: Minimum 20 gauge 3 5/8 " C-stud 16 inches maximum. Metal framing complying with local building codes., including the use of Weather -resistive barriers and /or vapor barriers where required. Minimum 1 1/2 " face and straight, true, of uniform dimensions and properly aligned.

- 1. Repair any punctures or tears in the water resistive barrier prior to the installation of the siding
- 3. Protect siding from other trades

##### **B.      Furring**

- 1. Install furring on a minimum 3/4 " rainscreen cavity or in accordance with



local building code for rainscreen requirements.

C. Installation

1. Fastening Method: Exposed
2. Place fasteners no closer than 3/4" from panel edges and 2" from panel corners.
3. Use fasteners as specified in the James Hardie tech Data Sheet and In the Hardie Reveal Panel installation instructions.
4. Install panels using 1/2" spacers at horizontal joints. Leave bottom edge of panel above all horizontal trims exposed, no caulking shall be placed at this overlap of Horizontal Trim. Factory primed edge should always be used.
5. Allow minimum vertical clearance between the bottom edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
6. Maintain clearance between siding and adjacent finish grade.
7. Allow minimum 1 inch vertical clearance between roofing and bottom edge of siding.
8. Face nail to sheathing.
9. Locate splices at least 12 inches away from window and door openings.

3.04 FINISHING

- A. Factory Finish Touch Up: Apply touch up paint to cut edges in accordance with manufacturer's printed instructions.
1. Touch-up nicks, scrapes, and nail heads in pre-finished siding using the manufacturer's touch-up kit pen.
  2. Touch-up of nails shall be performed after application, but before plastic protection wrap is removed to prevent spotting of touch-up finish.
  3. Use touch-up paint sparingly. If large areas require touch-up, replace the damaged area with new pre-finished siding. Match touch up color to siding color through use of manufacturer's branded touch-up kits

3.05 CLEAN UP

- A. Clean all siding surfaces of dirt, grime, and other surface blemishes.
- B. Remove from the site all excess material; shipping, packaging, debris, and etc., related to the siding work.

**END OF SECTION**

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## **SECTION 07 52 16**

### **SBS MODIFIED BITUMEN ROOFING**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. Provide two ply modified bitumen roof system over rigid insulation on metal deck as indicated and specified. Work includes:
  - 1. Two ply (base and granular surfaced top) SBS modified membrane.
  - 2. Insulation.
  - 3. Recover board.
  - 4. Flashing and accessories.
  - 5. Warranties
  - 6. Installing roof flashing and roofing related sheet metal furnished under Section 07 62 00.

##### **1.02 RELATED SECTIONS**

- A. Wood Blocking: Section 06 10 00.
- B. Flashing: Section 07 62 00.
- C. Roof Drains, Vents and Curbs: Divisions 22 and 23.
- D. Sustainable Design Requirements: Section 01 81 13.

##### **1.03 REFERENCES**

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM C518 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
  - 2. ASTM C1289 Standard Specification for Faced Rigid Polyisocyanurate Thermal Insulation
  - 3. ASTM D41 Standard Specification for Asphalt Primer Used in Roofing, Dampproofing and Waterproofing.
  - 5. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
  - 6. ASTM D6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
- B. Factory Mutual Research (FM):

1. Roof Assembly Classifications.
- C. Underwriters Laboratories, Inc. (UL):
1. Fire Hazard Classifications.
- 1.04 QUALITY ASSURANCE
- A. Manufacturer Qualifications: Minimum five (5) years as the sole manufacturer of the brand name; furnish notarized certification that manufacturer has been in business and had roofs installed for a minimum of ten (10) years.
  - B. Installer Qualifications: Experienced roofing installer approved or licensed by roofing materials manufacturer and with not less than five (5) years of successful experience installing a minimum of five (5) modified bitumen roofing systems similar to those required for this project.
    1. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress. Maintain proper supervision of workmen.
  - C. Manufacturer's Representative: During installation, inspections shall be made daily in order to ascertain that the roofing system has been installed according to their published specifications, standards and details.
    1. Inspector Requirements & Qualifications: Engage an experienced technical inspector, to perform daily job monitoring for this project. Inspector shall be specialized in inspecting roofing similar to that required for this Project; must have a minimum of five years experience providing roof construction monitoring and shall have no manufacturer sales responsibilities; must be full time employee of the roofing system manufacturer to daily inspect the manufacturer's project and provide daily written reports to the Owner Representatives. The approved inspector must be certified as a Registered Roof Observer by the Roof Consultants Institute.
      - a. Preparatory inspection.
      - b. Initial inspection.
      - c. Daily inspections.
      - d. Final inspection.
  - D. FM Approvals Listing: Design and provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
  - E. Wind Uplift: Conform to requirements of IBC 1609 – 2017 and ASCE 7-10.
  - F. Exterior Fire-Test Exposure: ASTM E108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

- G. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- H. Owner reserves the right to cut test panels from the finished roof in order to determine that minimum requirements have been met.
  - 1. Roof Installer: Repair, at no additional cost to the Owner, the roof where test panels were taken.
- I. Insulation Thermal Properties: Thermal conductivity k-factors and thermal resistance R-values indicated are values at 75 degrees F., mean temperature.
  - 1. Where insulation is identified by R-value, provide thickness required to achieve indicated R-value. Foam insulation R-values are "aged" thermal values in accordance with LTTR – Long Term Thermal Resistance predicted by ASTM C1289-13.
- J. Source Limitations: Obtain all roofing system components including but not limited to insulation, cover board, insulation fasteners and adhesives, modified bitumen felts and adhesives, edging, coping, base flashing, adhesives, and all miscellaneous adhesives from a single proposed roofing system manufacturer. All components shall be supplied and warranted by the proposed roof system manufacturer.

#### 1.04 SUBMITTALS

- A. Shop Drawings: Submit for all items. Include as a minimum the following:
  - 1. Layout of roof.
  - 2. Setting plans for tapered insulation.
  - 3. Location and type of penetrations.
  - 4. Layout of mechanical fasteners, including perimeter requirements.
  - 5. Perimeter, penetration and special details.
  - 6. Description of all materials.
  - 7. Conformance to fire classifications requirements of IBC 1505.
- B. Manufacturer's Approval: Obtain manufacturer's written approval of final shop drawings prior to beginning roofing operations.
- C. Samples: Submit samples of all roofing and flashing materials, walkways and fasteners; 12" square samples of membrane indicating color and thickness.
- D. Submit certification from roofing manufacturer that:
  - 1. Roofing membrane and the selected roofing insulation are compatible.
  - 2. Specifications and drawing details are acceptable for the deck and surfacing materials to which materials are to be applied.

3. Installer is trained and approved for this type of installation.
  4. Roof system is adhered properly to meet or exceed the requirements of the specified requirements.
- E. Submit field quality-control reports.
- F. Warranties: Sample of special warranties detailing terms as required herein.
- G. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged, labeled bundles or containers.
- B. Store roofing materials and accessories at the site in storage trailers or in the building in a dry, well-ventilated, weather tight place. Exterior storage not permitted. Comply with manufacturer's recommendations for handling and protection during installation.
1. Handle rolled goods to prevent damage to edge or ends.
  2. Do not apply roofing materials to damp, frozen, dirty or dusty substrate surfaces.
- C. Protection
1. Protect adjacent materials and surfaces from damage and soiling during roofing system installation.
  2. Provide special protection or avoid heavy traffic on completed roofing work.
  3. Protect paving and structure walls adjacent to hoists before starting work.
  4. Do not overload the building structure with storage of materials or installation equipment on the substrate decking.
  5. Handle and store materials and equipment to avoid damage to substrate decking.

#### 1.06 PROJECT CONDITIONS

- A. Environmental Conditions: Install roofing only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

#### 1.07 WARRANTY

- A. Contractor and roofing subcontractor shall warrant the total roofing system (membrane, insulation and flashing) with respect to workmanship and proper application for two (2) years from the date of acceptance by the Owner. Should any leaks covered under the warranty occur during this period, corrective action

will be taken by the Contractor to repair the roof to the satisfaction of the owner and membrane manufacturer. ALL CORRECTIVE WORK WILL BE DONE AT NO COST TO THE OWNER.

- B. The manufacturer(s) of the materials used shall provide a written, No Dollar Limit, **twenty (20)** year guarantee on the complete roof installation. Upon warranty inspection and acceptance of the roof, the guaranty will be turned over to the Owner on behalf of the Contractor, by an authorized representative of the manufacturer. The guaranty shall begin when the project is completed and accepted by the Owner. At no additional cost, the Manufacturer shall provide performance warranty visits at years 2, 5, 10 & 15 to inspect, clean the roofs and provide the Owner with a list of Owner required roof maintenance to ensure warranty continuity. Manufacture shall provide a written report of each visit with photos and report documentation to the Owner through an online database that is maintained the entire warranty period and that is accessible from any computer. Submit final guaranty in triplicate.
  - 1. Warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories and other components of membrane roofing system.
  - 2. System shall be warranted for all requirements specified herein, including for wind uplift as required.
- C. Corrective measures on leaks shall be undertaken within seventy-two (72) hours after notification has been received by the Contractor or membrane manufacturer from the Owner.
- D. If manufacturer, Contractor or roofing installer has any variance with these specifications in order to comply with required guarantees, submit same in writing to the Architect within 10 days prior to bid.

## **PART 2      PRODUCTS**

### **2.01      MANUFACTURERS**

- A. Basis of Design: Specifications are based on products manufactured by Tremco. Provide specified Tremco POWERply system or Owner approved equal.

### **2.02      MATERIALS**

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Membrane Base Ply: ASTM D 6163, Grade S, Type III, glass-fiber-reinforced, 120

mil SBS-modified asphalt sheet smooth surfaced, suitable for application specified.

1. Basis of Design Product: Tremco Powerply Heavy Duty Base Sheet
- D. Membrane Top Ply: ASTM D 6163, Grade G, Type III, non wicking glass-fiber-reinforced, thermoplastic polyurethane(TPU), reactive enhanced terpolymer (RET and styrene butadiene styrene (SBS) modified asphalt sheet, smooth surfaced, with integrated RFID chip providing all production dating information, suitable for application specified
1. Granule Color: White
  2. Granule Loss: ASTM D4977, <1 lbs granule loss per roll
  3. Basis of Design Product: Tremco Powerply Endure 100 FR
- E. Base Ply Flashing: ASTM D 6163, Grade S, Type III, glass-fiber-reinforced, 120 mil SBS-modified asphalt sheet smooth surfaced, suitable for application specified.
1. Basis of Design Product: Tremco Powerply Heavy Duty Base Sheet
- F. Top Ply Flashing: ASTM D 6163, Grade G, Type III, non wicking glass-fiber-reinforced, thermoplastic polyurethane(TPU), reactive enhanced terpolymer (RET and styrene butadiene styrene (SBS) modified asphalt sheet, smooth surfaced, with integrated RFID chip providing all production dating information, suitable for application specified
1. Granule Color: White
  2. Granule Loss: ASTM D4977, <1 lbs granule loss per roll
  3. Basis of Design Product: Tremco Powerply Endure 100 FR

## 2.03 FASTENERS/ADHESIVES

- A. Wood: Roofing nails of galvanized steel, long enough to penetrate the wood by at least 3/4-inch.
- B. Masonry: Nail-in expansion type device with zinc body, plated steel nail, mushroom head and long enough to embed into masonry a minimum of 1-inch.
- C. Insulation: Mechanical fasteners for attachment of insulation and cover board to decking shall be approved by the insulation manufacturer for the system specified.
1. The same brand fastener is to be used throughout the roof system.
  2. Number of fasteners and layout will be as recommended by the manufacturer and as per FM Approval Guide for the specified wind uplift.
  3. Length of fastener shall be determined by the thickness of the decking and any fill, and will vary in thickness of the insulation. Fasteners shall be of length to achieve a minimum of 1-inch penetration. Mechanical fasteners for attachment of Insulation NOTE:
  4. Fasteners/Plates: Manufacturer's standard #14 series fastener with 3" steel insulation plates to attach insulation and cover boards to substrate.
    - a. Basis of Design Product: Tremco #1410 fasteners with 3" steel



insulation plates

- D. SBS Base Ply Fasteners/Plates: Manufacturer's standard #15 series fastener with 2" steel barbed fastener disk to attach SBS Base Sheet to substrate.
  - 1. Basis of Design Product: Tremco #1510 fasteners with 2" steel barbed fastener disk
- E. Cold-Applied Polymer-Modified Asphalt Adhesive: Roof membrane manufacturer's standard, asbestos-free, cold-applied adhesive, specially formulated for compatibility and use with interply sheets:
  - 1. Basis of Design Product: Tremco Powerply Standard Cold Adhesive
- F. SBS Flashing Mastic: Roof membrane manufacturer's standard, asbestos-free asphalt mastic:
  - 1. Basis of Design Product: Tremco ELS Asphalt Mastic

2.04 PRIMER

- A. Asphalt Primer: Asphalt modified bitumen with thermoplastic polymers and volatile solvents.
  - 1. Primer to be applied on all dissimilar materials as required by roof system manufacturer.
  - 2. Basis of Design Product: Tremco Tremprime LV.

2.05 INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C1289 "Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board," Type II, glass-fiber mat facer on both major surfaces.
  - 1. Tapered Insulation: 1/4" per foot. No slope under 1/4" per foot will be permitted.
  - 2. R-Value: Provide thickness for average R of 30 over entire roof area.
  - 3. Minimum Thickness at Drain: 2".
  - 4. Compressive Strength: Minimum 20 (Grade 2).
  - 5. Basis of Design; Tremco Trisotech Insulation
- B. Coverboard: ASTM C1177, glass-mat, water-resistant gypsum substrate, primed surface; 1/2" or as required for wind and fire requirements.
  - 1. Basis of Design Tremco Dens Deck Prime.
- C. Provide adhesives and mechanical fasteners as recommended by insulation manufacturer for substrates encountered.
  - 1. Adhesive: Manufacturer's low VOC compliant, fluid applied urethane

adhesive formulated to adhere to insulation and recover boards to substrate.

a. Basis of Design Product: Tremco Low Rise Foam Insulation Adhesive

D. Crickets (Tapered Insulation): Provide tapered insulation crickets sloped approximately 1/2" per foot. Locate and arrange as indicated on drawings or as required to divert water at rooftop equipment or vertical obstructions.

1. Material: Polyisocyanurate; conform to requirements and manufacturers specified herein.

2. Basis of Design; Tremco Trisotech Insulation

## 2.06 RELATED MATERIALS

A. Expansion Joint Cover: As recommended by membrane manufacturer.

B. Insulation Cant Strips: ASTM C 728, perlite or ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

1. Adhesive: Manufacturer's low VOC compliant, fluid applied urethane adhesive formulated to adhere to insulation and recover boards to substrate.

a. Basis of Design Product: Tremco Low Rise Foam Insulation Adhesive

B. Walkways: Molded fiberglass reinforced plastic walkway, with integral grit non slip surfacing, 1" deep grid, 1.5" x 1.5" configuration, four feet wide panels in 12' lengths, with self supporting rubber feet and integral connections from one panel to the next by primary membrane roofing system manufacturer.

1. Fire rating: Grating shall be fire retardant with a tested flame spread rating of 25 or less when tested in accordance with ASTM E 84.

2. Color: Gray

3. Basis of Design: Tremco Fibergrate Molded Walkway Grating

C. Water Cut-Off Mastic: Roof manufacturer's standard.

## **PART 3 EXECUTION**

### 3.01 INSPECTION

A. Pre-Installation Conference: Not less than two weeks before start of roofing installation, meet at project site with Architect, Owner's representative, Contractor, roofing installer, and roofing material manufacturer's representative.

1. Review project requirements, required submittals, status of substrate work,

areas of potential conflict and interference, availability of materials, installer's personnel, equipment and facilities, construction schedule, weather and forecasted weather conditions, and coordinate methods, procedures and sequencing requirements for proper installation, integration and protection of the work.

- B. Examine substrates and installation conditions. Do not proceed with roofing work until unsatisfactory conditions have been corrected.
- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

### 3.02 PREPARATION

- A. Verify that work which penetrates roof deck, or requires men or equipment to traverse roof deck, has been completed.
- B. Examine substrate surfaces for adequate anchorage, foreign materials, moisture and unevenness that would prevent the execution of roofing system specified.
- C. Correct unsatisfactory conditions before starting roofing. Roof deck surface conditions shall comply with manufacturer's requirements and be acceptable to the roofing system installer.
- D. Protect other work from spillage of roofing materials. Repair or replace other work damaged by installation of the roofing system work.

### 3.03 INSTALLATION - GENERAL

- A. Comply with roofing manufacturer's instructions and recommendations for handling and installing roofing system.
  - 1. Start at low point of roof and work towards high point to minimize entry of water under the roofing system or as recommended by the manufacturer.
  - 2. Flash pipes, conduits and other penetrations or projections through roofing using roofing manufacturer's recommended flashing materials, accessories, and procedures.
  - 3. Prime all dissimilar surfaces to which membrane will come in contact. Apply at the rate recommended by manufacturer.
  - 4. Flash and make watertight equipment curbs for mechanical equipment located on the roof.
  - 5. General flashing details for roof penetrations, curbs, parapets and roof perimeters shall comply with roofing material manufacturer's standard details and recommendations for flashing.
  - 6. Install roof flashing and sheet metal work furnished under Section

07 62 00.

### 3.04 INSULATION INSTALLATION

- A. Apply only as much insulation to the roof that can be covered the same day with roofing membrane. At the conclusion of each day's work, seal exposed edges of the insulation. Cut and remove seal upon continuation of the work.
- B. Fasten and place tapered insulation in accordance with manufacturer's instructions and recommendations. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Stagger all joints of multi-layered insulation board minimum 6 inches in each direction. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
  - 1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
  - 2. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and adhere to insulation.
  - 3. To the greatest extent possible, mechanically attach all insulation and coverboard layers. Secure into top metal deck flange **only**.
  - 4. Adhere remaining layers once available fastener lengths are exceeded.

### 3.05 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

- A. Install base ply and finish ply modified bituminous roofing membrane according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:
  - 1. If recommended by manufacturer, unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
  - 2. To the greatest extent possible, mechanically attach SBS base ply sheet laps 12" o.c. to meet desired wind uplift requirements. Secure into top metal deck flange **only**.
  - 3. Once available fastener lengths are exceeded, adhere SBS base ply sheet to substrate in a solid application of cold process roofing membrane adhesive.
  - 4. Adhere SBS finish ply sheet to SBS base ply sheet in a solid application of cold process roofing membrane adhesive.
  - 5. Ensure membrane embedment into cold adhesive by rolling membrane with a 75# roller.
- B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
  - 1. Repair tears and voids in laps and lapped seams not completely sealed.
  - 2. Heat weld all end and side laps to ensure daily watertight bond.
- C. Install roofing membrane sheets so side and end laps shed water.

### 3.06 FLASHING AND STRIPPING INSTALLATION

- A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:
  - 1. Prime substrates with asphalt primer if required by roofing system manufacturer.
  - 2. Adhere flashing base ply and flashing finish ply to walls, curbs and parapets in flashing adhesive as required by manufacturer.
- B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.
- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
  - 1. Seal top termination of base flashing daily with asphalt mastic and reinforcing membrane.

### 3.07 WALKWAY INSTALLATION

- A. Install walkways according to manufacturer's written instructions.
- B. Verify that locations of access and servicing points for roof-mounted equipment are served by locations of roof walkways.
- C. Locate walkways according to drawings.
- D. Cut panels in a manner to produce a smooth exposed edge.as required to avoid obstructions, coordinate with equipment and roof access.
- E. Connect panels together using manufacturer's hold down clips spaced at maximum of 4 ft (1.2 m) apart and not less than 4 clips per panel, unless otherwise recommended by manufacturer.
- F. Fit walkway panels with styrene-butadiene rubber (SBR) feet, fit tightly on the base of the grating to create a 1/2 inch (13 mm) elevation of the grating above the roof membrane surface.
  - 1. For pedestrian loads, utilize one rubber foot every 24 inches (600 mm) on center.
  - 2. Install additional feet as recommended by manufacturer for equipment and material loads.

### 3.08 CLEANING AND PROTECTION

- A. Patch installations by other trades and make all necessary repairs as required.
- B. Upon completion of roofing work, clean drains of foreign materials and aggregate

and remove all debris and surplus materials.

- C. Protect finished roof areas from foot traffic and construction damage until final acceptance.

**END OF SECTION**

## **SECTION 07 54 23**

### **THERMOPLASTIC POLYOLEFIN ROOFING**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. Provide a thermoplastic membrane roofing system as shown and specified. Work includes:
  - 1. Fully adhered, single ply polyester reinforced thermoplastic polyolefin (TPO) membrane.
  - 2. Substrate board.
  - 3. Vapor retarder
  - 4. Insulation.
  - 5. Cover board.
  - 6. Flashing, pipe seals, and roofing accessories.
  - 7. Installing roof flashings and sheet metal furnished under Section 07 62 00.
  - 8. Membrane flashing under metal copings.

##### **1.02 RELATED SECTIONS**

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Wood Blocking: Section 06 10 00
- C. Flashing and Sheet Metal: Sections 07 62 00.

##### **1.03 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: To participate as a qualified company in production of Elasto/Plastic materials, the company must have a minimum of five (5) years as the sole manufacturer of the brand name. Manufacturer shall also furnish notarized certification that he has been in business and had roofs installed for a minimum of five (5) years.
- B. Installer Qualifications: An experienced roofing installer approved or licensed by roofing materials manufacturer and with not less than five (5) years of successful experience installing thermoplastic membrane roofing systems similar to those required for this project.
- C. Manufacturer's representative shall conduct timely inspection of the roof installation to satisfy all warranty requirements.

- D. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
- E. Insulation Thermal Properties: Thermal conductivity k-factors and thermal resistance R-values indicated are values at 75 degrees F., mean temperature.
  - 1. Where insulation is identified by R-value, provide thickness required to achieve indicated R-value. Foam insulation R-values are "aged" thermal values in accordance with LTTR – Long Term Thermal Resistance predicted by ASTM C1289.

#### 1.04 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience
- C. FM Approvals Listing: Design and provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
  - 1. Fire/Windstorm Classification: Class 1A-90.
- D. Wind Uplift: Conform to requirements of IBC 1609 – 2017 and ASCE 7-10.
- E. Fire Classification: U.L. Class A.
- F. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- G. Insulation Thermal Properties: Thermal conductivity k-factors and thermal resistance R-values indicated are values at 75 degrees F., mean temperature.
  - 1. Where insulation is identified by R-value, provide thickness required to achieve indicated R-value. Foam insulation R-values are "aged" thermal values in accordance with LTTR – Long Term Thermal Resistance



predicted by ASTM C1289-13.

1.05 SUBMITTALS

- A. Product Data: Submit for all items.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Include as a minimum the following:
  - 1. Layout of roof showing sheet sizes and field joint locations.
  - 2. Location and type of penetrations.
  - 3. Perimeter, penetration and special details.
  - 4. Description of all materials.
  - 5. Conformance to fire classifications requirements of IBC 1505.
  - 6. Layout of tapered insulation, including slopes.
- C. Manufacturer's Approval: Obtain manufacturer's written approval of final shop drawings prior to beginning roofing operations.
- D. Samples: Submit samples of all roofing and flashing materials.
- E. Submit certification from roofing manufacturer that the roofing membrane and the selected roofing insulation are compatible.
- F. Certifications: Roof manufacturer's certification of compatibility with all adjacent materials that come in contact with roofing membrane.
- G. Warranties: Sample of special warranties detailing terms as required herein.
- [H. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
  - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.]

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged, labeled bundles or containers.
- B. Store roofing materials, insulation and accessories at the site in storage trailers or the building in a dry, well-ventilated, weather tight place. Exterior storage not permitted. Comply with manufacturer's recommendations for handling and protection during installation.
  - 1. Handle rolled goods to prevent damage to edge or ends.
  - 2. Do not apply roofing materials to damp, frozen, dirty or dusty substrate surfaces.
- C. Protection

1. Protect adjacent materials and surfaces from damage and soiling during roofing system installation.
2. Provide special protection or avoid heavy traffic on completed roofing work.
3. Protect paving and structure walls adjacent to hoists before starting work.
4. Do not overload the building structure with storage of materials or installation equipment on the substrate decking.
5. Handle and store materials and equipment to avoid damage to substrate decking.

1.07 PROJECT CONDITIONS

- A. Environmental Conditions: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.07 WARRANTY

- A. Contractor and roofing subcontractor shall warrant the total roofing system (membrane, insulation and flashing) with respect to workmanship and proper application for two (2) years from the date of acceptance by the Owner. Should any leaks covered under the warranty occur during this period, corrective action will be taken by the Contractor to repair the roof to the satisfaction of the owner and membrane manufacturer. ALL CORRECTIVE WORK WILL BE DONE AT NO COST TO THE OWNER. Work includes all components of membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, substrate boards, vapor retarders, roof pavers, and walkway products.
- B. The manufacturer(s) of the materials used shall provide a written, No Dollar Limit, **[fifteen (15)] [twenty (20)]** year guarantee on the complete roof installation. Upon warranty inspection and acceptance of the roof, the guaranty will be turned over to the Owner on behalf of the Contractor, by an authorized representative of the manufacturer. The guaranty shall begin when the project is completed and accepted by the Owner. Submit final guaranty in triplicate.
  1. Warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories and other components of membrane roofing system.
  2. System shall be warranted for all requirements specified herein, including for wind uplift as required.
- C. Corrective measures on leaks shall be undertaken within seventy-two (72) hours after notification has been received by the Contractor or membrane manufacturer from the Owner.

**PART 2 PRODUCTS**

2.01 MEMBRANE ROOFING

- A. Thermoplastic Polyolefin (TPO) Type
  - 1. Thermoplastic Sheet Membrane: Reinforced single ply membrane factory fabricated into flexible sheets.
  - 2. Material Standard: Conform to ASTM D6878, Standard Specification for Thermoplastic Polyolefin Based Sheet.
  - 3. Thickness: Minimum 60 mils (0.60").
  - 4. Physical Properties
    - a. Breaking Strength - ASTM D751: 330 lbf/in.
    - b. Elongation at Break - ASTM D751: 30%.
    - c. Seam Strength - ASTM D751: 75 lbf.
    - d. Retention of Properties After Heat Aging - ASTM D3045
      - 1) Breaking Strength - ASTM D751: 330 lbf.
      - 2) Elongation - ASTM D751: 25% of original.
    - e. Tearing Strength - D1004: 156 lbg.
    - f. Low Temperature Bend - D2136: Pass.
    - g. Accelerated Weathering Test (Xenon Arc) - D2565: 10,000 hrs.
      - 1) Cracking (7x magnification): None.
      - 2) Discoloration (By Observation): Negligible.
      - 3) Cracking (7x magnification): None.
    - h. Linear Dimensional Change - ASTM D1204: 0.1%.
  - 5. Color: White.
- B. Flashing: 60 mils (0.60") nominal thick reinforced sheet factory fabricated to the required shapes and sizes to suit project conditions; furnished by sheet roofing membrane manufacturer.
  - 1. Inside and Outside Corners and Vent Flashing: Preformed.
  - 2. Provide asphalt compatible flashing membrane where asphalt contamination is anticipated.
- C. Adhesive: Provide types as recommended by manufacturer for materials and conditions encountered.
  - 1. Provide asphalt compatible flashing membrane where asphalt contamination is anticipated.
- D. Flashing Bars and Screws: Manufacturer's standard bars and fasteners. Spacings as required to meet design loads.
- E. Mechanical Fasteners: As recommended by roofing manufacturer.
- F. Splice Wash, Lap Sealant, Fastener Sealer, Etc.: Sheet material manufacturer's recommended materials for waterproof sealing of seams in membrane and waterproof sealing of joints between flashings and roofing membrane, adjoining surfaces, projections and penetrations through the roofing membrane. Compatible with materials with which used.

- G. Membrane-covered Roof Expansion Joint Cover: Bellows type consisting of .06" thick membrane, support and attachment flanges.
1. Joint Bellow Widths: As indicated.
  2. Membrane Cover: Material recommended by roofing manufacturer; compatible with roof membrane, integrally attached to bellow supports and attachment flange fabric.
  3. Bellow Supports: Closed cell foam, 3/8 in. minimum thickness.
  4. Concealed Attachment Flanges: Tin strip wrapped with neoprene-coated nylon fabric.
  5. Provide matching factory-fabricated corners, transitions, intersections and terminations.
  6. Termination Bar: Prepunched extruded aluminum bar.
- H. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. TREMCO
  2. GEN FLEX ROOFING SYSTEMS
  3. JOHNS MANVILLE
  4. GAF
  5. CARLISLE
  6. FIRESTONE.
  7. VERSICO.
  8. MULE HIDE.

## 2.02 INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C1289 "Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board," Type II, glass-fiber mat facer on both major surfaces.
1. Tapered Insulation: 1/4" per foot. No slope under 1/4" per foot will be permitted.
  2. R-Value: Provide thickness for average R of 30 over entire roof area.
  3. Minimum Thickness at Drain: 2".
  4. Compressive Strength: Minimum 20 (Grade 2).
- B. Provide adhesives and mechanical fasteners as recommended by insulation manufacturer for substrates encountered.
- C. Crickets (Tapered Insulation): Provide tapered insulation crickets sloped approximately 1/4" per foot. Locate and arrange as indicated on drawings or as required to divert water at rooftop equipment or vertical obstructions.
1. Material: Polyisocyanurate; conform to requirements and manufacturers specified herein.
- D. Coverboard: Provide one of the following:

1. ½" glass-mat, water-resistant gypsum substrate, primed surface; ASTM C1177, (adhered in adhesive). Dens-Deck by GEORGIA-PACIFIC, Secure Rock Roof Deck by USG, GlasRoc Roof Board by CERTAINTEED (adhered in adhesive)

2.03 VAPOR RETARDER

- A. Material: Polyethylene sheet backed rubberized asphalt membrane, 40 mils thick.
- B. Properties
  - a. Tensile Strength – ASTM D1970: 40 lbf/in. minimum.
  - b. Permeance – ASTM E96: 0.01 perms maximum.
  - c. Peel Adhesion – ASTM D903: 12 lbs/in. width
  - d. Elongation – ASTM D1970: 10% min.
- C. Manufacturers
  1. Basis of Design: Deck Guard HT by POLYGUARD PRODUCTS
  2. Other manufacturers: Subject to compliance with the specified requirements, products manufactured by MIRADRI; W.R. GRACE; POLYKEN TECHNOLOGIES; GAF or CERTAINTEED are acceptable.

2.04 MISCELLANEOUS ITEMS

- A. Wood Members: Comply with requirements of wood blocking, Section 06 10 00, for wood members indicated as roofing system work. Provide wood pressure treated as specified.
- B. Mastic: Type as recommended by roofing manufacturer.
- C. PVC Walkway Membrane: Roof manufacturer's recommended reinforced PVC heat weldable walkway membrane; minimum 30" wide x lengths indicated. Minimum 2.4mm thick (0.096").
- D. Substrate Board: ASTM C 1177, glass-mat, water-resistant gypsum substrate, Type X, 5/8 inch thick. GEORGIA-PACIFIC Dens Deck or ASTM C 1278 USG Securock.
  1. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.05 FASTENERS

- A. Provide roofing membrane manufacturer's recommended type mechanical fastener for deck. Type, size and spacing shall be as required to maintain manufacturer's system required warranty and wind uplift criteria.

**PART 3      EXECUTION**

**3.01          INSPECTION**

- A. Pre-Installation Conference: Not less than two weeks before start of roofing installation, meet at project site with Architect, Owner's representative, Contractor, roofing installer, and roofing material manufacturer's representative.
  - 1. Review project requirements, required submittals, status of substrate work, areas of potential conflict and interference, availability of materials, installer's personnel, equipment and facilities, construction schedule, weather and forecasted weather conditions, and coordinate methods, procedures and sequencing requirements for proper installation, integration and protection of the work.
- B. Examine substrates and installation conditions. Do not proceed with insulation and roofing work until unsatisfactory conditions have been corrected.
- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

**3.02          PREPARATION**

- A. Verify that work which penetrates roof deck, or requires men or equipment to traverse roof deck, has been completed.
- B. Examine substrate surfaces for adequate anchorage, foreign materials, moisture and unevenness that would prevent the execution of roofing system specified.
- C. Correct unsatisfactory conditions before starting roofing. Roof deck surface conditions shall comply with manufacturer's requirements and be acceptable to the roofing system installer.
- D. Protect other work from spillage of roofing materials. Repair or replace other work damaged by installation of the thermoplastic membrane roofing system work.

**3.03          SUBSTRATE BOARD**

- A. Install substrate board where indicated with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
  - 1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

**3.04          VAPOR RETARDER**

- A. Install in accordance with membrane manufacturer's instructions and recommendations.
  - 1. Install a single layer of membrane vapor barrier over entire substrate area.
  - 2. Overlap ends 6"; overlap side edges 3-1/2".

3.05 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 12 inches in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
  - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Adhered Insulation for Concrete Roof Deck: Install each layer of insulation and adhere to substrate as follows:
  - 1. Prime surface of concrete deck with asphalt primer at a rate of 3/4 gal/100 sq. ft. and allow primer to dry.
  - 2. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
- H. Mechanically Fastened and Adhered Insulation for Metal Roof Deck: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
  - 1. Fasten first layer of insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
  - 2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
  - 3. Install subsequent layers of insulation in a cold fluid-applied adhesive.

- I. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
  1. Fasten according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
  2. Fasten to resist uplift pressure at corners, perimeter, and field of roof.

3.05 ADHERED MEMBRANE INSTALLATION

- A. Comply with roofing manufacturer's instructions and recommendations for handling and installing roofing system.
- B. Flash and make watertight equipment curbs for mechanical equipment located on the roof.
- C. General flashing details for roof penetrations, curbs, parapets and roof perimeters shall comply with roofing material manufacturer's standard details and recommendations for flashings.
  1. Provide base flashing at perimeters and edges of membrane abutting walls, curbs or other construction. Provide prefabricated pipe seals for pipe and conduit penetrations, properly cemented to membrane and sealed to pipe or conduit with stainless steel clamp and top bead of sealant.
  2. Mechanical fasteners below counterflashing, where required at perimeter flashings, to be fully enclosed with suitable membrane to form water tight seal.
  3. Minimum height of membrane flashing terminations to be 8" above top of membrane, unless otherwise indicated.
- D. Install roof flashing and sheet metal work provided herein and furnished under Section 07 62 00.
- E. PVC Walkway Pads: Locate pads as indicated. Maintain approximately 4" between pads. Secure pads to membrane as recommended by membrane manufacturer.
- F. Blocking Shim blocking solidly as required to make top surface of blocking level with top of insulation.
- G. Perform test cuts at lap edges (seams) to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
  1. Perform test cuts after stoppages in the work and when recommended by roofing manufacturer after environmental changes.
  2. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.



- H. Install membrane roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition[ and to not void warranty for existing membrane roofing system].

3.06 CLEANING AND PROTECTION

- A. Patch installations by other trades and make all necessary repairs as required.
- B. Upon completion of roofing work, clean gutters and drains of foreign materials and aggregate and remove all debris and surplus materials.
- C. Protect finished roof areas from foot traffic and construction damage until Contract Completion.

**END OF SECTION**

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## **SECTION 07 62 00**

### **SHEET METAL FLASHING AND TRIM**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. Provide fabricated flashing and sheet metal work as shown and specified.
  - 1. Shop fabricated formed flashing and counterflashing.
  - 2. Formed miscellaneous roof drainage flashings (valley, step, drip, flat/slope roof transition etc.).
  - 3. Miscellaneous rooftop and equipment concealed flashing.
  - 4. Sheet metal roofing and related flashing, trim and accessories.
- B. Provide manufactured roof specialty work as shown and specified.
  - 1. Manufactured copings, gravel stops and fascia.
- C. Fasteners, sealants, solder and accessories to complete the work.

##### **1.02 RELATED SECTIONS**

- A. Masonry Flashing: Section 04 00 00.
- [B. Sustainable Design Requirements: Section 01 81 13.]

##### **1.02 QUALITY ASSURANCE**

- A. General: Sheet metal flashing and trim assemblies as indicated 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. General: Comply with Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) "Architectural Sheet Metal Manual" recommendations for materials, fabrication and installation of the work unless more stringent requirements are specified or shown on Drawings.
- C. Reference Standards
  - 1. American Society for Testing and Materials (ASTM).
  - 2. American Architectural Manufacturers Association (AAMA)
    - a. AAMA 2605; Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance

- Organic Coatings on Architectural Extrusions and Panels.
3. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
    - a. SMACNA "Architectural Sheet Metal Manual".
  4. Single Ply Roofing Industry: SPRI ES-1, Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
- D. Subcontractor: Subcontract sheet metal associated with roofing as a part of the roofing contract for undivided responsibility.
- E. 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
- F. Attachments to or penetrations in roofing systems to be made only with full approval of roofing manufacturer. Obtain approvals as required for installation of work under this section. Notify Architect if deviations from documents is required to obtain approval from roofing manufacturer prior to fabrication.
- G. SPRI Wind Design Standard: Manufacture and install roof edge copings and fascia tested according to SPRI ES-1 and capable of meeting the design pressures indicated on the Structural Drawings.
- H. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- I. Painted Finishes: Factory painted finish to be performed by an applicator specifically approved by the paint manufacturer. The applicator shall provide written notification of approval by paint manufacturer prior to application of the finish.

#### 1.03 SUBMITTALS

- A. Shop Drawings and Product Data: Submit on all sheet metal work specified herein. Drawings to show all expansion joint details, joint details, waterproof connections to adjoining work and at obstructions and penetrations, methods of attaching to building and all formed sections. Include the following:
1. Identification of material, thickness, weight, and finish for each item and location in Project.
  2. Details for sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
  3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
  4. Details of termination points and assemblies, including fixed points.

5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.

- B. Submit 8" square material samples for each type of sheet metal required.
- C. Submit full width by 8" long samples of all manufactured and fabricated items. Provide with specified finish and color.

#### 1.04 PROJECT CONDITIONS

- A. Do not proceed with the installation of flashing and sheet metal work until substrate construction, blocking and other construction to receive the work are completed.
  1. Metal roofing work is to follow progress of substrate as close as practical to limit exposure of insulation and wood materials.

#### 1.05 WARRANTY

- A. Warranty required for project [membrane] [built-up] roofing system work shall include all related roof flashing and sheet metal work. Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section.
- B. Provide Contractor's guarantee for all sheet metal work under this Section to be free from defects of material and workmanship for a period of two years. Work that is not water tight or is damaged by winds that do not exceed 90 mph will be considered defective.
- C. Provide manufacturer's guarantee of paint finish against failure of paint finish. Failure includes blistering, peeling, cracking, flaking, checking, excessive color change and chalking. Color change shall not exceed 5 N.B.S. units (per ASTM D523) and chalking shall not less than a rating of 8 per ASTM D4214.
  1. Warranty Period: 20 years.

### **PART 2 PRODUCTS**

#### 2.01 FABRICATED MATERIALS

- A. Prefinished Aluminum Sheet - All Flashings Exposed to View
  1. Description: 3004 alloy aluminum sheet with factory applied finish.
  2. Finish
    - a. Exposed Surfaces
      - 1) Material/Manufacturer: Fluoropolymer baked enamel finish

- with Kynar 500 (70%) resins by ELF ATOCHEM OF NORTH AMERICA INC.; "Trinar" by AKZO; "Duranar" by PPG; "Fluoropon" by VALSPAR or equal. Total dry film thickness not less than 1.0 mils
- 2) Reference: Meet the requirements of AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels.
  - 3) Color: As selected by Architect from paint manufacturer's complete specified line.
  - 4) Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.
- b. Concealed Surfaces: Can be manufacturer's standard coating for concealed surfaces.
3. Thicknesses: Provide the following minimum thicknesses:
    - a. Flashing and Counterflashing: .032".
    - b. Coping: .040".
    - c. Gravel Stop/Fascia: .040"
    - d. Miscellaneous Flashing (not otherwise identified): .032".
- B. Miscellaneous Flashing - Not Exposed to View: Galvanized steel, ASTM A653 G60. Mill phosphatized for paint adhesion. 0.0276". minimum unless otherwise indicated.
- C. Fasteners: Provide same metal as sheet metal or other non-corrosive compatible metal recommended by sheet metal manufacturer.
- D. Bituminous coating: Acid and alkali resistant solvent type black bituminous mastic.
- E. Joint Sealants: See Section 07 92 00. Color matched to factory finished materials at roofing, cornice, fascia, coping and similar type systems.
- F. Metal accessories: Provide fasteners, solder, welding rods, separators, sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work; matching or compatible with material installed, non-corrosive, size and gage as required for performance.
- G. Underlayment
1. Membrane: Bituthene Ice and Water Shield by W. R. GRACE; Polyken 640 Underlayment Membrane by POLYKEN TECHNOLOGIES; Polyguard Deck Guard by POLYGUARD PRODUCTS; Weather Watch by GAF; Winterguard by CERTAINTEED, a modified bituminous membrane, minimum 40 mils thick, self-adhering, self-sealing moisture barrier.
  2. Slip sheet: 4 lb./100 sq. ft., rosin-sized building paper.
- G. Wood members: Comply with requirements of [Rough Carpentry, Section 06 10 00] [Wood Blocking, Section 06 10 50].

H. Sheet Metal Roofing and Flashing - Copper

1. Material: ASTM B370 cold-rolled copper except where soft temper copper is required for forming.
2. Weight: Minimum 16 ounce for sheets and 20 ounce for flashings and cleats.
3. Solder: ASTM B32, 50-50 tin/lead solder with rosin flux.
4. Fasteners: Pancake head stainless steel screws.
5. Finish: Provide patina accelerator, type as recommended by roofing manufacturer and approved by the Architect.]

I. Stainless Steel: AISI Type 304; .018" thick; ASTM A240.

1. Finish: NAAMM Manual AMP 503; Type 2D – Dull stainless steel finish; Architectural Quality

2.02 MANUFACTURED MATERIALS

A. Coping

1. Fabricated in 10'-0" lengths to sizes indicated of 0.063" smooth aluminum. Provide manufacturer's standard 12" wide, 20 gage perforated galvanized steel cleats, molded styrene or aluminum gutter chairs and special adhesive for cleat installation. Coping cover snapped-on to cleat spaced 5'-0" on center.
2. Special Shapes: Provide units fabricated to radius indicated on drawings and fabricated to curve indicated on drawings. Provide metal locking corners.
3. Provide factory welded and mitered corners, butt joints and concealed .032" aluminum cover plates.
4. Manufacturers
  - a. OMG ROOFING PRODUCTS; "Permasnap Coping".
  - b. PETERSEN ALUMINUM CORP.; "Tite-Loc Coping".
  - c. ARCHITECTURAL PRODUCTS COMPANY; "Snap-Tight Coping".
  - d. CARLISLE SYN TEC, INC.; "SecurEdge 200 Coping".
  - e. FIRESTONE BUILDING PRODUCTS; "Firestone Coping System".
  - f. JOHNS MANVILLE, INC.; "Presto Lock Coping System".
  - g. METAL-ERA, INC., "Perma-Tite".

B. Gravel Stop

1. Fabricated in 10'-0" lengths to sizes indicated of 0.05" smooth aluminum, formed. Provide with galvanized spring clip (retainer) spaced at 12" on center.
2. Provide factory welded and mitered corners, butt joints and concealed .032" aluminum cover plates.
3. Manufacturers
  - a. OMG ROOFING PRODUCTS, Model No. TE 8.25.

- b. METAL-ERA, INC.; Anchor-Tite Fascia.
  - c. CARLISLE SYN TEC, INC.; Secur Edge 300 Fascia System.
  - d. FIRESTONE BUILDING PRODUCTS; Edge Guard and Fascia.
  - e. JOHNS MANVILLE, INC.; Presto-Lock Fascia Syste
- C. Finish: Provide exposed aluminum surfaces factory finished with baked-on fluoropolymer coating with Kynar 500 (70%) resin, similar to finish specified for "Prefinished Sheet Aluminum" herein. Color selected by Architect.

## 2.03 SHOP FABRICATION

- A. Shop fabricate sheet metal work to comply with standard industry standards as shown by SMACNA in the "Architectural Sheet Metal Manual."
  - 1. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Form sections square, true and accurate to size and profile, free from distortion and other defects detrimental to appearance or performance.
  - 1. Make all lines, edges, angles and moldings straight, sharp and true; reinforce for rigidity and strength.
- C. Fabricate for watertight and weatherproof performance with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form exposed sheet metal work with exposed edges folded back to form hems.
  - 1. Fabricate with seams overlapping in the direction of water flow.
- D. Fabricate non-moving seams in sheet metal with flat lock or butt hairline joints except as otherwise indicated. Fabricate corners mitered, soldered and sealed as one piece. Locate corner joints 2'-0" from corners and intersections.
- E. Seal movable non-expansion type joints with joint sealant. Form joints as indicated, when not indicated, in compliance with industry standards to receive joint sealants.
- F. Provide for separation of metal from non-compatible or corrosive substrates by coating concealed surfaces with bituminous coating or other permanent separation as recommended by the sheet metal manufacturer.
- G. Step Flashing: Aluminum; Conform to design requirements of SMACNA Page 4-17, (Figure 4-8A). Where flashing for roof type applications exceeds 12 inches in width, provide standing seam covering conforming to SMACNA.

## **PART 3 EXECUTION**



3.01 PREPARATION

- A. Examine substrates and installation conditions. Do not install flashing and sheet metal work until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.
- C. Coordinate flashing and sheet metal work with other work for the correct sequencing of items which make up the entire membrane or system of weatherproofing and rain drainage.

3.02 INSTALLATION

- A. Comply with SMACNA "Architectural Sheet Metal Manual" recommendations, and drawing details for installation of the work.
- B. Install prefabricated items in accordance with manufacturer's instructions and recommendations.
- C. Anchor units securely in place by methods indicated, providing for thermal expansion. Conceal fasteners and expansion provisions whenever possible. Install joint sealants where indicated.
- D. Set units true to lines and levels indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.
- E. Separate sheet metal work from dissimilar metals, treated wood, and cementitious materials. Provide roofing felt underlayment and rosin-sized paper slip sheet over treated wood surfaces.
- F. Fabricate, support and anchor downspouts in a manner which will withstand thermal expansion, stresses and full loading by ice or water without damage, deterioration or leakage
- G. Continuously seal exposed joints where flashing or counter flashing terminates into reglets after sheet metal is adequately wedged and secured.
- H. Metal flashings which may be built into masonry mortar joints shall be preformed with corrugations, ribs or crimps which will maintain integrity of mortar bond for masonry.
- I. Coping
  - 1. Install membrane roofing flashing over top of parapet substrate prior to installing coping. See Section [07 53 23]. Coordinate installation.
  - 2. Apply continuous bead of sealant on both sides of joints immediately prior to setting coverplates.

**END OF SECTION**

## **SECTION 07 81 23**

### **INTUMESCENT FIREPROOFING**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. Preparing surfaces to receive fireproofing.
- B. Protection of adjacent surfaces from overspraying.
- C. Spray application of intumescent, fire-resistive coatings on interior, exposed structural steel wide flange columns, beams, pipe columns, and related exposed structural steel to provide rated fireproofing.
- D. Application of decorative topcoat.

##### **1.02 RELATED SECTIONS**

- A. Structural Steel: Section 05 12 00.
- B. Firestopping: Section 07 84 00
- C. Sustainable Design Requirements: Section 01 81 13
- D. VOC Limits: Section 01 81 16.

##### **1.03 REFERENCES**

- A. American Society for Materials and Testing
  - 1. ASTM D 256: Impact Resistance Test.
  - 2. ASTM D 638: Tensile Strength.
  - 3. ASTM D 695: Standard Test Method for Compressive Strength.
  - 4. ASTM D 790: Standard Test Method for Flexural Strength.
  - 5. ASTM D 1002: Standard Test Method for Bond Strength.
  - 6. ASTM D 1044: Standard Test Method for Abrasion Resistance Test.
  - 7. ASTM D4541: Bond Strength.
  - 8. ASTM E84: Test Method for Surface Burning Characteristics of Building Materials.
  - 9. ASTM E119: Fire Tests of Building Construction and Materials.
- B. Underwriters' Laboratories
  - 1. U.L.: Fire Resistance Directory.
- C. Steel Structures Painting Council (SSPC)

1. SSPC-SP-1 Solvent Cleaning.
2. SSPC-SP-2 Hand Tool Cleaning.
3. SSPC-SP-3 Power Tool Cleaning.
4. SSPC-SP-6 Commercial Blast Cleaning.

1.04 SUBMITTALS

- A. Product Data: Submit for all items.
  1. Indicate product characteristics, performance, and limitation criteria.
- B. Submit manufacturer's installation instructions.
- C. Submit manufacturer's certification that products meet or exceed specified requirements.
- D. Submit certified test reports indicating the following:
  1. Bond Strength of Fireproofing: ASTM E760, tested to provide minimum bond strength twenty times weight of fireproofing materials.
  2. Fire test reports of fireproofing application to substrate materials similar to project conditions.
  3. U.L. Design Listings.
  4. Submit applicator's current certification, by product manufacturer, as a factory trained and manufacturer approved installer of this product.
- E. Sample: Submit 12" x 12" sample of fireproofing indicating thickness, density, fire rating, and finish texture that will be used in the finished project. Resubmit until approved by Architect. Approved sample will demonstrate minimum quality of work.
- [F. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
  1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.]

1.06 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.
- B. Applicator: Company specializing in applying the work of this Section with minimum 3 years documented experience and approved by manufacturer.
- C. Field Tests: Installer shall hire and pay for the services of an independent testing agency to test random samples, as applied, to verify thickness of intumescent fireproofing, in accordance with SSPC-PA2, Steel Structures Painting Council, "Paint Application Specification No.2 - Measurement of Dry Paint Thickness with Magnetic Gages".

1. Testing agency must be approved by Architect prior to their being retained by the Installer.
2. Testing and Inspection shall be in accordance with AWCI Technical Manual 12-B "Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials; an Annotated Guide.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire resistance ratings.
- B. Submit certification of acceptability of fireproofing materials to authority having jurisdiction and to Architect.

1.08 MOCKUP

- A. Provide mockup of applied intumescent fireproofing.
- B. Provide testing and analysis of mockup to manufacturer's published data.
- C. Apply sample section of 10 sq ft in size to representative substrate on site.
- D. Comply with project requirements as to thickness, density, fire rating, and finish texture. [Apply decorative topcoat to half of the mockup.]
- E. Examine installation to determine variances.
- F. If accepted, mockup will demonstrate minimum standard for the Work for materials and execution and to demonstrate finish. Approved mockup may remain as part of the Work.
  1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. When temperature is less than 40° F, follow manufacturer's field instructions for cold weather installation. So not apply when surface temperature is less than 5° F above the dew point.
- B. Provide ventilation in areas to receive fireproofing during and 72 hours, minimum, after application, to dry materials and dissipate solvent odors.
- C. Maintain non-toxic, unpolluted working area. Provide temporary enclosure to prevent spray from contaminating air.

1.10 SEQUENCING AND SCHEDULING

- A. Sequence work in conjunction with placement of ceiling hanger tabs, mechanical component hangers, and electrical components.

- B. Steel surfaces with less than 3 feet clear working access may necessitate applying materials to inaccessible surfaces prior to erection of the finished steel members.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Specifications are based on AD Firefilm III manufactured by the CARBOLINE COMANY. Equal system manufactured by CAFCO, HILTI INC. SHERWIN WILLIAMS or ALBI MANUFACTURING is acceptable providing it meets the performance requirements specified herein.

### **2.02 MATERIALS**

- A. Intumescent Fireproofing: Water based, factory mixed, asbestos free, intumescent material blended for uniform texture; conforming to the following requirements:
  - 1. Bond Strength: ASTM D4541, minimum 125 psi.
  - 2. Impact Resistance: ASTM D2794, 152 in-lb.
  - 3. Surface Burning Characteristics, ASTM E84: Class A.
  - 4. Durometer Hardness: ASTM D2240, minimum 65-70 Shore D.
  - 5. Abrasion Resistance: ASTM D4060, maximum 103 mg loss at 1000 cycles.
  - 6. VOC: 0 lbs./gal.
  - 7. Density: Minimum 89 pcf.
  - 8. Compressive Strength: ASTM E761, Minimum 755 psi.
- B. Provide field applied primer compatible with shop applied primer as recommended by intumescent fireproofing manufacturer. Provide CARBOLINE Carboguard 635 or similar type by other listed fireproofing manufacturers.
- B. Primer: Type recommended or approved by fireproofing manufacturer
- [C. Top Coat: Type as recommended by intumescent fireproofing manufacturer. Prior to applying Top Coat, finely sand base coat per manufactures recommendations to achieve smoothest finish possible.
  - 1. Colors: As selected by Architect.

## **PART 3 EXECUTION**

### **3.01 INSPECTION**

- A. Verify that surfaces are ready to receive work.
- B. Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place.

- C. Verify ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is complete.
- D. Verify that voids and cracks in substrate are filled, and projections are removed where fireproofing is exposed to view as a finish material.
- E. Beginning of installation means applicator accepts existing substrate.

3.02 PREPARATION

- A. Work in accordance with SSPC guidelines SP-1, SP-2, SP-3, or SP-6 as appropriate to prepare substrate.
- B. Clean substrate of dirt, dust, grease, oil, loose material, or other matter which may effect bond of fireproofing.
- C. Seal all penetrations or open ended fireproofing termination by chamfering at a 45 degree angle and sealing with high heat silicone sealant.

3.03 PROTECTION

- A. Protect floor areas from this Work by completely covering with tarps or 4 mil polyethylene sheets.
- B. Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting.
- C. Close off and seal ductwork in areas where fireproofing is being applied.

3.04 APPLICATION

- A. Apply primer and fireproofing in accordance with manufacturer's instructions. Do not apply to surfaces that would prohibit proper adhesions.
- B. Apply primer in accordance with primer manufacturer's recommendations. Provide primer "cut-back" three inches for bolted connections and 12 inches for welded connections.
- C. Apply fireproofing in sufficient thickness to achieve **2 hour fire rating** unless otherwise indicated, with as many passes necessary to cover with monolithic blanket of uniform hardness, density and texture. Spray and roll smooth the finished surface.

3.05 FIELD QUALITY CONTROL

- A. Inspections will be performed to verify compliance with requirements. Inspection and Testing shall be in accordance with AWCI Technical Manual 12-B "Standard Practice for the testing and Inspection of Field Applied Thin-Film Intumescent Fire-resistive materials".

- B. Patch fireproofing, which has been cut away to facilitate work of other trades, so as to maintain complete coverage of full thickness on appropriate substrate.
- C. Correct unacceptable Work and provide further inspection to verify compliance with requirements, at no cost.

3.06 CLEANING

- A. Clean work under provisions of Section 01 74 00.
- B. Remove excess material, overspray, droppings, and debris.
- C. Remove fireproofing from materials and surfaces not specifically required to be fireproofed.
- D. Leave work ready to receive decorative finishing.

**END OF SECTION**



## **SECTION 07 84 00**

### **FIRESTOPPING**

#### **PART 1 GENERAL**

- A. Provide labor, materials, services, coordination, and equipment necessary for complete installation of tested or engineering judgement based firestopping materials and systems. Section includes firestopping for the following:
1. Penetrations through fire resistance rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
  2. Penetrations through fire resistance rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
  3. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
  4. Sealant joints in fire resistance rated construction.
    - a. Gaps between the top of walls and ceilings or roof assemblies.
    - b. Openings around structural members which penetrate floors or walls.
  5. Walls enclosing plenum spaces, rated and unrated.
    - a. Gaps between the top of walls and ceilings or roof assemblies.
    - b. Openings around items which penetrate walls.
- [B. Firestopping Performed By
1. Penetrations: Trade causing or requiring the penetration.
  2. Multiple Use Penetrations: Trade utilizing the greatest amount of the penetration space.
    - a. Cost of work shared by all users of penetration in direct proportion to each trade's use of space.
  3. Others: General Contractor.
    - a. Perimeter slab/wall and slab/curtainwall.
    - b. Terminations of fire-rated construction; walls and partitions.]

#### **1.02 RELATED SECTIONS**

- A. Coordinate Work of this Section with work of other similar or equivalent Specification Sections as required to properly execute the work, including:
1. Masonry: Section 04 00 00.
  2. Gypsum Wallboard Partitions: Section 09 21 16.
  3. Deflection tracks for metal stud fire walls: Section 09 21 16.
  4. Plumbing: Division 22.
  5. HVAC: Division 23.

- 6. Electrical: Division 26
- 7. Sustainable Design Requirements: Section 01 81 13.
- 8. VOC Limits: Section 01 81 16.

1.03 DEFINITIONS

- A. Firestopping: Material or combination of materials to retain integrity of fire rated construction by maintaining an effective barrier against the spread of flame, smoke, and gases.
- B. Through-Penetration Firestop Systems: Material or combination of materials which are field constructed of fill, void, or cavity materials and forming materials, designed to resist fire spread when installed as a complete firestop system.
- C. Through-Penetration Firestop Devices: Factory built products designed to resist fire spread. Complete when delivered to site; ready for installation.

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM)
  - 1. E119: Fire Tests of Building Construction Materials.
  - 2. E814: Fire Tests of Through Penetration Fire Stops.
- B. National Fire Protection Association (NFPA)
  - 1. 70: National Electrical Code (NEC)
  - 2. 101: Code for Safety to Life from Fire in Buildings and Structures (Life Safety Code).
- C. Underwriters' Laboratories (UL)
  - 1. UL1479 Fire Tests of Through Penetration Fire Stops.
- D. Firestop Design Classification References
  - 1. Warnock Hersey Listing Manual
  - 2. UL Fire Resistance Directory - Vol. 1

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gasses.
- B. F-Rated Through Penetration Firestop Systems: Provide through penetration firestop systems with F ratings indicated as determined per ASTM E814, UL 1479 but not less than that equaling or exceeding the fire resistance rating of the constructions penetrated.

- C. T-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T-rated assemblies are required where specified by codes or where the following conditions exist:
  - 1. Where firestop systems protect penetrations located outside of wall cavities.
  - 2. Where firestop systems protect penetrations located outside fire resistive shaft enclosures.
  - 3. Where firestop systems protect penetrations located in construction containing doors required to have a temperature rise rating.
  - 4. Where firestop systems protect penetrating items larger than a 4 inch diameter nominal pipe or 16 square inch in overall cross sectional area.
- D. Fire Resistive Joint Sealants: Provide joint sealants with fire resistance ratings indicated, as determined per ASTM E119, UL 1479 and UL 2079 but not less than that equaling or exceeding the fire resistance rating of the construction in which the joint occurs.
- E. For firestopping exposed to traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions and will meet load requirements.
  - 1. For piping penetrations for plumbing and wet pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
  - 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
  - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not required removal of insulation.
- F. For through-penetration firestop systems exposed to view, provide products with flame spread of less than 25 and smoke developed ratings of less than 450, as determined per ASTM E 84.
- G. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of one (1) or less as tested per ASTM G21.

1.05 SUBMITTALS

- A. Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL or other nationally recognized independent testing laboratories firestop systems to be used, and manufacturer's installation instructions.
  - 1. Manufacturer's engineering judgement identification number and drawing details when no tested system is available.

- B. Shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration firestop system, and each kind of penetrating item. Include firestop design designation of qualified testing and inspecting agency evidencing compliance with requirements for each condition indicated.
  - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop configuration for construction and penetrating items.
  - 2. Where project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration approved by firestopping manufacturer with modifications marked.
- C. Product certificates signed by manufacturers of firestopping products certifying that their products and installation comply with specified requirements. Certification shall be signed by the Installer.
- D. Certification is required from manufacturer that Installer has been trained in the handling and installation of their products.
- E. Firestopping installer shall provide a letter of certification stating that all firestopping systems have been installed in accordance with the Contract Documents.
- [F. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
  - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.]

1.06 QUALITY ASSURANCE

- A. Meet requirements of ASTM E814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated and other ASTM Standards as applicable for the installation.
  - 1. ASTM E84 "Test Method for Surface Burning Characteristics of Building Materials."
  - 2. ASTM E119 "Test Methods for Fire Tests of Building Construction and Materials."
- B. Requirements of Regulatory Agencies: Comply with the applicable requirements for fire separations and penetrations of the following:
  - 1. OBC: See Chapter 6, Table 601 and 602 for the time rated construction requirements.
  - 2. NFPA 70.
  - 3. NFPA 101.
- C. Installer: Specialist in the installation of type(s) of firestopping required; trained and approved by the firestop manufacturer.

1. Shown to have successfully completed not less than 5 firestop projects similar in type and size to that of this Project.
- D. Single Source Responsibility: Obtain through-penetration firestop systems for kind of penetration and construction condition indicated from a single manufacturer.
- E. Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy".
- F. Do not use any product containing solvents that require hazardous waste disposal or which after curing dissolve in water.
- G. Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.
- H. Fire - Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" article:
  1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing test and follow up inspection services for firestop systems acceptable to authorities having jurisdiction.
  2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
    - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
    - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system listed by the following:
      - 1) UL in "Fire Resistance Directory".

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestopping undamaged products to project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacturer; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi-component materials.
  1. Comply with recommended procedures, precautions, or remedies described in material safety data sheets as applicable.
- B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

- C. Do not use damaged or expired materials.

1.08 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilation: Ventilate firestopping per firestopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

1.09 SEQUENCING AND SCHEDULING

- A. Coordinate this Work as required with work of other trades. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- B. Do not cover up those firestopping installations that will become concealed behind other construction until Owner's inspection agency and authorities having jurisdiction, if required, have examined each installation.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with through-penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products by one of the following:
  - 1. W.R. GRACE (Flamesafe System)
  - 2. FYRESLEEVE INDUSTRIES
  - 3. TREMCO
  - 4. HILTI, INC.
  - 5. SPECIFIED TECHNOLOGIES (STI).
  - 6. 3M FIRE PROTECTION PRODUCTS.
  - 7. THE RECTORSEAL CORPORATION.
  - 8. NELSON FIRESTOP PRODUCTS.

2.02 FIRESTOPPING, GENERAL

- A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.
  - 1. All materials shall comply with ASTM E814 or E 119 (UL 1429), and shall be manufactured of nontoxic, non-hazardous, asbestos free materials, and unaffected by water or moisture when cured.

2. Primers: Conform to manufacturer's recommendations for primers required for various substrates and conditions.
  3. Backup Materials: Backup materials, supports, and anchoring devices shall be provided as required by UL testing.
- B. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance rated systems. Accessories include but are not limited to the following items:
1. Permanent forming/damming/backing materials must be noncombustible and may include the following:
    - a. Semi-refractory fiber (mineral wool) insulation.
    - b. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
    - c. Joint fillers for joint sealants.
  2. Temporary forming materials.
  3. Substrate primers.
  4. Collars.
  5. Steel sleeves.

## 2.03 FIRESTOPPING, MATERIALS

- A. Use only firestopping products that have been UL 1479 or ASTM E814 tested for specific fire rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.
- B. For penetrations by noncombustible items including steel pipe, copper pipe, rigid steel conduit, and electrical metallic tubing (EMT), the following materials are acceptable:
1. HILTI FS 601 S Elastomeric Firestop Sealant or FS-ONE High Performance Intumescent Firestop Sealant
  2. STI Spec Seal; Sealant SSS 100
  3. 3M; Fire Barrier CP25 or Firestop Sealant 2000
  4. THE RECTORSEAL CORPORATION METACAULK; 1000, 950, 835, Putty, & Mortar or BIOFIRESHIELD K10 and K2 Mortar, Biostop 500+, Biotherm 100/200 & Biostop Putty.
  5. TREMCO, Inc.; Tremstop Fyre-Sil Sealant
  6. NELSON; FSP putty, CLK caulk; LBC caulk
- C. For penetrations by combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe (closed piping systems), the following materials are acceptable:
1. STI; Wrap Strip SSW12

2. HILTI; FS One Intumescent Firestop Sealant or CP 642 and CP G43 Firestop Collars and CP 645 wrap strip
  3. 3M; Fire Barrier FS-195 Wrap Strip or Fire Barrier CP 25
  4. RECTORSEAL; Metacaulk Wrap Strip, Firestop Collars, Metacaulk 1000' 950, & 835 or Biostop Wrap Strip, Collar, and Biostop 500+.
  5. NELSON; FSP putty; LBC caulk; PCS pipe choke; WRS wrap strip.
  6. TREMCO; Tremstop WBM Intumescent Firestop Sealant.
- D. For penetrations by combustible plastic pipe (open piping systems), the following materials are acceptable:
1. HILTI; CP 642 and CP 643 Firestop Collars and CP 645 wrap strip or FS-ONE High Performance Intumescent Firestop Sealant.
  2. 3M; Fire Barrier PPD Plastic Pipe Device.
  3. NELSON; PCS-Pipe Chokes; WRS-Wrap Strips; NELSON LBS (two inches and under).
- E. For large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following materials are acceptable:
1. STI; Spec Seal lightweight mortar SSM22B or putty.
  2. HILTI; FS635 Trowelable Firestop Compound or FS 657 FIREBLOCK.
  3. 3M; Fire Barrier CS-195 Composite Sheet or Firestop Foam 2001.
  4. RECTORSEAL; BIOFIRESHIELD K-10 & K2 Mortar or Metacaulk Firestop Mortar.
  5. NELSON: FSP putty; CLK N/S caulk; PLW pillow; CPS composite sheet; CMP - compound.
  6. TREMCO; PS Pillow System.
- F. For fire rated construction joints and other gaps with movement the following materials are acceptable:
1. HILTI CP 6015 Elastomeric Firestop Sealant, or CP 672 spread spray and CP 606 Flexible Sealant.
  2. STI Pensil 300
  3. 3M; (Dow Corning Fire Stop Sealant 2000) or Fire Barrier CP 25.
  4. TREMCO, Inc.; Tremstop Acrylic SP Sealant.
  5. BIOFIRESHIELD, Biostop 700, Biostop 500+ or Metacaulk 1000 & 1100.
  6. NELSON: CLK caulk; LBC caulk; FSC Firestop Compound.
- G. Cast-in-place firestop devices are installed prior to concrete placement for use with non-combustible and combustible plastic pipe (closed and open piping systems) penetrating concrete floors, the following products are acceptable.
1. HITLI CP 680 Cast-In-Place Firestop Device
  2. FOX COUPLING, INC. "Cast-In-Place Firestop Coupling".
  3. Proset Cast-In-Place Device
  4. TREMCO "Fyre Can" Cast-In-Place Device
  5. Equivalent products listed in the UL Fire Resistance Directory -Volume 2



- H. Insulation: Mineral wool, 3.5 PCF minimum density. Provide as a backer material in flutes of metal deck.
- I. Provide a firestopping system with an "F" rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- J. Provide a firestop system with an assembly rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.

2.04 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

2.05 RATED STUD DEFLECTION ASSEMBLY

- A. Deflection Track Ceiling Runner: See Section 09 21 16.
- B. Gypsum Wallboard: See Section 09 21 16.
- C. Insulation: Mineral wool, 3.5 PCF minimum density.
- D. Firestopping Compound: Types as manufactured by listed manufactures in 2.01A herein.
- E. Accessories: Provide all fasteners, clips and other related installation accessories as required for a complete UL approved assembly.

**PART 3 EXECUTION**

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.
  - 1. Verify penetrations are properly sized and in suitable condition for application of materials.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
  - 1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
  - 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop systems seal with substances.

### 3.03 INSTALLING THROUGH-PENETRATION FIRESTOPS

- A. General: Comply with the "System Performance Requirements" in Part 1 and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
  - 1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.04 INSTALLING FIRE RESISTIVE JOINT SEALANTS

- A. General: Comply with the "System Performance Requirements" in Part 1 with ASTM C1193, and with the sealant manufacturer's installation instructions and drawings -pertaining to products and applications indicated.
- B. Install joint fillers to provide support of sealants during application and at position required to produce the cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire resistance rating required.
- C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.
- D. Tool nonsag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.05 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Special Inspections Penetration Firestops. When required per IBC 1705, inspections of penetration firestop systems shall be conducted by an approved inspection agency in accordance with ASTM E 2174.
  - 1. Fire-resistant joint systems. Inspection of fire-resistant joint systems shall be conducted by an approved inspection agency in accordance with ASTM E 2393.
- E. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.
- F. Manufacturer's Field Services: During installation, contractor shall have manufacturer's representative provide periodic training and visual observations with written documentation of the results.
- G. Do not proceed to enclose firestopping with other construction until inspection agency has verified that the firestop installation complies with the requirements.
- H. Where deficiencies are found, repair or replace the firestopping so that it complies with requirements of tested and listed system design.

3.06 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, .preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
1. The words "Warning - Through-Penetration Firestop System -Do Not Disturb. Notify Building Management of Any Damage".
  2. Contractor's name, address, and phone number.
  3. Through-penetration firestop system designation of applicable testing and inspecting agency.
  4. Date of installation.
  5. Through-penetration firestop system manufacturer's name.
  6. Installer's name.

[3.07 IDENTIFICATION & DOCUMENTATION

- A. The firestop contractor is to supply documentation for each single application addressed. This documentation is to identify each penetration and joint location on the entire project.
1. The Documentation form for through penetrations is to include:
    - a. Sequential location number
    - b. Date of installation
    - c. Detailed description of the penetration's location
    - d. Tested system or engineered judgment number
    - e. Type of assembly penetrated
    - f. A detailed description of the size and type of penetrating item
    - g. Size of opening
    - h. Number of sides of assemblies addressed
    - i. Hourly rating to be achieved
    - j. Installer's name
- B. Compiled copies of these documents are to be provided to the Owner at the completion of the project.]

3.08 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-

penetration firestop systems immediately and install new materials to produce through-penetration firestop system complying with specified requirements.

**END OF SECTION**

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## **SECTION 07 92 00**

### **JOINT SEALANTS**

#### **PART 1 GENERAL**

##### **1.01 SCOPE**

- A. General: Prepare joints and apply sealant at all locations which normally require sealing to prevent infiltration of air, water, and insects and to reduce transmission of sound.
- B. Apply sealants to exterior and interior non-static joints. Do not seal normal drainage points or weep holes. Include the following:
  - 1. masonry control and expansion joints
  - 4. around louvers, exterior trim, windows, door frames, aluminum entrances and other penetrations or openings in exterior walls
  - 8. threshold bedding
  - 9. joints between different wall materials
  - 10. termination joints between wall materials and adjacent materials
  - 11. perimeter seal of metal door and borrowed light frames where they abut masonry and where they abut drywall in shower rooms, toilet rooms and kitchens
  - 12. composite wall panel joints
  - 13. other applications indicated
- C. Sealing of joints in concrete construction, including sidewalk joints, concrete paving joints and floor joints, tile floor expansion joints and other floor joints as indicated.
- D. Sealing of all exterior and interior locations where materials or equipment do not fit together or against the adjoining surface with a hairline joint.
- E. Caulking of interior static joints. Include the following:
  - 1. intersection of exposed structure or ceiling construction with masonry walls
  - 2. perimeter seal of metal door and borrowed light frames where they abut drywall [, except in shower rooms, toilet rooms and kitchens]
  - 3. intersection of grilles and louvers with adjacent surfaces
  - 4. intersection of cabinets, casework and similar items applied to or recessed in walls
  - 5. other applications indicated
- F. Sealing between wall and wall mounted plumbing fixtures and floor and floor mounted plumbing fixtures.

- G. Sealing at intersection of plastic laminate tops and side/backsplashes to each other and to wall.
- H. Sealing at reglets and flashings set in sealant.
- I. Seal penetrations through ceramic tile work.
- J. Trim exposed masonry flashing.
- K. Joints, perimeter, and penetrations in fire-rated assemblies. Use firestopping specified in Section 07 84 00.
- L. Joints, perimeter, and penetrations in sound-rated assemblies. See Section 09 21 16.

1.02 RELATED SECTIONS

- A. Firestopping Sealants: Section 07 84 00.
- B. Sustainable Design Requirements: Section 01 81 13.
- C. VOC Limits: Section 01 81 16.

1.03 GENERAL PERFORMANCE

- A. Except as otherwise indicated, joint sealant is required to establish and maintain airtight and waterproof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application.
- B. Failures of installed sealant to comply with this requirement will be recognized as failures of both materials and workmanship.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions.
  - 1. Certification, in the form of manufacturer's standard data sheet or by letter, stating that each type of compound and sealant to be furnished complies with these specifications.
  - 2. Statement that each product to be furnished is recommended for the application shown and is compatible with all materials to which applied.
  - 3. Instructions for handling, storage, mixing, priming, installation, curing and protection for each type of sealant.
- B. Submit manufacturer's color chart for color selections.
- C. Submit cured sealant samples in colors required for the work. Architect's approval will be for color only. Compliance with other requirements is the Contractor's



responsibility.

- D. Stone and sealant test reports for each type of stone used.
- [E. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.

- 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.]

#### 1.05 STORAGE AND HANDLING

- A. Prevent inclusion of foreign matter or the damage of materials by water or breakage.
- B. Procure and store in original containers until ready for use.
- C. Materials showing evidence of damage shall be rejected.

#### 1.06 WARRANTY

- A. Installer's Warranty: Contractor and joint sealant applicator shall jointly warranty joint sealant work for two (2) years from date of final acceptance. Warranty shall include replacing joints which fail to perform as airtight; or fail in adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration and stain resistance, general durability or any other form of apparent deterioration (excluding inherent qualities and limitations clearly specified in the manufacturer's submitted product data).
- B. 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 for ten (10) years from date of final acceptance
- C. 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.
- C. Comply with these specifications for repair or replacement of work.

## **PART 2 PRODUCTS**

2.01 MATERIALS

- A. Definition: The term "sealant" will be understood to be an elastomeric type. The term "caulk" will be understood to be a synthetic resin base of highest quality acrylic latex compound.
- B. General: [Provide materials that comply with Project Sustainable Design Requirements and Low Emitting Material goals.]
  - 1. 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.
  - 2. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
  - 3. Colors: As selected by Architect from manufacturer's full range; selected colors to match adjacent materials.
  - 4. Where exposed to foot traffic, select materials of sufficient strength and hardness to withstand stiletto heel traffic without damage or deterioration of sealant system.
- C. Manufacturers: BOSTIK; DOW CORNING CORPORATION; EUCLID CHEMICAL; TREMCO MANUFACTURING COMPANY; GENERAL ELECTRIC COMPANY/MOMENTIVE; SIKA CHEMICAL CO.; MAMECO INTERNATIONAL; BASF BUILDING SYSTEMS; VULCHEM.
  - 1. Manufacturer's listed under the following applications are for basis of design. Equal products by above listed manufacturers are acceptable.
- [D. Exterior Vertical and Overhead Joints: Single-component neutral curing silicone sealant meeting ASTM C920, Type S, Grade NS, Class 50.
  - 1. DOW 791
  - 2. GE SCS9000 Silpruf NB
  - 3. TREMCO Spectrum 3
  - 4. PECORA 895 NST
- [D. Exterior Vertical and Overhead Joints: Single or multi-component elastomeric polyurethane sealant meeting ASTM C920, Type M or S, Grade NS, Class 50.
  - 1. PECORA Dynatrol II
  - 2. TREMCO Dymeric 240
  - 3. BOSTIK Chem-Calk 500
  - 4. PACIFIC POLYMERS INTERNATIONAL Elastothane230 LM Type II
  - 5. POLYMERIC SYSTEMS INC. PSI-901
- E. Horizontal Wearing Expansion Joints; Interior and Exterior

1. Type: Two-part polyurethane based elastomeric sealant, complying with ASTM C920, Class 25, Type M, Grade P, Use T. Self-leveling or gun grade type as recommended by manufacturer for application shown.
  2. Location: For joints in exterior concrete pavements, sidewalks and interior floors.
    - a. BOSTIK Chem-Calk 555-SL
    - b. EUCLID Eucolastic II
    - c. SONNEBORN Sonolastic SL 2
    - d. TREMCO THC 900/901
- F. Interior Vertical and Overhead Joints: Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT. Do not use where painted.
1. DOW 799
  2. GE SCS2000 SilPruf
  3. TREMCO Spectrum 2
  4. PECORA 895 NST
- G. Interior Vertical and Overhead Joints: Use at joints requiring movement and to be painted. Single or multi-component polyurethane hybrid gun-grade, non-sag sealant complying with ASTM C920, Type S or M, Class 25, Use NT, M, A, Grade NS.
1. EUCLID Eucolastic I or II
  2. BASF Sonolastic NP 1 or NP 2
  3. BOSTIK Chem-Calk 900
  4. TREMCO Dymonic
- H. Sealants at Countertops, Backsplashes and Plumbing Fixtures: ASTM C920, Type S, Grade NS, Class 25. Provide with mildew resistive additive.
1. Sealant Colors
    - a. Countertops and Backsplashes: Clear.
    - b. Plumbing Fixtures: white, unless colored fixtures are selected, then sealant color shall match fixture color.
  2. Manufacturers/Products
    - a. DOW 786
    - b. GE SCS1700 Sanitary.
    - c. SONNEBORN Sonolastic Omniplus
    - d. TREMCO Tremsil 600
    - e. PECORA 898 Sanitary Sealant
- I. Caulk Joints – Interior, Static - Paintable: High quality acrylic latex compound, non-staining non-bleeding complying with ASTM C834 Type OP with a maximum volume shrinkage of 30%, as supplied by one of the above listed manufacturers.
- J. Exterior and Interior Joints Subject to Water Immersion: Two-part elastomeric polysulfide sealant, meeting ASTM C920, Type M, Grade NS, Class 25.

1. SONNEBORN Sonolastic Two-Part
2. EPOXY SYSTEMS 913
3. CMI Sealtight Deck-O-Seal

## 2.02 ACCESSORIES

- A. Joint Primer/Sealer: Non-staining type, recommended by sealant manufacturer; compatible with joint forming material.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming material.
- C. Bond Breaker Tape: Pressure sensitive polyethylene or plastic tape, recommended by sealant manufacturer, to suit applications where bond to substrate should be avoided for proper joint sealant performance.
- D. Joint Backing: Compressible rod stock conforming to ASTM C1330, Type B; material as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance
- E. Solvents: Cleaning agent recommended by the manufacturer of the sealant in writing to Architect.
- F. Expanding Control Joint Filler
  1. Description: Precompressed, closed-cell, self-expanding foam. Self stick pressure sensitive adhesive (PSA) on one or two sides as required by substrate conditions
  2. Size: As required for specific joint width and thickness.
  3. Manufacturer: EMSEAL, WILLIAMS PRODUCTS, ILLBRUCK, SCHUL INTERNATIONAL or POLYTITE MANUFACTURING CORP.

## **PART 3 EXECUTION**

### 3.01 INSPECTION

- A. Pre-Installation Meeting
  1. Prior to sealant installation, and at the Contractor's direction, meet at project site to review material selections, joint preparations, installation procedures, weather conditions and coordination with other trades.
  2. Include sealant installer, Contractor, Architect, manufacturer's representative and representatives of other trades or subcontractors affected by the sealant installation.
- B. Examine substrates and installation conditions. Do not proceed with joint sealant work until unsatisfactory conditions have been corrected.

- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

### 3.02 PREPARATION

- A. Clean, seal and prime surfaces in accordance with manufacturer's recommendations. Confine primer/sealant to areas of sealant bond.
- B. Remove dust, dirt, loose coatings, moisture and other substances which could interfere with sealant bond.
- C. Remove lacquers and protective films from metal surfaces.
- D. Architectural Concrete and Stone: Apply masking around joints to protect adjacent surfaces from defacement and staining during sealing operations. Repair damaged masking until sealant is installed.

### 3.03 INSTALLATION

- A. Apply joint sealant as late as possible in construction, preceding painting and following cleaning operations. Do not apply sealant during inclement weather conditions or when temperature is above or below manufacturer's limitations for installation.
- B. Install joint sealant materials and accessories in strict accordance with manufacturer's installation instructions.
- C. Set joint filler units at depth or position in joint as indicated to coordinate with other work. Do not leave voids or gaps between ends of joint filler units.
- D. Install sealant backer rod, except where recommended to be omitted by sealant manufacturer for application indicated. Use rod diameter that will cause compression when installed.
- E. Install bond breaker tape and where required by manufacturer's recommendations to ensure that sealants will perform as intended.
- F. Apply joint sealants in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces on both sides. Fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. At horizontal joints between a horizontal surface and vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt. Hand tool and finish all joints.
- G. Install joint sealants within recommended temperature ranges and to depths indicated or when not indicated, as recommended by sealant manufacturer. For normal moving vertical and horizontal joints, fill joints to a depth equal to 50% of joint width, but not more than 1/2" deep nor less than 1/4" deep, measured at the center section of bead.

- H. Confine materials to joint areas with masking tapes or other acceptable methods. Remove excess sealant materials promptly as work progresses and clean adjoining surfaces.
- I. Masonry Flashing: Where sealant joint is in direct contact with flexible masonry flashing, trim flashing flush with face of masonry after sealant is installed and cured. Verify during this procedure that weep holes have not been compromised during sealing operations.

3.04 CLEANING

- A. Upon completion, remove and dispose of masking materials; remove all excess sealing materials; clean adjacent materials of all soil and stain resulting from sealing operations.
  - 1. Replace damaged material and material which cannot be properly cleaned.

**END OF SECTION**

SECTION 08 11 00 - STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work Included in this Section:
  - 1. Steel Doors:
    - a. Non-fire-resistance rated interior steel doors.
    - b. Non-fire-resistance rated exterior steel doors.
    - c. Fire-resistance rated interior steel doors.
    - d. Thermally insulated steel doors.
  - 2. Steel Frames:
    - a. Non-fire-resistance rated interior steel frames.
    - b. Non-fire-resistance rated exterior steel frames.
    - c. Fire-resistance rated interior steel frames.
    - d. Steel frames in masonry openings.
    - e. Steel frames in gypsum board partitions.

1.02 REFERENCES

- A. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- B. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- D. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; 2004.
- E. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; 1993; also in WDHS-1/WDHS-5 Series, 1996.
- F. ITS (DIR) - Directory of Listed Products; current edition.
- G. UL (BMD) - Building Materials Directory; current edition.
- H. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2018.
- I. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

1.03 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- B. LEED Documentation: Submit information required by Section 01 35 31 for the following targeted credits:
  - 1. Credit MR 5: Materials and Resources - Regional Materials.
- C. Shop Drawings: Details of each opening showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

1.04 QUALITY ASSURANCE

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

1.05 DELIVERY, STORAGE, AND PROTECTION

- A. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

- A. Refer to Section 01 60 00 - Product Requirements.

## 2.02 MANUFACTURERS

### A. Steel Doors and Frames:

1. Ceco Door Products; Product \_\_\_\_: [www.cecodoor.com](http://www.cecodoor.com).
2. Republic Builders Products; Product \_\_\_\_: [www.republicdoor.com](http://www.republicdoor.com).
3. Steelcraft; Product \_\_\_\_: [www.steelcraft.com](http://www.steelcraft.com).
4. Metal Products, Inc.;

## 2.03 GENERAL

### A. Requirements for All Units:

1. Door Top Closures: Flush with top of faces and edges.
2. Door Edge Profile: Beveled on both edges.
3. Door Texture: Smooth faces.

### B. Hardware Preparation: In accordance with DHI (LOCS) and DHI WDHS.3, with reinforcement welded in place, in addition to other requirements specified in door grade standard.

### C. Finish: Factory primed, for field finishing.

### D. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

## 2.04 STEEL DOORS

### A. Thickness: 1-3/4 inches unless indicated otherwise.

### B. Exterior Doors, Non-Fire-Rated:

1. Grade: ANSI/SDI A250.8 Level 2, 18 ga., physical performance Level B, Model 1, full flush.
2. Core: Polyurethane.
3. Top Closures: Flush with top of faces and edges.
4. Galvanized.
5. Texture: Smooth faces.
6. Weatherstripping: Integral, recessed into door edge or frame.

### C. Interior Doors, Non-Fire-Rated:

1. Grade: ANSI/SDI A250.8 Level 2, 18 ga., physical performance Level B, Model 1, full flush.
2. Core: Cardboard honeycomb.
3. Texture: Smooth faces.

### D. Interior Doors, Fire-Rated:

1. Grade: ANSI/SDI A250.8 Level 2, 18 ga., physical performance Level B, Model 1, full flush.
2. Fire Rating: As indicated on Door and Frame Schedule, with temperature rise ratings as required by code, tested in accordance with NFPA 252.
  - a. Provide units listed and labeled by UL (BMD) or ITS (DIR).
  - b. Attach fire rating label to each fire rated unit.
3. Core: Mineral fiberboard.
4. Texture: Smooth faces.

## 2.05 STEEL FRAMES

### A. General:

1. Comply with the requirements of grade specified for corresponding door.
2. Frames for Wood Doors: Comply with frame requirements specified in ANSI A250.8 for Level 1, 16 gage
3. Finish: Factory primed, for field finishing.
4. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.



- 5. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
  - B. Exterior Door Frames: Fully welded.
    - 1. Weatherstripping: Separate, see Door Hardware section.
  - C. Interior Door Frames, Non-Fire-Rated:
    - 1. Masonry openings: Fully welded.
    - 2. Gypsum board partitions: Fully welded.
  - D. Interior Door Frames, Fire-Rated:
    - 1. Masonry openings: Fully welded.
    - 2. Gypsum board partitions: Fully welded.
    - 3. Fire Rating: Same as door, labeled.
- 2.06 ACCESSORY MATERIALS
- A. Glazing:
    - 1. As specified in Section 08 81 00.
  - B. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.
  - C. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
  - D. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.
- 2.07 FINISH MATERIALS
- A. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating. Factory-prime galvanized units.
    - 1. Galvanize exterior units.
    - 2. Galvanize interior units where shown on the door schedule.
  - B. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
  - C. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.

### 3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

### 3.03 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard.
- B. In addition, install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Coordinate installation of hardware.
- F. Coordinate installation of glazing.
- G. Coordinate installation of electrical connections to electrical hardware items.
- H. Touch up damaged factory finishes.

3.04 ERECTION TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION 08 11 00

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
  - 1. Solid core veneer-faced doors with a transparent finish.
  - 2. Solid core doors with an opaque finish.
  - 3. Fire-resistance rated doors.
  - 4. Factory finishing.
  - 5. Glazing stops and preparation of flush doors to receive glazing; glazing specified elsewhere.
  - 6. Prefitting by manufacturer.
  - 7. Premachining by manufacturer.

1.02 REFERENCES

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).
- B. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2018.
- C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- D. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2013.

1.03 SUBMITTALS

- A. Product Data: Submit detailed technical information for each distinct product specified in this section. Include complete data for factory finished doors.
- B. LEED Documentation: Submit information required by Section 01 35 31 for the following targeted credits:
  - 1. Credit MR 5: Materials and Resources - Regional Materials.
  - 2. Credit MR 7: Materials and Resources - Certified Wood.
  - 3. Credit EQ 4.1: Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
- C. Shop Drawings: Prepare and submit shop drawings showing relevant information, including:
  - 1. Construction details for each distinct product type.
  - 2. Dimensions and location of blocking for hardware.
  - 3. Fire ratings.
  - 4. Factory finishing details.
- D. Samples: Submit samples for the following:
  - 1. Veneer verification samples: Minimum 8-1/2 by 11 inches.
  - 2. Factory finishes:
    - a. Selection samples: Manufacturer's complete selection; minimum size 2 inches by 3 inches.
    - b. Verification samples: Minimum 8-inch-square sample for each color, effect, and type of factory finish.
  - 3. Glazing assemblies: For each type and finish, provide minimum 12-inch-long sample.
- E. Certificates:
  - 1. Submit certification that manufacturer's construction standards and tested fire door assembly requirements comply with contract requirements indicated for doors, hardware, hardware templating, size of lights, and other design characteristics.
    - a. Clearly note any exceptions to certification, citing door number and hardware set. Exceptions shall be subject to the approval of the Architect.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products as required to prevent damage or deterioration. Conform to manufacturer's recommendations, requirements of referenced standard, and recommendations of WDMA I.S. 1A, Appendix, "How to Store, Handle, Finish, Install, and Maintain Wood Doors."

- B. Clearly label each door with opening number where door will be installed. Use removable, temporary labels or mark on door surface which will be concealed from view after installation.
  - 1. Coordinate door identification with shop drawing designations.
- C. Environmental Requirements: Do not deliver, store, or install products of this section before building's design temperature and humidity levels have been achieved and will be maintained at those levels.

#### 1.05 WARRANTIES

- A. Manufacturer's Warranty (Interior Doors):
  - 1. Submit a written warranty signed by the manufacturer guaranteeing to correct failures in products which occur within the warranty period indicated below, without reducing or otherwise limiting any other rights to correction which the Owner may have under the contract documents. Failures are defined to include:
    - a. Faulty workmanship.
    - b. Delamination.
    - c. Stile, rail, or core show-through (telegraphing) visible to the naked eye to any degree when viewed from a horizontal distance of 3 to 4 feet.
    - d. Warp (including bow, cup, and twist) in excess of 1/4 inch when measured in accordance with WDMA I.S. 1A.
  - 2. Correction includes repair or replacement at the option of the Architect. Correct failures which occur within the following warranty periods after Substantial Completion:
    - a. Solid core interior doors: Life of original installation.
- B. If, for any reason, the Contractor's work results in nullification of manufacturer's warranty, the Contractor shall correct failures and pay for such correction.

### PART 2 PRODUCTS

#### 2.01 SUBSTITUTIONS

- A. Refer to Section 01 60 00 - Product Requirements.

#### 2.02 LEED REQUIREMENTS

- A. Materials and Resources - Certified Wood: Provide wood-based materials and products which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood based building components.
- B. Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
  - 1. Multipurpose Construction Adhesives: 70 g/l.

#### 2.03 WOOD DOORS - GENERAL REQUIREMENTS

- A. Flush Doors: Conform to one of the following:
  - 1. WDMA I.S. 1A: "Industry Standard for Interior Architectural Wood Flush Doors".
  - 2. AWI/AWMAC/WI (AWS) "Architectural Woodwork Standards".
- B. Door Performance Grade: Heavy Duty.
- C. Fire-Rated Doors:
  - 1. Provide doors that comply with NFPA 80 and that are precise duplicates of doors tested as part of fire-rated assemblies in accordance with requirements of NFPA 252. Seals shall not be visible when door is open. Do not employ frame-applied seals.
  - 2. Acceptable testing and inspection agencies:
    - a. Underwriters Laboratories Inc.
    - b. Warnock Hersey International Inc.
  - 3. Construction: Conform to testing agency requirements for indicated fire rating.
    - a. Ratings of 45 minutes or more: Mineral core.
    - b. Ratings of 20 minutes: Particleboard core.

- c. Temperature rise rating: For fire-rated doors in stairwell enclosures, provide door construction tested and certified to limit temperature rise in thirty minutes to 450 degrees, F.
- 4. Edges: Laminated edge (stile) designed for use with mortise hinges and appropriate for indicated fire resistance rating.
- 5. Rails and blocking: Laminated material designed for use as blocking or rails and appropriate for indicated fire resistance rating. Provide the following for fire rated doors with 45-minute or greater rating:
  - a. All doors: Provide 5-inch-wide top and bottom rails; provide lock blocking.
  - b. Doors with exit devices: Provide lock blocking both sides or continuous intermediate rail.
  - c. Doors with flush or surface bolts: Provide blocking for bolts.
  - d. Doors, transoms, or side panels with strikes: Provide blocking for strikes.
- 6. Acceptable products for edges, rails, and blocking:
  - a. "Firestop I" for blocking and rails, "Firestop II" for stiles; Georgia-Pacific.
  - b. "SLM" for blocking and rails, "SLM II" for stiles; Timberland Components.
  - c. "Triple-Ply"; Weyerhaeuser.
  - d. Other products acceptable to manufacturer, subject to the approval of the Architect.
- 7. Through-bolted hardware: Blocking specified in this section shall not relieve the requirement for through-bolted closers, exit devices, and similar hardware. Through-bolted closers, exit devices, and similar hardware specified shall not relieve the requirement for solid blocking. Provide through-bolted hardware and solid blocking.
- 8. Pairs of fire rated doors: Where required to meet fire rating, provide metal meeting edges at pairs of vertical rod exit devices, and astragals and metal edges elsewhere.
  - a. At veneered doors with transparent finish, cover metal with matching veneer.
  - b. At opaque field finished doors, provide metal primed for painting.
  - c. At doors with opaque factory finish (paint or HPDL), apply baked enamel factory finish to metal to match door finish.
- 9. Testing laboratory labels: Permanently affixed to hinge stile.
  - a. Construction labeling is not an acceptable to standard labeling unless requested in accordance with the substitution procedures specified in Division 1 and approved in writing by the Architect.

## 2.04 CONSTRUCTION

- A. Appearance Grade: Premium.
- B. Faces:
  - 1. Veneer species, cut, and grade for transparent finish (HPVA standards):
    - a. HHPVA Grade AA.
    - b. White (sap) Maple, Plain Sliced.
  - 2. Veneer matching for transparent finish:
    - a. Between adjacent veneer leaves: Book Match.
    - b. Within panel face: Running match.
  - 3. Surface for opaque finish: Medium density overlay (MDO) over hardwood veneer.
- C. Construction: PC-5 (5-ply).
- D. Core, Non-Fire-Rated Doors: Particleboard, bonded to stiles and rails, sanded.
- E. Core, Fire Rated Doors: As specified above.
- F. Core, Glass Light Doors: Where stile width is less than 10 inches, or where glass height is over 1/2 of the height of the door, or where other required features do not qualify for manufacturer's standard construction, provide specially reinforced core construction utilizing laminated strand lumber or other materials approved by the Architect.
- G. Core, Unit Entry Doors: For all Residential Unit entry doors, cross-core door for future card reader. Provide an electrical pathway between the lockset and the middle hinge location for

future electronic egress equipment. Refer to hardware specification for additional door hardware information.

H. Acoustical Doors: Construct to provide STC indicated.

I. Door Thickness: 1-3/4" unless indicated otherwise.

J. Glue: Type I.

## 2.05 ACCESSORIES

A. Stops for Glazing: Provide flush style glazing stops.

1. For non-fire-rated doors: Solid stock of species to match door face veneer; finish to match door.
2. For fire rated doors 45 minutes and over: Cold-rolled sheet steel of gage approved by testing agency for installation in fire-rated doors indicated. Cover exposed surfaces of glazing stops with wood veneer to match door faces. Finish veneer to match door.
3. For 20 minute fire-rated doors: Solid stock fire-retardant treated wood of species to match door face veneer; finish to match door.

## 2.06 FABRICATION

A. General:

1. Fabricate to provide consistent clearances as indicated.
2. Hinge and lock edges:
  - a. Provide 1/8-inch standard bevel at edges, unless standard bevel would not precisely match hardware bevel; provide proper bevel for hardware.
  - b. Predrill pilot holes for hinges on fire doors with laminated hinge stiles.
3. Make neat mortises and cutouts for door hardware indicated.
4. Prefitting: Fabricate and trim doors to size at factory to coordinate with frame shop drawings and floor finishes as indicated in the finish schedule.
  - a. Provide non-standard clearances and tolerances indicated in Part 3.
5. Premachining: Make all mortises and cutouts required for hardware at the factory to conform to approved hardware schedule, hardware templates, and door frame shop drawings.

B. Openings: Cut, trim, and seal openings in doors at the factory.

C. Doors to Receive Finish Specified Elsewhere: Coordinate shop priming with requirements for field-applied finishes; prime doors at factory using appropriate products; apply stain, first coat of paint system, or other sealing product as required.

## 2.07 FACTORY FINISHING

A. Comply with one of the following:

1. AWI/AWMAC/WI (AWS) Section 5, "Factory Finishing".
2. WDMA I.S. 1A "Finishing".

B. Transparent Finish:

1. WDMA I.S. 1A System TR-6 Catalyzed Polyurethane or TR-8 UV Cured Acrylated Polyester/Urethane.
2. AWI/AWMAC/WI (AWS)AWI System 11 Catalyzed Polyurethane or System 9 UV Cured Acrylated Polyester/Urethane.
3. Sheen: Satin.
4. Staining: Match the Architect's sample.
5. Grade: Premium.

C. Opaque Finish:

1. WDMA I.S. 1A System OP-6 Catalyzed Polyurethane or OP-8 UV Cured Acrylated Polyester/Urethane.
2. AWI/AWMAC/WI (AWS) System 11 Catalyzed Polyurethane or System 9 UV Cured Acrylated Epoxy, Polyester, orUrethane.
3. Sheen: Satin.
4. Color: Match the Architect's sample.

5. Grade: Premium.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Inspect door frames and doors before beginning door installation.
  1. Verify that frames are properly installed and aligned and are capable of providing trouble free support for doors throughout range of door swing.
  2. Do not install damaged or defective doors.
- B. Correct unsatisfactory conditions before installing products of this section. Commencement of installation indicates acceptance of conditions.

#### 3.02 INSTALLATION

- A. Hardware Installation: Elsewhere in Division 8.
- B. Install doors in accordance with manufacturer's recommended procedures and requirements of referenced standard.
  1. Fire-rated doors: Comply with NFPA 80 requirements.
- C. Prefit Doors: Minimize field fitting to those procedures which are necessary to complete work unfinished during factory prefitting and to provide trouble free operation.
  1. Accurately align and fit doors for trouble free operation throughout range of door swing.
- D. Prefitting Clearances:
  1. Door edge and head: 1/8 inch.
  2. Door edge and jamb: 1/8 inch.
  3. Door bottom edge and top surface of threshold: 1/4 inch.
  4. Door bottom edge and floor covering surface or finish (where threshold is not indicated): 1/8 inch.
  5. Meeting edges at pairs of doors: 1/8 inch total.
- E. Installation Clearances: Install doors so as to maintain prefitting clearances specified.
- F. Factory-Finished Doors: Before installing doors, restore finish at door edges cut during field fitting.

#### 3.03 ADJUSTING

- A. Adjust doors for proper operation; coordinate with hardware adjustment; replace doors that cannot be properly adjusted.
- B. Where door finishes are damaged during installation, restore in a manner that results in the door showing no evidence of the restoration. If refinished door cannot be made to match other doors, remove refinished door and replace with new conforming work at the Contractor's expense.
- C. Protect installed work.

END OF SECTION 08 14 16





SECTION 08 14 33 - STILE AND RAIL WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wood doors, stile and rail design; non-fire rated.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).

1.04 SUBMITTALS

- A. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria.
- B. Manufacturer's Installation Instructions: Indicate special installation instructions.
- C. Manufacturer's Qualification Statement.
- D. Installer's Qualification Statement.
- E. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

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

1.06 DELIVERY, STORAGE, AND HANDLING

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

1.07 WARRANTY

- A. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Stile and Rail Wood Doors:
  - 1. Basis of Design: Masonite.
    - a. Typical Interior Unit Doors: Cendura Series; West End Collection, Berkley
  - 2. Other manufacturers meeting requirements outlined in sections below.

2.02 DOORS

- A. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; solid lumber construction; mortise and tenon joints. Opaque finish as indicated on drawings.

2.03 DOOR AND PANEL FACINGS

- A. Materials for Opaque Finishes: Material allowed by quality standard indicated.
- B. Adhesive: Type I - Waterproof.

2.04 DOOR CONSTRUCTION

- A. Vertical Exposed Edge of Stiles: Hardwood for paint finish.
- B. Fit door edge trim to edge of stiles after applying veneer facing.
- C. Panels: Flat.
- D. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
  - 1. Exception: Doors to be field finished.

2.05 ACCESSORIES

- A. Door Hardware: As specified in Section 08 71 00.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standards.
- B. Adjust width of non-rated doors by cutting equally on both jamb edges.
- C. Machine cut for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit, clearance, and joinery tolerances.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.

3.05 SCHEDULE - SEE DRAWINGS

END OF SECTION 08 14 33

SECTION 08 31 00 - ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall and ceiling access door and frame units.

1.02 REFERENCE STANDARDS

- A. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of each access door and/or panel unit.
- D. Manufacturer's Installation Instructions: Indicate installation requirements.
- E. Project Record Documents: Record actual locations of each access unit.

1.04 QUALITY ASSURANCE

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

PART 2 PRODUCTSK

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Wall-Mounted Units:
  - 1. Location: As indicated on drawings.
  - 2. Material: Steel.
  - 3. Size: 24 inch by 24 inch, unless noted otherwise on drawings.
  - 4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
  - 5. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
  - 6. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
  - 7. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.
- B. Wall-Mounted Units in Wet Areas:
  - 1. Location: As indicated on drawings.
  - 2. Material: Steel, hot-dipped zinc, or zinc-aluminum-alloy coated.
  - 3. Size: 24 inch by 24 inch, unless noted otherwise on drawings.
  - 4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
  - 5. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
  - 6. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
- C. Fire-Rated Wall-Mounted Units:
  - 1. Location: As indicated on drawings.
  - 2. Wall Fire-Rating: As indicated on drawings.
  - 3. Material: Steel.
  - 4. Size: 24 inch by 24 inch, unless noted otherwise on drawings.
  - 5. Door/Panel: Insulated double-surface panel, with tool-operated spring or cam lock and no handle.
- D. Ceiling-Mounted Units:

1. Location: As indicated on drawings.
  2. Material: Steel.
  3. Size - Gypsum Ceilings: 24 inch by 24 inch, unless noted otherwise on drawings.
  4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
- E. Removable Access Units:
1. Location: As indicated on drawings.
  2. Material: Steel.
  3. Size: 24 inch by 24 inch, unless noted otherwise on drawings.

## 2.02 WALL AND CEILING MOUNTED UNITS

- A. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
1. Door Style: Single thickness with rolled or turned in edges.
  2. Units in Fire-Rated Assemblies: Fire rating as required by applicable code for fire-rated assembly that access doors are being installed.
  3. Steel Finish: Primed.
  4. Primed and Factory Finish: Polyester powder coat; color as selected by Architect.
  5. Door/Panel Size: As indicated on the drawings.
  6. Hardware:
    - a. Hardware for Fire-Rated Units: As required for listing.
    - b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.02 PREPARATION

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

### 3.03 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION 08 31 00

SECTION 08 40 00 - ALUMINUM FRAMING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior Aluminum doors and frames.
- B. Interior Storefront.
- C. Glass infill.
- D. Column/beam covers.

1.02 REFERENCES

- A. AA DAF-45 - Designation System for Aluminum Finishes; 2003 (R2009).
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
- C. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- F. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.
- G. AAMA 511 - Voluntary Guideline for Forensic Water Penetration Testing of Fenestration Products; 2008.

1.03 SUBMITTALS

- A. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glazing and infill, and internal drainage details.
- B. LEED Documentation: Submit information required by Section 01 35 31 for the following targeted credits:
  - 1. Credit EQ 4.1: Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
- C. Samples: Submit two samples 4 X 4 inches in size illustrating finished aluminum surface, glazing, glazing materials.
- D. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- E. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations.
- F. Report of field testing for water leakage.
- G. Project Closeout Submittals: Warranty.

1.04 QUALITY ASSURANCE

- A. Manufacturer and Installer: Company specializing in manufacturing aluminum glazing systems with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND PROTECTION

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond to aluminum when exposed to sunlight or weather.

1.06 PROJECT CONDITIONS

- A. Coordinate the work with installation of air barrier, vapor retarder, and joint sealants to adjacent materials.

- B. Coordinate the work with installation of firestopping at edge of slab.
- C. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

**1.07 Provide manufacturer's finish guarantee.**

- 1. Base Bid: 10 years.**
- 2. Alternate: 20 Years."**

**PART 2 PRODUCTS**

**2.01 SUBSTITUTIONS**

- A. Refer to Section 01 60 00 - Product Requirements.

**2.02 LEED REQUIREMENTS:**

- A. Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants:
  - 1. Provide adhesives complying with South Coast Rule No. 1168 by the South Coast Air Quality Management District.
    - a. Structural Glazing Adhesives: 100 g/l.

**2.03 MANUFACTURERS**

- A. Kawneer Company, Inc: [www.kawneer.com](http://www.kawneer.com).
- B. EFCO Corp: [www.efcocorp.com](http://www.efcocorp.com).
- C. Oldcastle Building Envelope: [www.obe.com](http://www.obe.com).
- D. YKK AP America, Inc: [www.ykkap.com](http://www.ykkap.com).

**2.04 ALUMINUM ENTRANCE DOORS**

- A. Kawneer Company, Inc.:
  - 1. 500 Door.
- B. EFCO:
  - 1. D500 Wide Stile.
- C. Oldcastle Building Envelope:
  - 1. 500 Wide Stile.
- D. YKK:
  - 1. 50D Wide Stile.
- E. Doors: Glazed aluminum.
  - 1. Overall Thickness: 1-3/4 inches.
  - 2. Top Rail: 5-6 inches wide.
  - 3. Vertical Stiles: 5-6 inches wide.
  - 4. Bottom Rail: 10 inches wide.
  - 5. Glazing Stops: Square.
  - 6. Finish: Same as adjacent framing members.
- F. Performance Requirements:
  - 1. Design and size components to withstand the following load requirements without damage or permanent set:
    - a. Member Deflection: Limit member deflection to L/175 in any direction or 3/4 inch, whichever is less, with full recovery of glazing materials.
  - 2. Movement: Accommodate the following movement without damage to components or deterioration of seals:
    - a. Movement between aluminum framing and perimeter framing.
  - 3. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
- G. Door Hardware: As specified in Section 08 71 00.
- H. Sill Sweep Strips: Resilient seal type, of neoprene; provide on all doors.

## 2.05 STOREFRONT SYSTEM

- A. Kawneer Company, Inc.:
  - 1. InFrame Interior Framing System
  - 2. Trifab 400
- B. EFCO:
  - 1. System 402.
- C. Oldcastle Building Envelope:
  - 1. FG 2000.
  - 2. FG 1000
- D. YKK:
  - 1. YES 20
  - 2. YES 45 CS/ YES 45 CI
- E. Performance Requirements:
  - 1. Design and size components to withstand the following load requirements without damage or permanent set:
    - a. Member Deflection: Limit member deflection to L/175 in any direction or 3/4 inch, whichever is less, with full recovery of glazing materials.
  - 2. Movement: Accommodate the following movement without damage to components or deterioration of seals:
    - a. Movement between aluminum framing and perimeter framing.
    - b. Inter-story drift.
  - 3. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and heel bead of glazing compound.
  - 4. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

## 2.06 COMPONENTS

- A. Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
- B. Aluminum Framing Members: Tubular aluminum sections, drainage holes, and internal weep drainage system.
- C. Column / Beam Covers: Aluminum, 0.064 inch thick, finish to match adjacent framing members.

## 2.07 MATERIALS

- A. Extruded Aluminum: ASTM B221.
- B. Sheet Aluminum: ASTM B209.
- C. Fasteners: Stainless steel.
- D. Glazing: As specified in Section 08 81 00.

## 2.08 FINISHES

- A. Comply with AA DAF-45 for aluminum finishes required.
- B. **Base Bid:** Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

**"C. Alternate: Finish: Fluoropolymer baked enamel finish with Kynar 500 (70%) resins by ELF ATOCHEM OF NORTH AMERICA INC.; "Trinar" by AKZO; "Duramar" by PPG; "Fluoropon" by VALSPAR. Total dry film thickness not less than 1.0 mils, or coatings meet or exceed the requirements of AAMA 2605.**

- 1. **Color: As selected by Architect from paint manufacturer's complete specified line.**
- 2. **Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.**
- 3. **Concealed members may be mill finished, providing they cannot be seen through the glass."**

## 2.09 FABRICATION

## **BID/PERMIT 1/30/2020**

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
- E. Arrange fasteners and attachments to conceal from view.
- F. Reinforce framing members for imposed loads.
- G. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
  - 1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.
- C. Verify that anchorage devices have been properly installed and located.

### **3.02 INSTALLATION**

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

### **3.03 ENTRANCE DOORS**

- A. Set thresholds in a bed of mastic and secure.
- B. Install hardware using templates provided.
  - 1. See Section 08 71 00 for hardware installation requirements.

### **3.04 ERECTION TOLERANCES**

- A. Storefront Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.
- C. Sealant Space Between Aluminum Framing and Adjacent Construction: 3/4 inch +/- 1/8 inch, unless indicated otherwise on the drawings.

### **3.05 FIELD QUALITY CONTROL**

- A. Test installed aluminum framing and glazing assemblies for compliance with performance requirements for water penetration, in accordance with ASTM E1105, and as follows.
  - 1. Arrange the test apparatus so as to test not only the aluminum framing and glazing assembly, but also to test the seal between it and the adjacent weather barrier (such as dampproofing on masonry, weather barrier on sheathing, etc.). Perform testing prior to installation of cladding (such as brick, siding, panels, etc.).
  - 2. Perform testing at a uniform pressure equal to the framing manufacturer's published laboratory test value for water penetration. No provision of any industry guideline shall be



effective to reduce the required field test pressure from the manufacturer's published laboratory test value.

3. First establish an air pressure of 50% of the required value, hold for 5 minutes, and report any water leakage; then establish an air pressure of 75% of the required value, hold for 5 minutes, and report any water leakage; then establish the required air pressure and hold for 15 minutes and complete the test in accordance with ASTM E1105.
    - a. Method A: Hold air pressure at 100% of the required value for 15 minutes, and report any water leakage.
  4. In the event that the test of a unit fails, perform additional forensic water penetration testing on that same unit in accordance with AAMA 511 to identify and analyze the nature of the failure.
- B. Repair or replace, as directed, components that have failed field testing, and then retest until performance is satisfactory.

### 3.06 ADJUSTING

- A. Adjust doors for smooth operation, proper alignment, weather seal, and hardware function.

### 3.07 CLEANING AND PROTECTION

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.
- D. Protect finished work from damage.

END OF SECTION 08 40 00



## **SECTION 08 41 13**

### **ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. Work under this section includes the design of the aluminum entrance and window systems and all materials, labor and equipment for the complete installation of the work as shown on the drawings and specified herein. Work includes:
1. Aluminum entrance doors.
  2. Aluminum entrance framing system for entrances and vestibule, including sidelight and transom frames as indicated.
  3. Aluminum storefront system.
  4. Glass and glazing of the systems.
  5. Hardware.
  6. Anchors, fasteners, flashings, trim and accessories to complete the work.
  7. Sealants required within entrance and window construction.
  8. All gaskets, sealants and tapes required in final assembly of the work.
  9. Installation of lock cylinders furnished under Section 08 71 10.

##### **1.02 RELATED SECTIONS**

- A. Joint Sealants: Section 07 92 00.
- B. Glazing: Section 08 81 00.
- C. Hardware: Section 08 71 10.
- F. Vapor/Air Barrier Transition Membranes: Section 07 27 26.
- G. Sustainable Design Requirements: Section 01 81 13.

##### **1.03 QUALITY ASSURANCE**

- A. Provide aluminum doors and framing system manufactured by a single firm specializing in the production of this type of work.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- C. Painted Finishes: Factory painted finish to be performed by an applicator specifically approved by the paint manufacturer. The applicator shall provide written notification of approval by paint manufacturer prior to application of the finish.

1.04 REFERENCES

- A. American Architectural Manufacturers Association (AAMA): Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels, AAMA 2605.

1.05 SUBMITTALS

- A. Submit the following:
1. Framing system details.
  2. Door details.
  3. Window details.
  4. Installation instructions.
  5. Finish samples.]
- B. Tests: Submit two copies of test reports made or witnessed by an independent testing laboratory showing the results of tests conducted on previously manufactured windows of the type used on this project. The reports shall verify conformance to thermal movement, air and water infiltration and structural properties as described herein.
- C. Building Shop Drawings: Include complete evaluations of all systems including doors; details and methods of anchorage; details of construction finishes; methods of assembly; location and installation of hardware and reinforcement for same; size, shape and thickness of materials; joints and connections; details of joining with other work.
1. Scale: Include typical unit elevation of each system at 1/2" scale and details at full scale where practical.
- D. Product Data: Submit manufacturer's specifications for materials and fabrication of work, and instructions and recommendations for installation and maintenance. Include certified test reports showing compliance with requirements where a test method is indicated.
- E. Samples: Submit samples of each type and color and finish required by this Section, on 12" sections of extrusions or formed shapes and on 6" squares of sheet/plate. Include two or more samples in each set.
1. Architect reserves right to require fabrication samples showing prime members, joinery, anchorage, expansion provisions, glazing and similar details, profiles and intersections.
- [F. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.]

1.05 DELIVERY, STORAGE AND HANDLING

- A. Pack, deliver, handle, store and protect materials from damage in accordance with AAMA Curtain Wall #10, "Care and Handling of Architectural Aluminum" recommendations.
1. Remove paper type wrappings when unloading.
  2. Store materials inside the buildings whenever possible in clean, dry ventilated areas free of dust or corrosive fumes.
  3. Stack members vertically or on edge, shim between components to provide water drainage and ventilation. Protect with adequate coverings, placed to provide adequate air circulation.
  4. During installation, protect materials from lime mortar, run-off from concrete and copper, weld splatter, acids, roofing materials, solvents and abrasive cleaner.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.07 WARRANTIES

- A. Submit written warranty signed by manufacturer, Contractor, and installer agreeing to repair or replace work which fails in materials or workmanship within three (3) years of the date of project acceptance.
1. Failure of materials or workmanship shall include excessive leakage or air infiltration, excessive deflections and defects in accessories, weather seals and other components of work.
- B. Finish (Alternate #6): Provide paint manufacturer's guarantee of paint finish against failure of paint finish. Failure includes blistering, peeling, cracking, flaking, checking, excessive color change and chalking. Color change shall not exceed 5 N.B.S. units (per ASTM D523) and chalking shall not less than a rating of 8 per ASTM D4214.
1. Warranty Period: 20 years.

- C. Finish (Base Bid): Warranty Period: 10 years

**PART 2 PRODUCTS**

2.01 MANUFACTURERS

- A. Basis of Design: Drawings and specifications are based on products by KAWNEER CO.
- B. Other Acceptable Manufacturers: Equal products by the following manufacturers

are acceptable providing they meet or exceed the requirements specified herein and conform to the design intent indicated on the drawings:

1. CRL – U.S. ALUMINUM
2. EFCO
3. OLDCASTLE BUILDING ENVELOPE
4. TUBELITE DIVISION, INDAL, INC.
5. YKK AMERICA

## 2.02 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. Sheet and Plate: ASTM B 209.
  2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
  3. Extruded Structural Pipe and Tubes: ASTM B 429.
  4. Structural Profiles: ASTM B 308.
- B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
1. Structural Shapes, Plates, and Bars: ASTM A 36.
  2. Cold-Rolled Sheet and Strip: ASTM A 1008.
  3. Hot-Rolled Sheet and Strip: ASTM A 1011.

## 2.03 STOREFRONT, WINDOW FRAMING AND ENTRANCE DOOR SYSTEMS

- A. Type: An integrated system of extruded aluminum sections, glazing devices, sealing devices, doors and hardware and operable windows.
- B. Materials: Provide aluminum alloy and temper for each shape as recommended by manufacturer and processor to comply with requirements of performance, fabrication, and application of finish.
1. Thickness: As required to meet design requirements with a minimum of 1/8" for major sections.
- C. Framing: KAWNEER 451T, framing for 1" insulating glass.
1. Type: Thermally broken, outside glazed, fixed type framing as indicated on drawings.
  2. Frame
    - a. Members: Main frame members designated specifically for manufacture of aluminum windows extruded from 6063-T5 aluminum alloy.
    - b. Glazing: Extruded snap-in type bead. Units to accept 1" insulating

- glass.
    - c. Trim: Provide all trim, sills, flashings and closures to complete installation.
    - d. Size
      - 1) Sightline: Nominal 2".
      - 2) Depth: 4-1/2".
    - [e. Provide subframing as required for power operated entrance door application. See Section 08 42 29.
  - 3. Glazing Plane: Center
  - 4. Special Framing Shapes: Provide as detailed or as required to maintain design intent as indicated on building elevations drawings and section drawings. Aluminum extruded shapes and bent aluminum sheet, minimum 0.063", finished after fabrication.
  - 5. Vestibule Framing: Non-thermally broken; dimensions to match exterior framing. KAWNEER Trifab II 451. Units to accept 1/4" glass.
  - 6. Interior Framing: Non-thermally broken. KAWNEER Trifab II 451. Units to accept glass thickness indicated.
    - a. Designed to resist a 200 lb/SF concentrated load in any direction where indicated on the drawings.
    - b. Size
      - 1) Sightline: Nominal 2".
      - 2) Sill Sightline: Nominal 4-1/2"
      - 3) Depth: 4-1/2".
  - 7. Provide extruded solid backed framing shapes where framing abuts solid wall conditions.
- D. Performance Requirements: Exterior window wall system (excluding doors) shall meet or exceed the following performance requirements.
- 1. Wind loads: Provide storefront system; include anchorage, capable of withstanding wind load design pressures indicated on the drawings.
  - 2. Thermal Movement: Window framing system shall be designed to provide for expansion and contraction of component materials caused by a surface temperature range of 180° F., without causing buckling, stresses on glass, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or other detrimental effects.
    - a. Doors: Function properly over the above specified temperature range.
  - 3. Air Infiltration: Air leakage shall not exceed 0.06 cfm per square foot of fixed wall area when tested in accordance; with ASTM E283 at test pressure not less than 6.24 psf.
  - 4. Water Infiltration
    - a. Provide drainage to exterior face of framing any water entering at joints.
    - b. No uncontrolled water penetration shall occur when tested in accordance with ASTM E331, at test pressure not less than 8.0 psf.
  - 5. Structural Properties - Uniform Load: A static air design load of 20 psf shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the

specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

6. Thermal Properties
  - a. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than (Glass to Center) 0.44 (low-e) BTU/hr/ft sq./degree F
  - b. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than (Glass to Center) 62 frame and 68 glass (low-e)

E. Glazed Aluminum Entrance Doors: Modified medium stile, mid-stile, single acting aluminum entrances.

1. Stiles: Wide Style Nominal 5" wide.
2. Rails
  - a. Top: 35" high.
  - b. Bottom: 10" high.
  - c. Intermediate Rail: 5" high. Coordinate location of intermediate rail with mounting height of exit device.
3. Section Wall Thickness: .125" for major components; 0.05" for glazing moldings.
4. Door Thickness: 1-3/4".
5. Corners: Stiles through design, joined by concealed bolts and weld.
6. Provide complete with snap-in glazing stops and gaskets.
7. Sizes: As indicated. Provide single or pairs of doors as scheduled.
8. Exterior Entrance Weatherstripping: KAWNEER "Sealair Weathering" system or equal by other approved manufacturer. Locate weatherstripping at jambs, head and meeting stiles (as applicable). Provide bottom rail with EPDM blade gasket sweep. Size sweep to close against door threshold. Sweep housing finish to match door finish.
9. Glazing: 1" insulated, exterior doors, 1/4" vestibule doors unless otherwise indicated.

2.04 FINISHES

- A. **Alternate** Finish: Fluoropolymer baked enamel finish with Kynar 500 (70%) resins by ELF ATOCHEM OF NORTH AMERICA INC.; "Trinar" by AKZO; "Duranar" by PPG; "Fluoropon" by VALSPAR. Total dry film thickness not less than 1.0 mils, or coatings meet or exceed the requirements of AAMA 2605.
  1. Color: As selected by Architect from paint manufacturer's complete specified line.
  2. Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.
  3. Concealed members may be mill finished, providing they cannot be seen through the glass.



- B. Base Bid Finish: Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41  
Clear anodic coating not less than 0.7 mils thick

1. Comply with AA DAF-45 for aluminum finishes required.

2.05 ENTRANCE DOOR HARDWARE

- A. Prepare and reinforce doors and frames for hardware. Factory fit and install hardware in accordance with Section 08 71 10 and manufacturer's requirements.

2.06 ACCESSORIES

- A. Fasteners: Aluminum, non-magnetic stainless steel or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum components. Finish exposed fasteners to match aluminum work.
- B. Flashing, Trim and Accessories: Provide as required to complete the work. Finish shall match aluminum entrances and storefront finishes. Work includes:
1. Aluminum closure panels, flashing and trim.
  2. Concealed Flashing: Dead-soft stainless steel, 26 gauge minimum, type selected by manufacturer for compatibility.
  3. All trim materials shall be finished after fabrication, unfinished exposed edges at holes and trim terminations are not acceptable.
- C. Brackets and Reinforcements: Manufacturer's high strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A123.
- D. Bituminous Coatings: Cold applied asphalt mastic complying with SSPC PS 12, compounded for 30 mil thickness per coat.
- E. Structural Sealant: Designed to carry gravity loads of glazing and capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed storefront/strip windows without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
1. Structural Glazing Sealants: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in storefront/strip windows assembly indicated.
    - a. Color: As selected by Architect from manufacturer's full range of colors.
  2. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile

Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.07 FABRICATION

- A. Provide manufacturer's standard fabrication and accessories that comply with indicated requirements. Minor dimension differences will be accepted in order to utilize manufacturer's standard products.
- B. Fit and assemble the work at the shop to the greatest extent possible. Disassemble only as required for shipment and erection. Maintain true continuity of line and accurate relation of planes and angles. Provide secure attachment and support at mechanical joints, with hairline fit of contacting members. Conceal fasteners wherever possible.
- C. Reinforce aluminum work as necessary at points of support or anchorage and at mechanical joints and points of attachment to meet performance requirements and for support of the system. Separate dissimilar metals with bituminous paint or preformed separators that will prevent corrosion. Separate metal surfaces at moving joints with plastic inserts or other non-abrasive concealed inserts.
- D. Coordinate work of this section with other work for proper sequence of construction without delays. Verify dimensions of supporting structure and other elements that precede wall system work before fabrication of required components. Provide for erection tolerances for other work where field measurements cannot be obtained.

**PART 3 EXECUTION**

3.01 INSPECTION

- A. Examine substrates supporting structure, and installation conditions. Do not proceed with aluminum entrances erection until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

- A. General
  - 1. Do not install component parts that are observed to be defective, including warped, bowed, dented, abraded and broken members.
  - 2. Remove and replace members that have been damaged during installation or thereafter before time of acceptance.
  - 3. Do not cut or trim component parts during erection, in a manner which would damage finish, decrease strength or result in a visual imperfection or a failure in performance of the work.

- B. Install components in accordance with the manufacturer's installation instructions and recommendations.
- C. Install component parts level, plumb, true to line and with uniform joints and reveals. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers.
- D. Assembly and Anchorage: Anchor component parts securely in place, by bolting or other permanent mechanical attachment system, which will comply with performance requirements and permits movements as required.
  - 1. Anchor storefront sill to a continuous interior aluminum anchor.
- E. Apply a bituminous coating or other suitable separator on concealed contact surfaces of dissimilar materials, before assembly or installation to prevent corrosive or electrolytic action.
- F. Set sill members and entrance thresholds in a bed of sealant compound, or with joint fillers or gaskets to provide weathertight requirements.
- G. Install glass and glazing, in accordance with Section 08 81 00 and the manufacturer's requirements.
- H. Install joint sealants specified in Section 07 92 00, in accordance with the manufacturer's requirements.
- I. Coordinate installation of storefront framing with installation of air/vapor barrier transition membrane.
- J. Adjust operating hardware to function properly, without binding, and to provide tight proper fit at contact points and weatherstripping.

### 3.03 CLEANING AND PROTECTION

- A. Protect glass from breakage immediately upon installation, by attachment of streamers to framing held away from glass. Do not apply markings of any type to surfaces of glass.
- B. Remove protective coating when completion of construction activities no longer require its retention.
- C. Immediately before acceptance of the work, clean the aluminum entrance systems thoroughly, inside and out. Demonstrate proper cleaning methods to Owner's maintenance personnel during final cleaning. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds, cleaning methods, sealants and glazing materials used for cleaning, repair and maintenance of work and turn over to Owner upon acceptance of the work.

### END OF SECTION

**END OF SECTION**

## **SECTION 08 51 13**

### **ALUMINUM WINDOWS**

#### **PART 1 GENERAL**

##### **1.01 SCOPE**

- A. Provide all exterior aluminum windows, including fixed and operable sash. Work includes:
  - 2. Fixed windows.
  - 3. Glass and glazing of the various window systems.
  - 4. Anchors, fasteners, flashings, trim and accessories to complete the work

##### **1.02 RELATED SECTIONS**

- A. Joint Sealant: Section 07 92 00.
- B. Glass and Glazing: Section 08 81 00.
- C. Aluminum Framed Entrances and Storefronts: Section 08 41 13.

##### **1.03 QUALITY ASSURANCE**

- A. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project, not less than five (5) years of successful experience with a minimum of 5 projects similar in scope and complexity to this project.
  - 1. When requested by Owner, provide a list the referenced projects. Include project name, Owner, Architect, Contractor, Installer and product references.
- B. Manufacturer: Windows to be manufactured by a single firm with minimum five years experience in fabrication of aluminum windows with a minimum of 5 projects similar in scope and complexity to this project.
- [C. Factory painted finish to be performed by an applicator specifically approved by paint manufacturer. The applicator shall provide written notification of approval by paint manufacturer prior to application of the finish.]

##### **1.04 REFERENCE STANDARDS**

- A. Unless otherwise indicated or specified, conform to the latest edition of the following. When conflicting requirements arise, follow the more stringent.
  - 1. Architectural Aluminum Manufacturer's Association (AAMA)

## **SECTION 08 51 13**

### **ALUMINUM WINDOWS**

- a. CW-10 Care and Handling of Architectural Aluminum from Shop to Site
- b. 101 Aluminum Prime Windows and Sliding Glass Doors
- c. 502 Voluntary Specification for Field Testing of Windows and Sliding Glass Doors
- d. 505 Dry Shrinkage and Composite Performance Thermal Cycling Test Procedure
- e. 910 Voluntary "Life-Cycle" Specifications and Test Methods for Architectural Grade Windows and Sliding Glass Doors
- 2. American Society for Testing and Materials
  - a. A123 Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strip
  - b. B221 Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes
  - c. B633 Electrodeposited Coatings of Zinc on Iron and Steel
  - d. B766 Electrodeposited Coatings of Cadmium
  - e. C509 Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material
  - f. D523 Standard Test Method for Specular Gloss
  - g. D2287 Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
  - h. D4214 Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
  - i. E283 Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
  - j. E330 Structural Performance of Exterior Windows, Curtainwalls and Doors by Uniform Static Air Pressure Difference.
  - k. E331 Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Pressure Difference.
  - l. E523 Standard Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Copper
- 3. General Services Administration (GSA)
  - a. RR-W-365 Wire Fabric (Insect Screening)
- 4. American Architectural Manufacturers Association (AAMA): Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels, AAMA 2605.

#### 1.04 SYSTEM DESCRIPTION

## **SECTION 08 51 13**

### **ALUMINUM WINDOWS**

- A. General: In addition to requirements shown or specified comply with applicable provisions of AAMA/NWWDA 101/I.S.2 for design, materials, fabrication and installation of component parts.
- B. Design Requirements
  - 1. Manufacturer is responsible for designing system, including installation instructions and necessary modifications to meet specified requirements and maintain visual design concepts.
  - 2. Requirements shown by details are intended to establish basic dimension of unit, sight lines and profiles of members.
  - 3. Provide assemblies free from rattles, wind whistles and noise due to thermal and structural movement and wind pressure.
  - 4. Installation instructions are to take into account specified site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
  - 5. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
  - 6. Evacuate water without infiltration to interior from exterior face of wall, water entering joints, and condensation occurring within windows, by drain holes and gutters of adequate size or other acceptable method.
  - 7. Provide concealed fastening wherever possible.
- C. Performance Requirements: Requirements for aluminum windows, terminology and standards of performance, and fabrication and workmanship are those specified and recommended in AAMA/NWWDA 101/I.S.2 and applicable general recommendations published by AAMA. Conform to more stringent of specified ANSI/AAMA standards and following:
  - 1. Air Infiltration Test: Not exceed 0.10 cubic feet per minute per foot of crack length when tested at a pressure of 6.24 psf. Perform tests in accordance with ASTM E 283 with the sash in a closed and locked position.
  - 2. Water Resistance Test: Subject window unit to a water resistance test in accordance with ASTM E 331 and E547 with no water passing the interior face of the window frame and no leakage as defined in the test method. Mount the glazed unit in its vertical position continuously supported around the perimeter and the sash placed in the fully closed and locked position. When a static pressure of 12.00 pounds per square foot has been stabilized, apply five gallons of water per square foot of window area to the exterior face of the unit for a period of 15 minutes.
  - 3. Uniform Load Deflection Test: ASTM E 330 at 120 pounds per square foot: No member deflection more than 1/175 of its span. Maintain test load for a period of 10 seconds resulting in no glass breakage, permanent damage of fasteners, hardware parts, support arms, actuating mechanisms or any other damage causing the window to be inoperable.

## **SECTION 08 51 13**

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4. Uniform Load Structural Test: Apply a minimum exterior and interior uniform load of 150 pounds per square foot to the entire outside surface of the test unit. Maintain this test load for a period of 10 seconds. Results: No glass breakage, permanent damage of fasteners, hardware parts, support arms, actuating mechanisms, or any other damage causing the window to be inoperable. And no permanent deformation of any frame or vent member in excess of 0.2 percent of its span.
5. Life Cycle Test: Per AAMA 101 and AAMA 910, provide proof that the product meets the criteria including passing air and water tests at the conclusion of the cycle tests.
6. Condensation Resistance Factor: Test in accordance with AAMA 1502 standards and tests of thermal performance resulting in a CRF of no less than 66-72 using Clear-Clear insulating glass.
7. Test reports more than four years old will not be accepted.

#### **1.05 SUBMITTALS**

- A. Product Data: Submit manufacturer's specifications, recommendations and standard details for aluminum window units.
- B. Shop Drawings: Submit shop drawings, including location floor plans or exterior wall elevations showing all window openings, typical unit elevations at 1/4 inch scale, and half size detail sections of every typical composite member. Show anchors, hardware, operators and other components as appropriate if not included in manufacturer's standard data. Include glazing details and standards for factory glazed units.
- C. Samples
  1. Submit two samples of each required aluminum finish and color, on 3 x 3 inch long sections of extrusion shapes or aluminum sheets as required for window units.
    - a. Finish samples to show the light and dark range limits of the anodizing colors. These finish samples will be used in the field as a check for items specified in this section. Anodized items whose color does not fall within the range indicated by these samples are unacceptable and shall not be used in the finished work.]
  2. Submit additional samples, if and as directed by Architect, to show fabrication techniques, workmanship of component parts, and design of hardware and other exposed auxiliary items.
- D. Calculations: Submit test results and engineering calculations indicating adequacy of materials, anchors, fasteners and other load bearing components to meet uniform load deflection and structural requirements.
  1. Submit calculations sealed by a professional engineer, registered in the State of Ohio. This engineer shall be the one who performs calculations as required hereafter. Calculation submission must coincide with Shop Drawing submission.



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#### **1.06 WARRANTY**

- A. Provide written warranty, signed by Contractor and installer agreeing to repair or replace defective materials and workmanship of aluminum windows during a period of three (3) years following substantial completion.
  - 1. Certify in writing that all work is in accordance with the Contract Documents and authorized alterations and/or additions thereto and that, should any defect develop during the warranty period due to improper workmanship or materials under his jurisdiction such defects will upon written request, be repaired or replaced by Contractor at Contractor's expense.
  - 2. "Defective" is defined to include abnormal deterioration, aging, weathering, glass breakage, and failure of system to meet performance requirements, including structural and infiltration.
  - 3. Repairs or replacements required because of acts of God exceeding performance requirements, vandalism, inadequate maintenance, alterations, failure of structure supporting windows or other causes beyond manufacturer's, installer's or Contractor's control, as judged by Architect, shall be completed as a change in the work.
- B. Provide manufacturer's guarantee of paint finish against failure of paint finish. Failure includes blistering, peeling, cracking, flaking, checking, excessive color change and chalking. Color change shall not exceed 5 N.B.S. units (per ASTM D523) and chalking shall not less than a rating of 8 per ASTM D4214.
  - 1. Warranty Periods
    - a. Coil Coated Items: 20 years.
    - b. Sprayed Items (Extrusions and fabrications): 5 years.

#### **1.07 DELIVERY AND STORAGE OF MATERIALS**

- A. Pack, load, ship, unload, store and protect windows in a manner which will avoid abuse, damage and defacement in accordance with AAMA CW-10.
- B. Store all materials delivered to the site in locations designated by the Architect. Spaces will be located where stored materials will not be exposed to wetting or damage, and will permit easy access to and handling of the materials.
  - 1. Stack vertically or on edge so that water cannot accumulate on or within components.
  - 2. Use nonstaining wood or plastic shims between components to provide water drainage and air circulation.
- C. Deliver other materials, except bulk materials, to project site in manufacturer's unopened containers with name, brand type, grade and color fully indicated thereon. Store bulk materials as required to avoid any deleterious effects of weather, soiling or contamination.

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**ALUMINUM WINDOWS**

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design; GRAHAM GT 6800 Series Fixed Window
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. TRACO
  - 2. ALUMITECH.
  - 3. EFCO
  - 4. WAUSAU
  - 5. MODULINE
  - 6. PEERLESS
  - 7. BOYD ALUMINUM
  - 8. OLDCASTLE

**2.02 MATERIALS**

- A. Aluminum Extrusions: Alloy and temper recommended by window manufacturer for strength, corrosion resistance and application of required finish, but not less than 22,000 psi ultimate tensile strength, a yield of 16,000 psi. Comply with ASTM B221.
- B. Fasteners: Aluminum, stainless steel, or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors and other components of window units.
  - 1. Do not use exposed fasteners on exterior except where unavoidable for application of hardware. Match finish of adjoining metal.
  - 2. Provide non-magnetic stainless steel, tamper-proof screws for exposed fasteners, where required, or special tamper-proof fasteners.
  - 3. Locate fasteners so as not to disturb the thermal barrier construction of windows.
- C. Anchors, Clips And Window Accessories: Depending on strength and corrosion-inhibiting requirements, fabricate units of aluminum, non-magnetic stainless steel or hot-dip zinc coated steel or iron complying with ASTM A123.
- D. Compression Glazing Strips and Weatherstripping: At manufacturer's option, provide neoprene gaskets complying with ASTM D2000 Designation 2BC415 to 3BC415, PVC gaskets complying with ASTM D2287, or expanded neoprene gaskets complying with ASTM C509, Grade 4.
- E. Sealant

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### **ALUMINUM WINDOWS**

1. Unless otherwise indicated for sealants required within fabricated window units, provide elastomeric type as recommended by window manufacturer for joint size and movement, to remain permanently elastic, non-shrinking and non-migrating. Provide product complying with AAMA Specification 803 and 808.
  2. Refer to Section 07 92 00 for perimeter sealants between window units and surrounding construction.
- F. Thermal Barrier: Provides a continuous uninterrupted thermal barrier around the entire perimeter of the frame and all sash and not be bridged by any metal conductors at any point. Provide manufacturer's standard construction which has been in use on similar window units for a period of not less than three years, has been tested to demonstrate resistance to thermal conductance and condensation and has been tested to show adequate strength per AAMA 505.

#### **2.03 WINDOW TYPES (OPERATION)**

- A. General: Except as otherwise indicated, provide window units complying with requirements of AAMA Classification "AW" for "Architectural" type windows. Windows for this project will be rated a minimum of AP-AW60 for full size test units per AAMA/NWWDA 101/I.S.2 to withstand a design pressure of 60 psf minimum.
- B. Fixed Aluminum Windows
1. No special hardware required.
  2. Minimum Wall Thickness: 0.125 inches.
  3. Minimum Frame Depth: 3.375 inches.

#### **2.04 FABRICATION AND ACCESSORIES**

- A. General: Provide manufacturer's standard fabrication and accessories which comply with specifications. Include complete system for assembly of components and anchorage of window units and provide complete pre-glazing at the factory.
- B. Window Material
1. Windows: Aluminum.
  2. Secondary Members (friction tabs, shoes, weatherstripping guides, etc.): Aluminum or a material compatible with aluminum.
  3. Aluminum extrusions not less than 0.125 thickness at any location for main frame and sash members or window design to incorporate multi-chamber hollow construction in both the sash and frame utilizing euro-groove technology.
- C. Hardware
1. Material: Aluminum, stainless steel or other non-corrosive materials compatible with aluminum for hardware having component parts which are

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### ALUMINUM WINDOWS

- exposed. Cadmium or zinc-plated steel where used must be in accordance with ASTM Specification B766 or B633.
2. Primary Locking Devices: Cast in white bronze cam action locks. When vent height exceeds thirty inches, two such locking devices will be required. "Hand" cam lock handles on projected units to facilitate operations.
- F. Thermal Barrier: Provides a continuous uninterrupted thermal barrier around the entire perimeter of the frame and all sash and shall not be bridged by any metal conductors at any point.
- H. Mullions - Other structural members: When mullion units occur, whether they are joined by integral mullions, independent mullions or by a combination of frame members, the resulting members must be capable of withstanding the load outlined under Uniform Load specified load requirements, without deflecting more than 1/175th of its span. When independent or integral mullions are used to join windows, the mullions shall contain a thermal barrier as specified. Evidence of compliance may be by mathematical calculations.
- I. Weather Protection
1. Provide means of drainage for water and condensation which may accumulate in members of window units by use of two weeps per main frame member.
  2. Do not position other material in such a manner as to obstruct the weep holes function.
- [J. Glazing:
1. Pre-glaze all units at the factory with 1" insulating glass units; see Section 08 81 00.
  2. Glaze units to allow for glass replacement without the use of special tools.

#### 2.05 METAL FINISHES

- [A. Finish: **(Alternate #6)**: Fluoropolymer finish containing not less than 70% PVDF (Kynar 500) resins; "Trinar" by AKZO; "Duranar" by PPG; "Fluoropon" by VALSPAR. Total dry film thickness not less than 1.0 mils, or coatings meet or exceed the requirements of AAMA 2605.
1. Color: As selected by Architect from paint manufacturer's complete specified line. To be coordinated with and match entrance door color and storefront framing color. See Section 08 41 13.
  2. Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.

**B. Base Bid Finish: Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick**

**1. Comply with AA DAF-45 for aluminum finishes required."**

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### **ALUMINUM WINDOWS**

#### **PART 3 EXECUTION**

##### **3.01 INSPECTION**

- A. Examine substrates, supporting structure and installation conditions. Do not proceed with window erection until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

##### **3.02 INSTALLATION**

- A. General
  - 1. Do not install component parts which are observed to be defective, including warped, bowed, dented, abraded, and broken members. Remove and replace members which have been damaged during installation or thereafter before time of acceptance.
  - 2. Do not cut or trim component parts during erection, in a manner which would damage finish, decrease strength or result in a visual imperfection of a failure in performance of the work.
- B. Install the aluminum windows in accordance with the manufacturer's instructions and recommendations for the installation of the aluminum window components.
- C. Install component parts level, plumb, true to line and with uniform joints and reveals. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers. Use erection equipment which will not mar or stain finished surfaces, and will not damage component parts.
- D. Assembly and Anchorage: Anchor component parts securely in place by bolting or other permanent mechanical attachment system which will comply with performance requirements and permit movements as required.
- E. Apply a bituminous coating or other suitable permanent separator on concealed contact surfaces of dissimilar materials, before assembly or installation to prevent corrosive or electrolytic action.
- F. Set sill members in a bed of sealant compound or with joint fillers or gaskets to provide weathertight requirements.
- G. Install aluminum window glass and glazing in accordance with Section 08800 and the manufacturer's requirements.

##### **3.03 CLEANING AND PROTECTION**

- A. Protect glass from breakage immediately upon installation, by attachment of streamers to framing held away from glass. Do not apply markings of any type on surfaces of glass.

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- B. After installation, clean framing members following procedures recommended by manufacturer.
  - 1. Use no solvents detrimental to finish of aluminum framing. Consult with manufacturer of finish to determine solvents and cleaning agents which may be used on the finish, including recommended methods and limitations or procedures
- C. Prior to acceptance of building, clean glass. Remove labels, grease and foreign substances.
- D. Protect work as recommended by manufacturer and approved by Architect. Protect system from damage during subsequent construction activities. Remove and replace broken, scratched or otherwise damaged materials at no expense to the Owner.

**END OF SECTION**

## SECTION 087100 – DOOR HARDWARE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
  - 2. Sliding doors.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Electromechanical door hardware.
  - 3. Automatic operators.
- C. Related Sections:
  - 1. Division 08 Section “Hollow Metal Doors and Frames”.
  - 2. Division 08 Section “Flush Wood Doors”.
  - 3. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
  - 4. Division 08 Section “Automatic Door Operators”.
  - 5. Division 28 Section “Access Control”.
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  - 2. ICC/IBC - International Building Code.
  - 3. NFPA 70 - National Electrical Code.
  - 4. NFPA 80 - Fire Doors and Windows.
  - 5. NFPA 101 - Life Safety Code.
  - 6. NFPA 105 - Installation of Smoke Door Assemblies.
  - 7. UL/ULC and CSA C22.2 – Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
  - 8. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

### 1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
  2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
  3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each door hardware item.
    - b. Manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - e. Explanation of abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for door hardware.
    - g. Door and frame sizes and materials.
    - h. Warranty information for each product.
  4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
  1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:



- a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
  - b. Complete (risers, point-to-point) access control system block wiring diagrams.
  - c. Wiring instructions for each electronic component scheduled herein.
- 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- E. Informational Submittals:
  - 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware 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.
- C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
  2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
1. Function of building, purpose of each area and degree of security required.
  2. Plans for existing and future key system expansion.
  3. Requirements for key control storage and software.
  4. Installation of permanent keys, cylinder cores and software.
  5. Address and requirements for delivery of keys.
- G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
  2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
  3. Review sequence of operation narratives for each unique access controlled opening.
  4. Review and finalize construction schedule and verify availability of materials.
  5. Review the required inspecting, testing, commissioning, and demonstration procedures
- H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

#### 1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

#### 1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of the hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
  - 1. Ten years for mortise locks and latches.
  - 2. Five years for exit hardware.
  - 3. Twenty five years for manual surface door closer bodies.
  - 4. Five years for motorized electric latch retraction exit devices.
  - 5. Two years for electromechanical door hardware.

## 1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

## PART 2 - PRODUCTS

### 2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
  - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

### 2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
  - 1. Quantity: Provide the following hinge quantity:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.
    - c. Four Hinges: For doors with heights 91 to 120 inches.
    - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
  - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
    - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
  - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

- a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
  - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
- 4. Hinge Options: Comply with the following:
  - a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
- 5. Manufacturers:
  - a. Bommer Industries (BOM) - LB Series.
  - b. Hager Companies (HAG) - CB Series.
  - c. McKinney Products; ASSA ABLOY Architectural Door Accessories (MCK) - TA Series.
  - d. Stanley Hardware (STA) - CB Series.
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
  - 1. Manufacturers:
    - a. **Select Products Limited (SEL)**
    - b. Pemko Products; ASSA ABLOY Architectural Door Accessories (PEM).
- C. Sliding and Folding Door Hardware: Hardware is to be of type and design as specified and should comply with ANSI/BHMA A156.14.
  - 1. Sliding Bi-Passing Pocket Door Hardware: Provide complete sets consisting of track, hangers, stops, bumpers, floor channel, guides, and accessories indicated.
  - 2. Manufacturers:
    - a. Hager Companies (HAG).
    - b. Johnson Hardware (JOH).
    - c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PEM).

## 2.3 POWER TRANSFER DEVICES

- A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug

directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

- a. Pemko Products; ASSA ABLOY Architectural Door Accessories (PEM) – EL-CEPT Series.
- b. Securitron (SUC) - EL-CEPT Series.
- c. Von Duprin (VON) - EPT-10 Series.

- B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:

- a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MCK) - Electrical Connecting Kit: QC-R001.
- b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MCK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

- a. Hager Companies (HAG) - Quick Connect.
- b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MCK) – QC-C Series.
- c. Stanley Hardware (STA) – WH Series.

## 2.4 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

- 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
- 2. Furnish dust proof strikes for bottom bolts.
- 3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
- 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Manufacturers:

- a. Ives (IVE).
- b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (ROC).

- c. Trimco (TRI).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
- 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
  - 2. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
  - 3. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
  - 4. Manufacturers:
    - a. Ives (IVE).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (ROC).
    - c. Trimco (TRI).

## 2.5 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years' experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
- C. Cylinders: Original manufacturer cylinders complying with the following:
- 1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
  - 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  - 3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
  - 4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
  - 5. Keyway: Match Facility Standard.

~~D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified patented cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents. Cylinders are to be factory keyed with owner having the ability for on site original key cutting.~~

~~1. Manufacturers:~~

- ~~a. Resident Rooms Medeco (MED) X4 Series.~~
- ~~b. Common Areas BEST SFIC as listed in Hdw sets where applied.~~
- ~~c. No substitution~~

~~E. Keying System: Each type of lock and cylinders to be factory keyed.~~

- ~~1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.~~
- ~~2. Furnish factory cut, nickel silver large bow permanently inscribed with a visual key control number as directed by Owner.~~
- ~~3. Existing System: Key locks to Owner's existing system.~~

~~F. Key Quantity: Provide the following minimum number of keys:~~

- ~~1. Change Keys per Cylinder: Two (2)~~
- ~~2. Master Keys (per Master Key Level/Group): Five (5).~~
- ~~3. Construction Keys (where required): Ten (10).~~

G. Construction Keying: Provide construction master keyed cylinders.

~~H. Key Registration List (Bitting List):~~

- ~~1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.~~
- ~~2. Provide transcript list in writing or electronic file as directed by the Owner.~~

## 2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Manufacturers:

- a. Schlage (SCH) – L9000 Series.
- b. Sargent Manufacturing (SAR) – 8200 Series.
- c. Stanley Best (BES) – 40H-UN Series.

## 2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latch bolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.



B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
5. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
6. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.
7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
  - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
  - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
8. Vertical Rod Exit Devices: **NKU Uses Concealed Vertical Cables in place of Vertical Rods.** Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

9. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
  10. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
  11. Rail Sizing: Provide exit device rails factory sized for proper door width application.
  12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:
    - a. Von Duprin (VON) - 35A/98 XP Series.
    - b. Sargent Manufacturing (SAR) - 80 Series.

## 2.9 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
  2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
  3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
  4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
  5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:

- a. LCN Closers (LCN) - 4040 Series.
- b. Sargent Manufacturing (SAR) - 351 Series.

2.10 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
  - a. Stainless Steel: 300 grade, .050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
  - a. Ives (IVE).
  - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (ROC).
  - c. Trimco (TRI).

2.11 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
  - 1. Manufacturers:
    - a. Ives (IVE).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (ROC).
    - c. Trimco (TRI).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
  - 1. Manufacturers:
    - a. Architectural Builders Hardware (ABH).
    - b. Rixson Door Controls (RIX).

## 2.12 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
  - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
  - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. Pemko Products; ASSA ABLOY Architectural Door Accessories (PEM).
2. Reese Enterprises, Inc. (REE).

2.13 ELECTRONIC ACCESSORIES

- A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

- a. Security Door Controls (SDC) - DPS Series.
- b. Securitron (SUC) - DPS Series.

- B. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Manufacturers:

- a. Sargent Manufacturing (SAR) - 3500 Series.
- b. Securitron (SUC) - BPS Series.
- c. Von Duprin (VON) - PS.

2.14 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.15 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### 3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

### 3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
  - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9

Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

### 3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

### 3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

### 3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

### 3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

### 3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with

corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

- B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

### Hardware Sets

#### Set: 1.0

Description: Exterior - Alum / Card Reader / Exit Device (nightlatch) / Closers w.stops / DPS

1 Continuous Hinge	SEL SL11HD or SL24HD EPT prep (type as applicable)	CL AN	
1 Rim Exit Device, Nightlatch	VON EL LX RX 99NL OP	US32D	⚡
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26	
1 Cylinder Housing	SCH 80-XXX series (type as applicable)	US32D	
1 Door Pull	IVE 8190-0 10" CTC	US32D	
1 Door Closer w/stop	LCN 4040XP SCUSH	EN	
1 Blade Stop Spacer	LCN 4040 61	EN	
1 Threshold	PEM 171A FHSL14		
1 Sweep	PEM 345ANB		
1 ElectroLynx Harness	VON CON-X (length as required for device to hinge)		⚡
1 Card Reader	Card Reader by Others		
1 ElectroLynx Harness	VON CON-X (length as required for hinge to power supply)		⚡
1 Electric Power Transfer	VON EPT-10		⚡
1 Wiring Diagram	Riser and Point-to-Point Wiring Diagrams		
1 Position Switch	Honeywell 947-75TWH		⚡
1 Junction Box	VON JB7		
1 <b>Power Supply. Not required, power from DSX system.</b>	<b>VON 90X series as needed for devices and mode operation</b>		⚡

Notes: \* Weatherstrip supplied with aluminum frame & door.

\* Coordinate all wiring & conduit with the electrical contractor.

\* Door contacts monitor the position of the doors and reports status to the security system.

\* Operation Description: Doors would be locked and secure. When the correct credential is presented to the card reader the exit device latch will release for entry. Entry would be allowed by mechanical key at all times. Manual egress is allowed at all times.



**Set: 2.0**

Description: Exterior - Alum / Pair / EL Exit Device (nightlatch) / Auto Oper / Ovhd Stops / DPS

2	Continuous Hinge	SEL SL11HD or SL24HD EPT prep (type as applicable)	CL AN	
1	Concealed Vert Rod Exit, Night latch. Concealed Vertical Cable , not vertical rods	VON EL LX RX 9949NL-OP	US26D	⚡
1	Concealed Vert Rod Exit, Dummy Pull. Concealed Vertical Cable, not vertical rods.	VON LX RX 9949EO	US32D	⚡
1	Small Format Inter Core.	BEST SFIC	26	
1	Cylinder Housing	SCH 80-XXX series (type as applicable)	US32D	
2	Door Pull	IVE 8190-0 10" CTC	US32D	
2	Conc Overhead Stop	ABH 102_ series (size as needed)	630	
1	Door Closer w/stop	LCN 4040XP SCUSH	EN	
1	Automatic Opener. Only needs to open one leaf not both	LCN 9540 series	ALUM	⚡
1	Threshold	PEM 171A FHSL14		
2	Sweep	PEM 345ANB		
2	Astragal	PEM 305CN		
2	ElectroLynx Harness	VON CON-X (length as required for device to hinge)		⚡
2	ElectroLynx Harness	VON CON-X (lenth as required for hinge to power supply)		⚡
1	Electric Power Transfer	VON EPT-10		⚡
1	Wiring Diagram	Riser and Point-to-Point Wiring Diagrams		
2	Door Switch Actuators	BEA 10 PBR1		⚡
2	Position Switch	Honeywell 947-75TWH		⚡
1	Junction Box	VON JB7		
1	Power Supply. Not required , gets power from DSX system	VON 90X series as needed for devices and mode operation		⚡
1	Relay	All required relays needed to meet mode of operation		


Notes: \* Weatherstrip supplied with aluminum frame & door.  
 \* Coordinate all wiring & conduit with the electrical contractor.  
 \* Door contacts monitor the position of the doors and reports status to the security system.  
 \* Operation Description:

Locked Mode - Doors would be locked and secure. Entry would be allowed by mechanical key at all times. Manual egress is allowed at all times or interior door switch actuator is pressed, exit device latches will release and automatic operator at the active leaf will open the door.

Unlocked Mode: Doors can be programmed through the access control system to be electronically dogged down (push/pull mode) at the active leaf and both door switch actuators active. Doors can be manually opened or egress or either door switch actuator can be pressed for the automatic operator to open the door at active leaf.

**Set: 3.0**

Description: Exterior - Exit Device (exit only) / Closer w.stop / DPS


1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Rim Exit Device, Exit Only	VON 99EO x less dogging	US26D
1 Door Closer w/stop	LCN 4040XP SCUSH	EN
1 Threshold	PEM 171A FHSL14	
1 Rain Guard	PEM 346C	
1 Gasketing	PEM 18041CNB	
1 Sweep	PEM 345ANB	
1 Position Switch	Honeywell 947-75TWH	

Notes: \* Coordinate all wiring & conduit with the electrical contractor.

\* Door contacts monitor the position of the doors and reports status to the security system.

**Set: 4.0**

Description: Exterior - Dormitory with Deadbolt Lock / Closer w.stop / DPS

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Dormitory/Exit Lock	SCH L9473 B 06A x 09-509 x L583-363	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Door Closer w/stop	LCN 4040XP SCUSH	EN
1 Threshold	PEM 171A FHSL14	
1 Rain Guard	PEM 346C	
1 Gasketing	PEM 18041CNB	
1 Sweep	PEM 345ANB	
1 Position Switch	Honeywell 947-75TWH	

Notes: \* Coordinate all wiring & conduit with the electrical contractor.

\* Door contacts monitor the position of the doors and reports status to the security system.

**Set: 5.0**

Description: Exterior - Storeroom Lock / Closer w.stop / DPS

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Storeroom/Closet Lock	SCH L9080 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Door Closer w/stop	LCN 4040XP SCUSH	EN
1 Threshold	PEM 171A FHSL14	
1 Rain Guard	PEM 346C	
1 Gasketing	PEM 18041CNB	
1 Sweep	PEM 345ANB	
1 Position Switch	Honeywell 947-75TWH	



Notes: \* At roof deck door - key side is stair side of door. Free egress from the roof at all times.  
\* Coordinate all wiring & conduit with the electrical contractor.  
\* Door contacts monitor the position of the doors and reports status to the security system.

**Set: 6.0**

Description: Exterior - Pair / Storeroom Lock with Deadbolt / Closer w.stop / DPS

2 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
2 Flush Bolt (Manual)	IVE FB458 / FB258 (type as required)	US26D
1 Dust Proof Strike	IVE DP2	US26D
1 Storeroom Deadbolt Lock	SCH L9480 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
2 Door Closer w/stop	LCN 4040XP SCUSH	EN
1 Threshold	PEM 171A FHSL14	
1 Rain Guard	PEM 346C	
1 Gasketing	PEM 18041CNB	
2 Sweep	PEM 345ANB	
2 Astragal	PEM 305CN	
2 Position Switch	Honeywell 947-75TWH	



Notes: \* Coordinate all wiring & conduit with the electrical contractor.  
\* Door contacts monitor the position of the doors and reports status to the security system.

**Set: 7.0**

Description: Exterior - Storeroom Lock with Deadbolt / Closer w.stop / DPS

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN	
1 Storeroom Deadbolt Lock	SCH L9480 B 06A	US26D	
1 Small Format Inter Core.	BEST SFIC	26	
1 Door Closer w/stop	LCN 4040XP SCUSH	EN	
1 Threshold	PEM 171A FHSL14		
1 Rain Guard	PEM 346C		
1 Gasketing	PEM 18041CNB		
1 Sweep	PEM 345ANB		
1 Position Switch	Honeywell 947-75TWH		⚡

Notes: \* At roof deck door - key side is stair side of door. Free egress from the roof at all times.  
\* Coordinate all wiring & conduit with the electrical contractor.  
\* Door contacts monitor the position of the doors and reports status to the security system.

**Set: 8.0**

Description: Interior - Alum / Pair / Card Reader / Exit Device (nightlatch) / Auto Oper / Ovhd Stops / DPS

2 Continuous Hinge	SEL SL11HD or SL24HD EPT prep (type as applicable)	CL AN	
1 Concealed Vert Rod Exit, Nightlatch	VON EL LX RX 9949NL-OP	US26D	⚡
1 Concealed Vert Rod Exit, Dummy Pull NKU uses concealed vertical cables	VON LX RX 9949EO	US32D	⚡
1 Small Format Inter Core.	BEST SFIC	26	
1 Cylinder Housing	SCH 80-XXX series (type as applicable)	US32D	
2 Door Pull	IVE 8190-0 10" CTC	US32D	
2 Conc Overhead Stop	ABH 102_ series (size as needed)	630	
1 Door Closer w/stop	LCN 4040XP SCUSH	EN	
1 Automatic Opener. Only needs to open one leaf not both	LCN 9540 series	ALUM	⚡
1 ElectroLynx Harness	VON CON-X (length as required for device to hinge)		⚡
1 Card Reader	Card Reader by Others		

1 ElectroLynx Harness	VON CON-X (length as required for hinge to power supply)	⚡
1 Electric Power Transfer	VON EPT-10	⚡
1 Wiring Diagram	Riser and Point-to-Point Wiring Diagrams	
2 Door Switch Actuators	BEA 10 PBR1	⚡
2 Position Switch	Honeywell 947-75TWH	⚡
1 Junction Box	VON JB7	
1 Power Supply. Not required	VON 90X series as needed for devices and mode operation	⚡
1 Relay	All required relays needed to meet mode of operation	

Notes: \* Coordinate all wiring & conduit with the electrical contractor.

\* Door contacts monitor the position of the doors and reports status to the security system.

\* Operation Description:

Locked Mode - Doors would be locked and secure. Entry would be allowed by mechanical key at all times. Manual egress is allowed at all times or interior door switch actuator is pressed, exit device latches will release and automatic operator at the active leaf will open the door.

Unlocked Mode: Doors can be programmed through the access control system to be electronically dogged down (push/pull mode) at the active leaf and both door switch actuators active. Doors can be manually opened or egress or either door switch actuator can be pressed for the automatic operator to open the door at active leaf.

### Set: 9.0

Description: Interior - Rated / Exit Device (passage) / Closer / Wall Stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Rim Exit Device, Passage	VON 99L-BE-F 06	US26D
1 Door Closer	LCN 4040XP EDA / REG (arm type as applicable)	EN
1 Kick Plate	IVE 8400 8" x 1 or 2" LDW (as applicable) x BEV x CSK	US32D
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
1 Gasketing	PEM S88_ (owner & architect to select color)	

Notes: \* Provide Intumescent Gasket as required by the door manufacturer.

**Set: 10.0**

Description: Interior - Push.Pull Set / Closer / Wall Stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Push Plate	IVE 8200 4" x 16"	US32D
1 Pull Plate	IVE 8103-0 10" CTC	US32D
1 Door Closer	LCN 4040XP EDA / REG (arm type as applicable)	EN
1 Kick Plate	IVE 8400 8" x 1 or 2" LDW (as applicable) x BEV x CSK	US32D
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
3 Silencer	IVE SR64 / SR65 (type as applicable)	

**Set: 11.0**

Description: Interior - Pair / Dummy Levers / Roller Latches / Ovhd Stops (Inner Unit Closet)

6 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
2 Roller Latch	IVE RL32	US26D
2 Single Dummy Trim	SCH L9170 06A	US26D
2 Surf Overhead Stop	ABH 902_ series (size as needed)	652
2 Silencer	IVE SR64 / SR65 (type as applicable)	

**Set: 12.0**

Description: Interior - Alum / Passage Set / Ovhd Stop

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Passage Latch	SCH L9010 06A	US26D
1 Surf Overhead Stop	ABH 902_ series (size as needed)	652

**Set: 13.0**

Description: Interior - Privacy Set / Ovhd Stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Privacy Lock w/occupancy indicator	SCH L9040 06A x L283-722 x 09-509 x L583-363	US26D
1 Surf Overhead Stop	ABH 902_ series (size as needed)	652

1 Mop Plate	IVE 8400 4" x 1" LDW x BEV x CSK	US32D
1 Gasketing	PEM S88_ (owner & architect to select color)	
1 Coat Hook	IVE 574	626

**Set: 14.0**

Description: Interior - Privacy Set / Ovhd Stop (Inner Suite Bathroom)

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Privacy Lock. BEST cylindrical 9K series	BEST 9K37L Series	US26D
1 Surf Overhead Stop	ABH 902_ series (size as needed)	652
1 Gasketing	PEM S88_ (owner & architect to select color)	
1 Coat Hook	IVE 574	626

Notes:

**Set: 15.0**

Description: Interior – Privacy Set / Wall Stop (Inner Suite Bathroom)

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Privacy Lock. BEST cylindrical 9K series	BEST 9K37L Series	US26D
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
1 Gasketing	PEM S88_ (owner & architect to select color)	
1 Coat Hook	IVE 574	626

Notes:

**Set: 16.0**

Description: Interior – Alum / Office Lock / Wall Stop

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Office/Entry Lock	SCH L9050 B 06A x 09-509 x L583-363	US26D

1	Small Format Inter Core.	BEST SFIC	26
1	Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D

**Set: 17.0**

Description: Interior - Rated / Dormitory Lock / Closer w.stop (Suite Entry Door)

3	Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1	Dormitory/Exit Lock.	SCH L9080 B 06A x 09-509 x L583-363	US26D
1	Small Format Inter Core.	BEST SFIC	26
1	Door Closer w/stop	LCN 4040XP SCUSH	EN
1	Kick Plate	IVE 8400 8" x 1 or 2" LDW (as applicable) x BEV x CSK	US32D
1	Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
1	Gasketing	PEM S88_ (owner & architect to select color)	
1	Viewer	IVE U698	626

Notes: \* Provide Intumescent Gasket as required by the door manufacturer.

\* Provide thru-bolts for closers and/or exit device on all rated openings if doors are not being supplied with blocking. Coordinate with door specifications.

\* At openings where a wall stop will work delete stop in closer and provide a wall stop.

\* Provide (2) door viewers at accessible units.

**Set: 18.0**

Description: Interior - Dormitory Lock / Wall (Inner Suite Unit Bedrooms)

3	Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1	Dormitory Lock. BEST cylindrical 9K series	BEST 9K37 (T) or (A) Series (Verify T or A function with owner prior to supply)	US26D
1	Small Format Inter Core.	BEST SFIC	26
1	Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
1	Gasketing	PEM S88_ (owner & architect to select color)	

Notes:



**Set: 19.0**

Description: Interior – Alum / Classroom Lock / Wall Stop

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Classroom Lock	SCH L9070 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D

Notes: \* Doors 91" to 120" provide (4) hinges.

**Set: 20.0**

Description: Interior - Alum / Classroom Lock / Ovhd Stop

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Classroom Lock	SCH L9070 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Surf Overhead Stop	ABH 902_ series (size as needed)	652

Notes: \* Doors 91" to 120" provide (4) hinges.

**Set: 21.0**

Description: Interior - Classroom Lock / Ovhd Stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Classroom Lock	SCH L9070 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Surf Overhead Stop	ABH 902_ series (size as needed)	652
3 Silencer	IVE SR64 / SR65 (type as applicable)	

**Set: 22.0**

Description: Interior - Alum / Classroom Lock / Closer w.stop

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Classroom Lock	SCH L9070 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Door Closer w/stop	LCN 4040XP SCUSH	EN

Notes: \* Doors 91" to 120" provide (4) hinges.

**Set: 23.0**

Description: Interior – Storeroom Lock / Wall Stop (Unit Mech)

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Storeroom/Closet Lock	SCH L9080 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
3 Silencer	IVE SR64 / SR65 (type as applicable)	

**Set: 24.0**

Description: Interior - Storeroom Lock / Ovhd Stop (Unit Mech)

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Storeroom/Closet Lock	SCH L9080 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Surf Overhead Stop	ABH 902_ series (size as needed)	652
3 Silencer	IVE SR64 / SR65 (type as applicable)	

**Set: 25.0**

Description: Interior – Rated / Storeroom Lock (knurling) / Closer / Wall Stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Storeroom/Closet Lock	SCH L9080 B 8(knurling) 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Door Closer	LCN 4040XP EDA / REG (arm type as applicable)	EN
1 Kick Plate	IVE 8400 8" x 1 or 2" LDW (as applicable) x BEV x CSK	US32D
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
1 Gasketing	PEM S88_ (owner & architect to select color)	

Notes: \* Provide Intumescent Gasket as required by the door manufacturer.

**Set: 26.0**

Description: Interior - Rated / Storeroom Lock / Closer w.stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Storeroom/Closet Lock	SCH L9080 B 06A	US26D
1 Small Format Inter Core.	BEST SFIC	26
1 Door Closer w/stop	LCN 4040XP SCUSH	EN
1 Kick Plate	IVE 8400 8" x 1 or 2" LDW (as applicable) x BEV x CSK	US32D
1 Gasketing	PEM S88_ (owner & architect to select color)	

Notes: \* Provide Intumescent Gasket as required by the door manufacturer.

**Set: 27.0**

Description: Interior - Rated / Storeroom Lock / Closer / Wall Stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Storeroom/Closet Lock	SCH L9080 B 06A	US26D
1 Small Format Inter Core.	BEST SFIC	26
1 Door Closer	LCN 4040XP EDA / REG (arm type as applicable)	EN
1 Kick Plate	IVE 8400 8" x 1 or 2" LDW (as applicable) x BEV x CSK	US32D
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
1 Gasketing	PEM S88_ (owner & architect to select color)	

Notes: \* Provide Intumescent Gasket as required by the door manufacturer.

**Set: 28.0**

Description: Interior - Sliding Track Set / Flush Pulls

1 Sliding Door Hdwe	PEM HBP200A	
2 Flush Pull	IVE 962	US26D

**Set: 29.0**

Description: All by Others

1 Note

All Hardware by Others

END OF SECTION 087100

## **SECTION 08 71 13**

### **AUTOMATIC DOOR OPERATORS**

#### **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. Low energy automatic door operators for swinging doors.

###### **B. Related Sections:**

- 1. Division 08 Section "Hollow Metal Doors and Frames".
- 2. Division 08 Section "Flush Wood Doors".
- 3. Division 08 Section "Door Hardware".
- 4. Division 26 Section "Electrical".
- 5. Division 28 Section "Access Control".

- A. Codes and Standards: Comply with the version year adopted by the Authority Having Jurisdiction.

- 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
- 2. ANSI/BHMA A156.4 - Door Controls, Door Closers.
- 3. ANSI/BHMA A156.19 - Power Assist and Low-Energy Power Operated Doors.
- 4. ICC/IBC - International Building Code.
- 5. NFPA 70 - National Electrical Code.
- 6. NFPA 80 - Fire Doors and Windows.
- 7. NFPA 101 - Life Safety Code.
- 8. NFPA 105 - Installation of Smoke Door Assemblies.
- 9. UL/ULC and CSA C22.2 – Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
- 10. UL 325 - Door, Drapery, Gate, Louver, and Window Operators and Systems.
- 11. State Building Codes, Local Amendments.

### 1.3 PERFORMANCE REQUIREMENTS

- A. Automatic door operators to be used on interior or exterior doors; up to 200 pounds (91 kg) weight and maximum door width of 48" (1219 mm).
  - 1. Auto door operator capable of operating within temperature ranges of -22°F (-30°C) and 122°F (50°C).

### 1.4 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, and finishes for automatic door operators, including activation devices. Include operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: Include details and attachments to other work.
  - 1. Include locations and elevations of each unique entrance showing activation devices.
  - 2. Indicate required clearances, components, and location and size of field connections.
  - 3. Wiring Diagrams: For power, signal, and activation wiring.
- C. Qualification Data: Provide copy of manufacturer's official certification or accreditation document indicating proof of status as a qualified and authorized installer of automatic door operators and accessories.
- D. Operating and Maintenance Manuals: Provide manufacturer's operating and maintenance manual for each item comprising the automatic door operator installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturer and Installer providing the operators and installation. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.
- E. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project.
- B. Certified Installer Qualifications: Locally certified ASSA ABLOY Power Operator Preferred Installer required for the installation and maintenance of the automatic door operator units and accessories indicated for the Project.
- C. Source Limitations: Obtain automatic door operators, including activation devices, from single source, qualified supplier unless otherwise indicated.

- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended location and application.
- E. Exit Door Requirements: Comply with requirements of authorities having jurisdiction for doors with automatic door operators serving as a component of a required means of egress.
- F. Fire Rated Door Assemblies: Provide operators for fire rated door assemblies that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for use on types and sizes of labeled fire doors required.
- G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and the procedures for receiving, handling, and installing automatic door operators.
  - 1. Prior to installation of automatic door operators, arrange for certified Installer's representative to conduct a project specific meeting to review the installation and maintenance of their respective products. Project meeting to be attended by representatives of related trades furnishing and installing the aluminum, hollow metal and wood doors sections.
  - 2. Review and finalize construction schedule and verify availability of materials.

#### 1.6 COORDINATION

- A. Electrical Systems Coordination: Coordinate the layout and installation of scheduled automatic door operators and related activation devices, with required connections to source power junction boxes, remote power supplies, access control equipment, detection and monitoring hardware, and fire alarm system.
- B. Templates: Obtain and distribute to the parties involved, templates for doors, frames, operators, and other work specified to be factory prepared and reinforced for installing automatic door operators. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators to comply with indicated requirements.
- C. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified automatic door operators without additional in-field modifications.

#### 1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Special Warranty: Written warranty, executed by manufacturer, agreeing to repair or replace components of automatic door operators that fail in materials or workmanship within specified warranty period after final acceptance by Owner. Failures include, but are not limited to, the following:
  - 1. Faulty or sporadic operation of automatic door operator, including activation and safety devices.
  - 2. Deterioration of metals, metal finishes, and other materials beyond normal weathering or use.
- C. Special Warranty Period: Two years from date of Substantial Completion.
- D. Provide extended warranty from defects in material or workmanship under normal use for a period of 3 years from the date of substantial completion for units installed by a certified ASSA ABLOY Power Operator Preferred Installer in accordance with the manufacturer's written warranty certificate.

## 1.8 MAINTENANCE SERVICE

- A. Maintenance Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance by skilled employees of automatic door operator Installer. Include planned and preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.
- B. Extended Maintenance Support and Service Agreement: Submit for Owner's consideration an optional extended Service Agreement for the installed automatic door operator system. The extended Service Agreement is considered elective and is without manufacturer's requirement stipulating mandatory coverage for owner and/or vendor system support.
  - 1. A published copy of this agreement to be included with the submittal package
  - 2. Support for the installed automatic door operator system is provided through the vendor under a specified, limited 24 hour support program.
  - 3. Automatic door operators and components are to be available on a one-day turn around time frame from the vendor.

## PART 2 - PRODUCTS

### 2.1 ELECTROMECHANICAL DOOR OPERATORS

- A. General: Provide low energy operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.



1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.
- B. Standard: Certified ANSI/BHMA A156.19.
- C. Performance Requirements:
  1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
  2. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.
- D. Configuration: Surface mounted or in-ground as required. Door operators to control single swinging and pair of swinging doors.
- E. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19.
- F. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.
- G. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.
- H. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.
- I. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- J. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Besam Automated Entrance Systems (BE) – SW200i Series.
  2. LCN Closers (LC) - 9500 Series.

## 2.2 ACTIVATION DEVICES

- A. General: Provide activation devices in accordance with ANSI/BHMA A156.19 standard, for condition of exposure indicated and for long term, maintenance free operation under normal traffic load operation. Coordinate activation control with electrified hardware and access control interfaces. Activation switches are standard SPST, with optional DPDT availability.

- B. Push-Plate Switch: Momentary contact door control switch with push-plate actuator.
  - 1. Configuration: Square or round push-plate control switch with single or double gang junction box mounting. Provide narrow profile face plate where indicated for jamb or mullion mounting.
    - a. Mounting Location: As indicated on Drawings.
  - 2. Push-Plate Material: Stainless steel.
  - 3. Message: International symbol of accessibility with "Push (Press) to Open (Operate)" text.
  - 4. Manufacturers:
    - a. Norton Door Controls (NO) – 500 Series.
- C. Key Switch: Key controlled actuator device enclosed in single or double gang junction box.
  - 1. Faceplate Material: Stainless steel.
  - 2. Functions: On-off, maintained contact.
  - 3. Two-way Mounting: Recess or surface mounting as indicated on Drawings.
  - 4. Manufacturers:
    - a. Alarm Controls (AK) – MCK Series.
    - b. Securitron (SU) – MKA Series.
    - c. Wikk Industries (WI) – KS Series.

## 2.3 ACCESSORIES

- A. Signage: As required by cited ANSI/BHMA A156.19 standard for the type of operator.

## 2.4 FINISHES

- A. Standard: Designations used to indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware. Units will be sprayed with a combination of waterborne acrylic and polyester powder coat.
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame preparation and reinforcements, power connections, electrical systems interfaces, and other conditions affecting performance of automatic door operators.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 INSTALLATION

- A. General: Install complete automatic door operators according to manufacturer's written instructions and ANSI/BHMA A156.19 standard, including activation devices, control wiring, remote power units if any, connection to the building's fire alarm system, and required signage.
- B. Power Connection: Reference Division 26 "Electrical" Sections for connection to electrical power distribution system.
- C. Access Control System: Coordinate connections and operation with access control system
- D. Signage: Apply signage as required by ANSI/BHMA A156.19 standard for type of door operator and direction of pedestrian travel.

3.3 FIELD QUALITY CONTROL

- A. Inspection: Certified Installer' representative to inspect and test automatic door operators to determine compliance of installed systems with specifications and ANSI/BHMA A146.19 standard. Report discrepancies in writing to Architect and Contractor within 24 hours after inspection.

3.4 ADJUSTING

- A. Comply with requirements of ANSI/BHMA A156.19 standard. Adjust automatic door operators to function smoothly, and lubricate as recommended by manufacturer.

3.5 DEMONSTRATION

- A. Certified Installer's representative to provide eight (8) hours of training to Owner's maintenance personnel in the proper adjustment, operation, and maintenance of automatic door operators.

END OF SECTION 087113

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## **SECTION 08 81 00**

### **GLASS AND GLAZING**

#### **PART 1 GENERAL**

##### **1.01 SCOPE**

- A. Work Included: Provide glass and glazing for all exterior and interior openings as indicated on the drawings and specified herein. Work also includes the following:
  - 1. Glass for Aluminum Framed Entrances and storefronts
  - 2. Aluminum Windows
- B. Work Not Included: Glass and glazing not provided under this Section are as follows:
  - 1. Framed Mirrors: Section 10 28 13.

##### **1.02 RELATED SECTIONS**

- A. Sustainable Design Requirements: Section 01 81 13.
- B. VOC Limits: Section 01 81 16.

##### **1.03 PERFORMANCE REQUIREMENTS**

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thicknesses indicated or specified are minimums and are for detailing purposes only. Confirm glass thickness by analyzing project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet, as a minimum, the following criteria:
  - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E1300, according to the following requirements:
    - a. Specified Design Wind Loads: 30 psf.
    - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical under wind action.
      - 1) Load Duration: 60 seconds or less.
    - c. Probability of Breakage for Sloped Glazing: 1 lite per 1000 lites set

more than 15 degrees off vertical and under wind and snow action.

- 1) Load Duration: 30 days.
  - d. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1", whichever is less.
    - 1) For monolithic glass lites, heat treated to resist wind loads.
    - 2) For insulating glass.
    - 3) For laminated glass lites.
  - e. Minimum Glass Thickness for Exterior Lites" 1/4".
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120° F, ambient; 180° F, material surfaces.

#### 1.04 REFERENCED STANDARDS

- A. Reference Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standard.
1. AAMA: American Architectural Manufacturers Association.
  2. ANSI: American National Standards Institute.
  3. ASTM: American Society for Testing and Materials.
  4. GANA: Glass Association of North America.
  5. IGMA: Insulated Glass Manufacturers Alliance.
  6. NFPA: National Fire Protection Association.
  7. IGCC: Insulating Glass Certification Council.
- B. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations listed below, except where more stringent requirements are indicated herein.
1. Glass Association of North America (GANA) "Glazing Manual."
  2. Insulated Glass Manufacturers Alliance (IGMA)
    - a. TM-3000 "Vertical Glazing Guidelines"
    - b. TB-3001 "Sloped Glazing Guidelines".
  3. American Architectural Manufacturers Association (AAMA)
    - a. TIR-A7 "Sloped Glazing Guidelines"
    - b. GDSG-1 "Glass Design for Sloped Glazing".

#### 1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this project and who employs glass installers for this project who are certified under the National Glass

Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

- B. Fire-Rated Door Assemblies: Provide assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
- C. Safety Glass Standards: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
  - 1. Each lite shall bear permanent, non-removable label manufacturers designation of safety glazing standard for which it complies.
- D. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or on at least one component lite of unit with appropriate certification label of Insulating Glass Certification Council (IGCC).
- E. Allowable Tolerances: Thicknesses of glass specified are nominal; provide glass manufactured to tolerances listed in GANA Manual.
- G. Fire-Rated Window Assemblies: Provide assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

1.05 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of glass, glazing sealants and accessories required.
  - 1. Indicate structural, physical and environmental characteristics, size limitations, special handling requirements, etc.
- B. Submit insulating glass manufacturer's certification indicating units meet or exceed specified requirements.
- C. Submit laminated glass manufacturer's certification indicating units meet or exceed specified requirements.
- D. Shop Drawings: Required data for shop drawings on glazing may be incorporated with shop drawings for framing members. Show thicknesses of glass; proposed "bites" in frames, sizes and locations of blocks, clips, beads, stops edge treatments; note quality, type and strength of each lite.
- E. Samples: Submit and obtain approval of samples before proceeding with glass fabrication. Minimum two 12" x 12" samples of each glass type required, except clear monolithic glass. Submit color samples of exposed sealants and/or gaskets.

[F. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.

1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.]

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle glazing materials in accordance with manufacturer's recommendations to prevent damage and deterioration.
- B. Various items to receive glazing as specified elsewhere may be factory-glazed or site-glazed at Contractor's option.
- C. Deliver glazing compounds and sealants in manufacturer's unopened labeled containers.
- D. Deliver glass with manufacturer's labels intact. Do not remove labels until glass has been installed.

1.07 PROJECT CONDITIONS

- A. Field verify measurements and conditions of installations.
- B. Examine all details. Provide proper fitting for details indicated.
- C. Do not perform work under adverse weather or job site conditions. Install liquid sealants when temperatures are within lower or middle third of temperature range recommendations by manufacturer.
- D. Protect work from damage during and after installation until project acceptance.

1.08 WARRANTY

- A. Contractor to guarantee work under this Section against defects of materials, fabrication and installation. Guarantee period is one year, except where specified otherwise. Defects include, but are not necessarily limited to:
  1. Weather tightness: Two (2) year warranty.
- B. Insulating Glass: Submit manufacturer's written warranty that for ten (10) years from date of substantial completion, a replacement will be provided (furnished and installed) for any unit which develops edge separation, thermal stress cracks, or other defects which materially obstruct vision through the glass or affect thermal and physical integrity of insulating glass units, except warranty shall not cover glass breakage from other than natural causes. Defective units shall be replaced at no additional cost to the Owner.
- C. Coated Glass: Submit manufacturer's written warranty that for five (5) years from date of substantial completion, a replacement will be provided for defective units.



Defects are defined as peeling, cracking or deterioration in coating due to normal conditions and not due to handling or installation contrary to glass manufacturer's published instructions. Defective units shall be replaced at no additional cost to the Owner.

## **PART 2      PRODUCTS**

### **2.01           MANUFACTURER**

- A.     Acceptable Manufacturers and Fabricators: Specifications herein are based on glass and materials manufactured or fabricated by the following companies. Not all firms listed manufacture or fabricate all the items specified herein. However, to ensure consistent quality of appearance and performance, provide each type or kind of glass or material from a single source. Manufacturers for specialty products are listed within the specification to establish a particular type, color, pattern, etc. Equal products by the manufacturers listed are acceptable providing they meet the type, color, pattern, etc. as approved by the Architect.

1.     Manufacturers
  - a.     AGC FLOAT GLASS NORTH AMERICA
  - b.     VITRO
  - c.     GUARDIAN INDUSTRIES
  - d.     SAINT GOBAIN
2.     Fabricators
  - a.     VIRACON
  - b.     OLDCASTLE BUILDINGENVELOPE
  - c.     ARCH ALUMINUM & GLASS LLC
  - d.     TRULITE GLASS AND ALUMINUM

### **2.02           PRIMARY FLOAT GLASS**

- A.     Conformance: Type I, Class 1 for clear glass, Class 2-tinted heat-absorbing and light-reducing, conforming to ASTM C1036.
- B.     Thickness: 1/4", unless otherwise indicated.
- C.     Color: Clear.
1.     When used in insulating units, provide color specified under each insulating unit.

### **2.03           HEAT TREATED FLOAT GLASS**

- A.     Conformance: Condition A, Kind FT, Kind HS, Type I, Class 1 for clear glass, Class 2-tinted heat-absorbing and light-reducing, conforming to ASTM C1048.
1.     Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise

indicated.

2. Roll Wave Maximum Distortion Tolerance: 0.003 inch target with 0.005 inch maximum peak to valley measurement.
3. Bow and Warp Maximum Tolerance: 50 percent of the maximum allowed in ASTM C 1048.

B. Thickness: 1/4", unless otherwise indicated.

C. Color: Clear.

1. When used in insulating units, provide color specified under each insulating unit.

D. Locations: Safety glazing locations as designated and required by applicable code(s) and where indicated.

#### 2.04 COATED FLOAT GLASS

A. General: Provide coated glass complying with this article and in schedules at the end of Part 3.

B. Low E, Sputter Coated Float Glass: Float glass with metallic-oxide or metallic nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), complying with requirements specified in schedules at end of Part 3.

#### 2.05 INSULATING GLASS

A. Sealed Insulating Glass: General: Provide preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E2190 for performance classification indicated as well as with other requirements specified for glass characteristics, air space, sealing system, sealant, spacer material, corner design and desiccant.

1. For properties of individual glass making up units, refer to requirements specified in schedule at the end of Part 3 as applicable to types, kinds, classes and conditions.
2. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites to comply with glass design requirements. Provide Kind FT (fully tempered) where safety glass is indicated or required.

B. Edge Construction: Double sealed with a primary seal of polyisobutylene and a secondary seal of silicone. Delete low-E coating prior to fabrication of insulating units according to coated glass manufacturer's instructions.

1. Spacer to be black; clear aluminum color not permitted.

#### 2.06 GLAZING MATERIALS AND ACCESSORIES

- A. Glazing Sealants and Compounds: [General: Provide materials that comply with Project Sustainable Design Requirements and Low Emitting Material goals.]
1. Comply with manufacturer's recommendations for selection of hardness. Select materials and variations or modifications for compatibility with surfaces contacted in the installation.
  2. Exterior Glazing: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
    - a. Glazing Sealant: One-part neutral-curing silicone glazing sealant, ASTM C 920 Class A, Type S, Grade NS, Class 100/50, Use NT; for high movement joints at metal-to metal and glass to metal.
      - 1) Dow Corning Corporation; 790
      - 2) GE Advanced Materials - Silicones; SilPruf LM SCS2700
      - 3) Pecora Corporation; 890
      - 4) Tremco Incorporated; Spectrem 1
    - b. Glazing Sealant: One-part neutral-curing silicone glazing sealant, ASTM C 920, Type S, Grade NS, Class 50, Use NT; for general applications in glazing installation subject to high movement including perimeter; use non-staining formula at absorbent perimeter applications
      - 1) DOW CORNING CORPORATION; 795 or 756 SMS
      - 2) GE ADVANCED MATERIALS -SILICONES; SilPruf NB SCS9000 or SilPruf SCS2000
      - 3) PECORA CORPORATION; 864
      - 4) TREMCO INCORPORATED; Spectrem 2
    - c. Glazing Sealant: One-part neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT; for general applications in glazing installation including perimeter; use non-staining formula at absorbent perimeter applications.
      - 1) DOW CORNING CORPORATION; 791
      - 2) GE ADVANCED MATERIALS-SILICONES; UltraGlaze SSG4000 or UltraGlaze SSG4000AC
      - 3) TREMCO INCORPORATED; Proglaze SSG or Tremsil 600
    - d. Structural Glazing Sealant: ASTM C1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in glazing assembly indicated.
      - 1) DOW CORNING CORPORATION; 995.
      - 2) GE ADVANCED MATERIALS -SILICONES; UltraGlaze SSG4000.
      - 3) PECORA CORPORATION; 896.
      - 4) TREMCO INCORPORATED; Proglaze SG.
  3. Interior Glazing: Compound of polymerized butyl rubber and inert fillers,

with or without polyisobutylene modification, solvent based, 95% solids, formed and coiled on release paper, tack-free in 24 hours, paintable, non-staining.

B. Miscellaneous Glazing Materials

1. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
2. Setting Blocks: Neoprene or EPDM, 80-90 durometer hardness, with proven compatibility with sealants used.
3. Spacers: EPDM, 40-50 durometer hardness with proven compatibility with sealants used.
4. Compressible Filler (Rod): Closed cell or waterproof jacketed rod stock of synthetic rubber or plastic form, compatible space with sealants used, flexible and resilient, with 5-10 psi compression strength for 25% deflection.

C.

2.13 FABRICATION

A. General: Fabricate glass and other glazing products in sizes required to glaze openings indicated, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

1. Glass Thickness: Design analyze and comply with published recommendations of glass product manufacturers and organizations listed herein.

B. Glass Cutting: Cut glass to accurate sizes and shapes as indicated on drawings. Allow edge clearances and tolerances in accordance with GANA recommendations.

1. Edges: Provide factory-cutting and factory-formed edges for all butt-glazed, heat tempered and insulating glass. Provide ground edges for all drilled holes, notches and other fabrication or finishing techniques.
2. Butt-Glazed Systems: All work in accordance with manufacturer's recommendations.
  - a. Edges Exposed to Air: Polished finish.
  - b. Edges Receiving Sealant: "Suede" finish.
  - c. Concealed Edges: Factory option.

C. Heat Strengthened and Tempered Glass

1. Heat Strengthened: Heat treated to strengthen glass in bending to not less than 2.0 times annealed strength for the strengthened glass.
2. Tempered: Heat treated to strengthen glass in bending to not less than 4 to 5 times annealed glass strength for the strengthened glass.
3. Cut glass to required size before tempering. Comply with Glass Tempering

- Association recommendations.
4. Provide tongless tempered glass. When size limitations require tong edges, support each piece during tempering process so that tong marks will be concealed in the glazed system.

### **PART 3 EXECUTION**

#### **3.01 INSPECTION**

- A. Examine substrates, substructure and installation conditions. Do not proceed with glazing work until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

#### **3.02 PROTECTION AND PREPARATION**

- A. Protect glass from edge damage during handling and installation. Remove and legally dispose damaged glass off of the project site. Damaged glass is defined as glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and/or appearance.
- B. Do not cut, seam, nip or abrade tempered glass.
- C. Inspect each piece of glass immediately before installation and eliminate any which have observable edge damage or face imperfections.
- D. Unify appearance of each series of lights by setting each piece to match other pieces, as nearly as possible. Inspect each piece and set with pattern, draw, and bow oriented in same direction as other pieces.
- E. Clean glazing channels and other framing members to receive glass immediately before glazing. Remove loose coatings. Apply primer to joint surfaces receiving sealants when recommended by sealant manufacturer.

#### **3.03 INSTALLATION - GENERAL**

- A. Comply with combined recommendations and technical reports of manufacturer's of glass and glazing materials used with GANA "Glazing Manual", except when more stringent requirements are indicated.
- B. Install insulating units to comply with recommendations by IGMA, except as otherwise specifically indicated or recommended by glass and sealant manufacturers.
- C. Glazing channel dimensions shown are intended to provide for necessary bite on glass, minimum edge clearance and adequate sealant thickness, with reasonable tolerance. Adjust as required by job conditions at time of installation.

- D. Install setting blocks in sill rabbets, properly sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Install primers, sealants, tapes, and gaskets in accordance with manufacturer's recommendations. Set glass without springing and install securely to prevent rattling or breakage.
- F. Where wedge-shaped gaskets are driven into one side of the channel to pressurize the sealant or gasket on the opposite side, provide adequate anchorage to ensure gasket will not "walk" out when subjected to dynamic movement. Anchor gasket to stop with matching ribs, or by proved adhesives, including embedment of gasket tail in cured heal bead.
  - 1. Miter cut and bond gasket ends together at corners where gaskets will not pull away from corners and result in voids or leaks in the glazing system.
- G. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.
- H. Coordinate aluminum framing systems work with other work for proper sequence of construction. Verify dimensions of supporting structure and other elements which precede wall system work before fabrication of required components. Provide for erection tolerances for other work where field measurements cannot be obtained.

### 3.04 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes edge-to-edge, but not necessarily in one continuous length. Do not stretch tapes to make them fit openings.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward

centers of openings.

3.05 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gaskets by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.06 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealant to provide a substantial wash away from glass.

3.07 PROTECTION AND CLEANING

- A. Protect glass from breakage immediately upon installation by attachment of streamers to framing held away from glass. Do not apply markers of any type to surfaces of glass. Remove non-permanent labels and clean surfaces.
- B. Maintain glass in a reasonable clean condition during construction so that it will not be damaged by corrosive action, and will not contribute (by wash off) to the deterioration of glazing materials and other work. Remove and replace glass which is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents and vandalism.
- C. Wash and polish on both faces not more than four days before acceptance of the work. Comply with glass manufacturer's recommendations for final cleaning.

3.08 GLAZING SCHEDULE

- A. Basis of Design Products: Glass types and products below are based on listed manufacturer.
  - 1. Other Acceptable Manufacturers: Equal products by other manufacturers listed in Part 2 herein are acceptable providing they meet or exceed the performance requirements specified herein and conform to the design intent as determined by the Architect:
- B. Insulating Glass – IG-1 and IG-1A
  - 1. Type: Two thicknesses of float or tempered glass, as required by code.
  - 2. Glass/Color
    - a. Interior Pane
      - 1) IG-1
        - a) Type I (transparent, flat)
        - b) Class 1 (clear)
        - c) Quality q3 (select)
      - 2) IG-1A
        - a) Type 1 (transparent, flat)
        - b) Kind: FT (fully tempered)
        - c) Class 1 (clear)
        - d) Quality q3 (select)
    - b. Exterior Pane: VIRACON Solarscreen 2000 Low E VE 1-2M
      - 1) IG-1
        - a) Type I (transparent, flat)
        - b) Class 1 (clear)
        - c) Quality q3 (select)
        - d) Low-Emissivity Coating: Sputtered on #2 surface.
      - 2) IG-1A
        - a) Type 1 (transparent, flat)
        - b) Kind: FT (fully tempered)
        - c) Class 1 (clear)
        - d) Quality q3 (select)
        - e) Low-Emissivity Coating: Sputtered on #2 surface.
  - 3. Unit Thickness: 1" (two 1/4" panes and 1/2" air space).
  - 4. Thermal Conductance (U-Value): 0.28 Summer Daytime.
  - 5. Transmittance
    - a. Ultraviolet %: 10.
    - b. Visible %: 70.
    - c. Solar %: 32.
  - 6. Shading Coefficient: 0.43.
  - 7. Solar Factor (SHGC): 0.37.

**END OF SECTION**



## **SECTION 08 91 19**

### **FIXED LOUVERS**

#### **PART 1 GENERAL**

##### **1.01 SCOPE**

- A. Provide wall louvers as indicated. All louvers on exterior of building to be provided under this Section.

##### **1.02 RELATED SECTIONS**

- A. Sealant: Section 07 92 00.
- B. Sustainable Design Requirements: Section 01 81 13.

##### **1.03 QUALITY ASSURANCE**

- A. Reference Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standard.
  - 1. AMCA: Air Moving and Conditioning Association.
  - 2. SMACNA: Sheet Metal and Air Conditioning Contractors National Association.
  - 3. ASTM: American Society for Testing and Materials.
  - 4. NAAMM: National Architectural Aluminum Manufacturer's Association.
  - 5. AAMA: American Architectural Manufacturers Association.
- B. Performance Requirements: Provide units whose performance ratings have been determined in compliance with AMCA Standard 500 and 511.
- C. Water Penetration and Free Area: Meet AMCA Standard for louvers specified.
- D. Wind Load: Design louvers and supports for 20 pounds per square foot wind load.
- E. Comply with SMACNA "Architectural Sheet Metal Manual" recommendations for fabrication, construction details and installation procedures, except as otherwise indicated.
- F. Field Measurements: Verify size, location and placement of louver units prior to fabrication wherever possible.
- G. Shop Assembly: Coordinate field measurements with fabrication and shop assembly.
- H. Factory painted finish to be performed by an applicator specifically approved by

paint manufacturer. The applicator shall provide written notification of approval by paint manufacturer prior to application of the finish.].

#### 1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications; certified test data, where applicable; and installation instructions for required products, including finishes.
- B. Shop Drawings: Submit plans, elevations and details of sections and connections to adjoining work. Indicate materials, finishes, fasteners, joinery and other information to determine compliance with specified requirements.
- [C. Samples: Submit three samples, 6" square, of each required aluminum fluoropolymer finish. Prepare samples on metal of same gage and alloy to be used in the work.]
- [C. Samples: Submit finish samples showing the light and dark range limits of the anodizing color. These finish samples will be used in the field as a check for items specified in this Section. Anodized items whose color does not fall within the range indicated by these samples are unacceptable and shall not be used in the finished work.]
- [D. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
  - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.]

### **PART 2 PRODUCTS**

#### 2.01 MATERIALS

- A. Aluminum Sheet: ASTM B209, Alloy 3003 or 5005 with temper as required for forming or as otherwise recommended by the metal producer to provide the required finish.
- B. Aluminum Extrusions: ASTM B 221. Alloy 6063-T52.
- C. Fasteners: Stainless Steel, 300 series.
- D. Anchors and Inserts: Use non-ferrous metal anchors and inserts for exterior installation.
- E. Bituminous Paint: Acid and alkali resistant solvent type black bituminous mastic.

#### 2.02 FABRICATION, GENERAL

- A. Provide louvers and accessories of design, materials, sizes, depth, arrangement and metal thicknesses indicated, or if not indicated, as required for optimum performance with respect to airflow; water penetration; strength; durability and

uniform appearance as suited to applications shown and intended use.

- B. Fabricate frames including integral sills to suit adjacent construction with adequate tolerances for installation including application of sealant in joints between louvers and adjoining work, where applicable.
- C. Include supports, anchorages and accessories required to achieve a complete assembly, properly installed.
- D. Provide sill extensions and loose sills made of same material as louvers, where indicated or required, for drainage to exterior and to prevent water penetrating to interior.
- E. Glazing Adapter: Where louvers are combined with storefront or curtainwall assemblies, provide manufactures recommended 0.081 in. thick 6063T5 extruded aluminum glazing adapter at louver perimeter. Coordinate gasketing and sealants for complete installation.
- E. Join frame members to one another and to stationary louver blades by field bolted connections made necessary by size of louvers. Maintain equal blade spacing including separation between blades and frames at head and sill to produce a uniform appearance.
- [F. Provide hinged louver section where indicated. Hinged panel to appear as frameless from building exterior. Louver blades on hinged section to align with fixed panels at jambs.
  - 1. Hinge: Minimum .093" thick aluminum; 3" continuous type' 1/4" diameter pin. Finish to match louver blades. Provide with 6" stainless steel screws at maximum 6" on center.
  - 2. Lock: Provide aluminum plates, shaped and located as detailed on the drawings. Padlock provided by University.
  - 3. Finish: Finish all exposed surfaces of hinged louver section to match louver blades.]

## 2.03 STATIONARY EXTRUDED ALUMINUM WALL LOUVERS

- A. Horizontal Blade Louvers: Size and depth indicated, with blades of profile, slope and spacing indicated, or if not indicated, to meet performance requirements.
  - 1. Extrusion Thickness: Not less than .081" for blades and frames.
  - 2. Furnish units complying with following performance requirements.
    - a. Free Area: Not less than 45%.
    - b. Water Penetration: Not more than 0.01 oz. per square foot of free area at an minimum intake airflow of 1000 fpm free area velocity.
- B. Manufacturer and Type: Provide louver vane profile to match AIROLITE K6774 manufactured by AIROLITE; AIRLINE; ARROW; CONSTRUCTION SPECIALTIES; INDUSTRIAL LOUVERS; AMERICAN WARMING AND

VENTALATING; RUSKIN; RELIABLE or PENN AIRSTREAM.

2.04 LOUVER SCREENS

- A. Provide screens for exterior louvers.
- B. Fabricate screen frames of the same metal and finish as the louver units to which secured, unless otherwise indicated.
- C. Provide frames consisting of U-shaped metal for permanently securing screen mesh.
- D. Size: 1/2" sq. mesh, 0.063" anodized aluminum wire.
- E. Locate screens on inside face of louvers. Secure screens to louver frames with machine screws, spaced at each corner and at 12" o.c. between.

2.05 BLANK-OFF PANELS

- A. Blank-Off Panels: Laminated panels consisting of rigid extruded polystyrene or polyurethane insulation core and .032 aluminum facing sheets.
  - 1. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard extruded-aluminum-channel frames, not less than 0.080-inch nominal thickness, with corners mitered and with same finish as panels.
  - 2. Seal perimeter joints between panel faces and louver frames with gaskets or sealant.
  - 3. Finish: [Provide with baked-on black enamel flat finish.] [Provide with finish to match louvers.]

2.06 METAL FINISHES

- A. Aluminum Finishes: Fluoropolymer finish containing not less than 70% PVDF (Kynar 500) resins; "Trinar" by AKZO; "Duramar" by PPG; "Fluoropon" by VALSPAR. Total dry film thickness not less than 1.0 mils, or coatings meet or exceed the requirements of AAMA 2605.
  - 1. Color: As selected by Architect from paint manufacturer's complete specified line.
  - 2. Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.

**PART 3 EXECUTION**

3.01 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with

requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions and directions for the installation of anchorages which are to be embedded in concrete or masonry construction. Coordinate the delivery of such items to the project site.

### 3.03 INSTALLATION

- A. Locate and place louver units plumb, level and in proper alignment with adjacent work.
- B. Use concealed anchorages wherever possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealant and joint fillers as indicated.
- D. Repair damaged finishes. Restore finishes so that there is no evidence of corrective work. Return items which cannot be refinished in the field to the shop, make the required alterations, and refinish the entire unit, or provide new units, as directed by Architect.
- E. Protect galvanized and non-ferrous metal surfaces from corrosion or galvanic action by application of a heavy coating of bituminous paint on surfaces which will be in contact with concrete, masonry or dissimilar metals.
- F. Provide concealed gaskets and flashing and install as the work progresses to make the installations weathertight.
- G. Refer to Section 07 92 00 for sealant in connection with installation of louvers.

### 3.04 CLEANING

- A. Clean louver surfaces in accordance with manufacturer's instructions. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces in accordance with manufacturer's instructions.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

**END OF SECTION**

SECTION 09 05 61 - PREPARATION OF CONCRETE TO RECEIVE ADHESIVELY INSTALLED FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing of concrete floors that will receive adhesively applied floor covering.
- B. Testing of new concrete floor slabs for moisture.
- C. Testing of new concrete floor slabs for pH.
- D. Testing of floor slabs for adhesive bond.
- E. Remediation of concrete floor slabs where testing indicates unsatisfactory moisture or pH conditions or unsatisfactory adhesive bond.
  - 1. Contractor shall perform all specified remediation of concrete floor slabs.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Moisture and pH testing shall be performed by an independent testing agency employed and paid by Contractor.
- B. Include the cost of moisture and pH testing in the base bid.
- C. Include the cost of moisture-resistant sealer-surfacer in the base bid.
- D. Unit Prices: See Section 01 22 00 - Unit Prices.
- E. Unit Price for Standard Flooring Adhesive: State on the bid form the unit price per square foot for using the floor covering manufacturer's standard adhesive.
  - 1. Provide a unit price for each distinct type of floor covering.
- F. Unit Price for Moisture-Resistant Flooring Adhesive: State on the bid form the unit price per square foot for using the moisture-resistant flooring adhesive.
  - 1. Provide a unit price for each distinct type of floor covering.
- G. Unit Price for Moisture-Resistant Sealer-Surfacer: State on the bid form the unit price per square foot for the moisture-resistant sealer-surfacer.
  - 1. Provide a unit price for each distinct type of floor covering.

1.03 REFERENCES

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2016a.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).
- C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.
- D. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2017.
- E. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2017.

1.04 SUBMITTALS

- A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
  - 1. Moisture and pH limits and test methods.
  - 2. Manufacturer's required bond/compatibility test procedure.
- B. Testing Agency's Report: Include:
  - 1. Description of areas tested; include floor plans and photographs if helpful.
  - 2. Summary of conditions encountered.
  - 3. Moisture and pH test reports in the format required by referenced test method.

- 4. Copies of specified test methods.
- C. Adhesive Bond and Compatibility Test Report.
- D. Product Data: Manufacturer's published data on each product specified in Part 2.
  - 1. Manufacturer's installation instructions.
- E. Moisture-Resistant Installer Qualifications: Signed by the materials manufacturer.
- F. Closeout Submittals: Manufacturer's executed warranty.

#### 1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified, and acceptable to the Owner.
  - 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with the respective project owner's project contact information.
- B. Contractor's Responsibility Relating to Independent Agency Testing:
  - 1. Provide access for and cooperate with testing agency.
  - 2. Confirm date of start of testing at least 10 days prior to actual start.
  - 3. Allow at least 4 business days on site for testing agency activities.
  - 4. Achieve and maintain specified ambient conditions.
  - 5. Allow ample time for testing activity and remedial measures, if necessary, in the Construction Project Schedule. Notify Owner and Architect when specified ambient conditions have been achieved, and coordinate dates of testing with the parties involved.
- C. Moisture-resistant sealer-surfacer Installer: Approved by materials manufacturer.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

#### 1.07 FIELD CONDITIONS

- A. In spaces where concrete testing will be performed, maintain ambient temperature at anticipated in-service temperature for not less than 48 hours prior to and during testing.
- B. In spaces where concrete testing will be performed, maintain relative humidity at anticipated in-service humidity level for not less than 48 hours prior to and during testing.

### PART 2 PRODUCTS

#### 2.01 REMEDIATIONS

- A. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
- B. Excessive Moisture Emission or Relative Humidity or excessive pH: If an adhesive that is resistant to the level of moisture and pH present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply Moisture-Resistant Sealer-Surfacer over entire floor area.

#### 2.02 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
  - 1. Cementitious compound, resistant to moisture, mildew, and alkali, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
  - 2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.



3. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Moisture-Resistant Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Moisture-Resistant Sealer-Surfacer: Multi-coat system comprising epoxy sealer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of pH found, followed by surfacing coat that acts to relieve osmotic vapor pressure and provides a suitable profile for adhesion of floor coverings without further treatment.
  1. Mechanically abrade concrete to achieve ICRI Concrete Surface Profile (CSP) of 3 before applying moisture-resistant sealer-surfacer.
  2. Products:
    - a. ARDEX Engineered Cements; [www.ardexamericas.com](http://www.ardexamericas.com).
      - 1) 3-coat system: Ardex MC Rapid, Ardex P 82 Ultra Prime, and either Ardex Feather Finish, Ardex V1200, or Ardex K13 depending on project conditions.
    - b. Koster American Corporation; [www.kosterusa.com](http://www.kosterusa.com).
      - 1) 3-coat system: Koster VAP I 2000, Koster I 09 Primer, Koster SL Premium.
    - c. Sika Corporation; [www.sikafloorusa.com](http://www.sikafloorusa.com).
      - 1) 3-coat system: Sika MB, SikaLevel-02 EZ Primer, and either SikaLevel Skim Coat, SikaLevel-125, or SikaLevel-325.
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. Perform following operations in the order indicated:
  1. Preliminary cleaning.
  2. Testing.
    - a. Perform both moisture vapor emission and internal relative humidity tests. One type of test alone is not satisfactory.
    - b. Perform the following types of test in close proximity to each other:
    - c. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer. Ensure that a portion of the tests are adjacent to exterior walls and to expansion and control joints.
    - d. Internal Relative Humidity Tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer. Ensure that a portion of the tests are adjacent to exterior walls and to expansion and control joints.
    - e. pH tests; at same frequency as other tests.
  3. Specified moisture remediation, if required.
  4. Patching, smoothing, and leveling, as required.
  5. Other preparation specified.
  6. Adhesive bond test performed by flooring installer.
  7. Protection.

#### 3.02 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

#### 3.03 MOISTURE VAPOR EMISSION TESTING

- A. Test new concrete floors for moisture vapor emission.

- B. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- C. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- D. Test in accordance with ASTM F1869 and as follows.
- E. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- F. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.
- G. Report: Report the information required by the test method.

### 3.04 INTERNAL RELATIVE HUMIDITY TESTING

- A. Test new concrete floors for relative humidity.
- B. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- C. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- D. Test in accordance with ASTM F2170 Procedure A and as follows.
- E. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- F. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- G. Report: Report the information required by the test method.

### 3.05 PH TESTING

- A. Test new concrete floors for pH.
- B. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- C. Note: This procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
- D. Use a wide range pH paper, its associated chart, and distilled or deionized water.
- E. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the pH paper into the water, remove it, and compare immediately to chart to determine pH reading.
- F. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value is over 10.

### 3.06 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Test floors for adhesive bond of floor covering to floor slabs that have been prepared in accordance with floor covering manufacturer's recommendations.
- B. In the event that bond does not comply with floor covering manufacturer's requirements, perform surface preparation and remediation as recommended by floor covering manufacturer.

### 3.07 REMEDIATION OF FLOORS TO RECEIVE FLOOR COVERING

- A. Comply with requirements and recommendations of product manufacturer.
- B. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities as recommended by product manufacturer.

C. Do not fill expansion joints, isolation joints, or other moving joints.

3.08 PROTECTION

A. Cover prepared floors with building paper or other durable covering.

END OF SECTION 09 05 61



SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior metal stud wall framing.
- B. Interior metal shaftwall framing and bracing systems.
- C. Hat-shaped furring channels.
- D. Resilient furring channels.
- E. Acoustic insulation.
- F. Gypsum wallboard.
- G. Glass mat faced tile backing board.
- H. Interior gypsum ceilings/soffits.
- I. Joint treatment and accessories.
- J. Aluminum Trim.

1.02 REFERENCES

- A. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a (Reapproved 2014).
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- C. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.
- D. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- E. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- F. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- G. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014, with Editorial Revision (2015).
- H. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
- I. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.
- J. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2017a.
- K. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012 (Reapproved 2017).
- L. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2016a.
- M. ASTM E413 - Classification for Rating Sound Insulation; 2016.
- N. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

1.03 SYSTEM DESCRIPTION

- A. Acoustic Attenuation for Interior Partitions Indicated as Acoustic: STC of 54 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

#### 1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's product data for systems required. Include installation instructions and data sufficient to show compliance with requirements.
- B. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- C. LEED Documentation: Submit information required by Section 01 35 31 for the following targeted credits:
  - 1. Credit MR 5: Materials and Resources - Regional Materials.
  - 2. Credit EQ 4.1: Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
- D. Design Data:
  - 1. Submit data substantiating gage and spacing of metal framing members to comply with specified loading requirements.
  - 2. Submit data substantiating bracing requirements.
  - 3. Submittal of manufacturer's standard published load tables, marked to show products selected to comply with design requirements and project conditions, will be acceptable. Where manufacturer's standard published load tables are not adequate to demonstrate compliance with design requirements and project conditions, submit design data bearing the seal of a professional engineer licensed to practice in the state in which the project is located.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original and unopened packages, containers, or bundles, with brand names and manufacturer's labels intact and legible.
- B. Store materials in dry location, fully protected from weather and direct exposure to sunlight.
- C. Stack gypsum board products flat and level, properly supported to prevent sagging or damage to ends and edges.
- D. Store corner bead and other metal and plastic accessories to prevent bending, sagging, distortion, or other mechanical damage.

#### 1.06 PROJECT CONDITIONS

- A. Do not store or install products until building is fully enclosed and temperature and humidity controlled.
- B. Temperature: Maintain temperature in areas of installation between 50 and 80 degrees F for at least 48 hours before installation begins and continuously thereafter.
- C. Ventilation: Provide controlled ventilation and dehumidification.
- D. Do not allow excessive variations in humidity or temperature.

### PART 2 PRODUCTS

#### 2.01 SUBSTITUTIONS

- A. Refer to Section 01 60 00 - Product Requirements.

#### 2.02 LEED REQUIREMENTS

- A. Regional Materials: Provide recycled gypsum board and fire rated gypsum board from the plants listed below to obtain local/regional credit.
  - 1. Certaineed, Carrollton, Kentucky Plant: [www.certainteed.com](http://www.certainteed.com).
  - 2. LaFarge North America, Silver Grove, Kentucky Plant: [www.lafargenorthamerica.com](http://www.lafargenorthamerica.com).
  - 3. National Gypsum Company, Shippingport, PA: [www.nationalgypsum.com](http://www.nationalgypsum.com).
  - 4. USG Corporation, Bridgeport, Alabama Plant: [www.usg.com](http://www.usg.com).
- B. Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants:

1. Provide adhesives complying with South Coast Rule No. 1168 by the South Coast Air Quality Management District.
  - a. Drywall and Panel Adhesives: 50 g/l.

## 2.03 METAL FRAMING MATERIALS

- A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel of size and properties necessary to comply with ASTM C754, for the spacing indicated.
  1. Studs: C-shaped .
    - a. Nominal depths: As indicated in Section 09 06 10 or as otherwise indicated on the drawings.
  2. Runners: U-shaped, sized to match studs.
    - a. Nominal depths: As indicated in Section 09 06 10 or as otherwise indicated on the drawings.
  3. Ceiling Channels: C-shaped, cold-rolled.
  4. Furring:
    - a. Hat-shaped, minimum depth of 7/8 inch, except as otherwise indicated.
    - b. Where indicated as "resilient" or "acoustical," or where required for STC ratings are indicated, provide manufacturer's special type designed for attachment by one flange for reduced sound transmission.
  5. Thickness: Provide thickness as required for span, loading, deflection, and other required criteria.
    - a. Minimum thickness, all locations, unless otherwise indicated: 0.0188 inch design thickness / 0.0179 inch minimum base metal thickness.
    - b. Minimum thickness, tile backer board locations: 0.0312 inch design thickness / 0.0296 inch minimum base metal thickness.
    - c. So-called "EQ" or "equivalent gage" framing with thickness equal to or greater than specified above is acceptable. So-called "EQ" or "equivalent gage" framing with thickness less than specified above is not acceptable.
  6. Finish: G40 hot-dip galvanized per ASTM A653/A653M.
    - a. So-called "G40e" equivalent coating is not acceptable.
  7. Stud spacing: 16 inches, maximum.
  8. Shaftwall framing spacing: 24 inches, maximum.
  9. Furring spacing: 16 inches on center, maximum.
  10. Maximum deflection of wall framing of L/240 at 5 psf.
    - a. For wall framing to receive ceramic tile: L/360 at 5psf.
  11. Maximum deflection of shaftwall framing of L/240 at 7.5 psf.
- B. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- C. Partition Head To Structure Connections:
  1. Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and screwed to secondary deflection channel set inside but unattached to top track.

## 2.04 GYPSUM BOARD MATERIALS

- A. Gypsum Board Manufacturers, except where specific brand name products are required below:
  1. G-P Gypsum Corporation: [www.gp.com](http://www.gp.com).
  2. LaFarge North America: [www.lafargenorthamerica.com](http://www.lafargenorthamerica.com).
  3. National Gypsum Company: [www.nationalgypsum.com](http://www.nationalgypsum.com).
  4. USG Corporation: [www.usg.com](http://www.usg.com).
- B. Gypsum Wallboard: ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
  1. Thickness: 5/8 inch, all locations. 1/2 inch not acceptable.
  2. Edges: Tapered; beveled or rounded.
  3. Type X: Fire resistant, UL or Intertek rated.
- C. Glass Mat Faced Gypsum Backing Board: ASTM C1178/C1178M.
  1. Core: Water-resistant silicone-treated gypsum core.

2. Facers: Alkali-resistant fiberglass mat front and back. Front face surfaced with water and vapor barrier coating.
3. Thickness: 5/8 inch, Type X.
4. Product:
  - a. Georgia-Pacific Corporation: Dens-Shield Tile Backer Firestop Type X.
  - b. USG Durock Brand Glass-Mat Tile Backerboard.
  - c. CertainTeed GlasRoc Diamond back Tile Backer.
- D. Gypsum Shaftwall or Coreboard: ASTM C1396/C1396M; sizes to minimize joints in place; 1 inch thick; square edges, ends square cut.

## 2.05 ACCESSORIES

- A. Except as otherwise specifically indicated, provide trim and accessories by manufacturer of gypsum board materials, made of galvanized steel or zinc alloy and configured for concealment in joint compound.
  1. Include corner beads, edge trim, and other trim units necessary for project conditions. Provide accessories as required in order to achieve details indicated, whether or not specific accessories are shown on the drawings.
  2. Exposed trim: At locations indicated, provide manufacturer's standard metal units designed to be left exposed or semi-exposed.
- B. Corner Beads: Galvanized steel.
- C. Edge Trim: Bead types as detailed.
- D. Control Joints: At locations indicated, provide manufacturer's standard one-piece control joints of zinc alloy.
- E. Aluminum Trim: Extruded Aluminum alloy 6063-T5, pre-punched for screw attachment, formed to receive gypsum compound.
  1. Finish:
    - a. Anodized Finish.
      - 1) Clear.
  2. Manufacturers:
    - a. Fry Reglet Corporation.
    - b. Pittcon Industries.
  3. Provide factory-fabricated "T", "L", and "cross" intersections.
- F. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
  1. Joint Compound:
    - a. General Interior Use: Ready-mixed vinyl-based joint compound. All-purpose taping and topping compound: type specifically formulated for embedding tape and accessories, for prefilling, and for finishing drywall.
    - b. Glass mat faced gypsum backing board: Tile setting compound as specified in tile section.
  2. Joint Tape:
    - a. Gypsum wallboard: Provide manufacturer's standard paper type tape.
    - b. Glass mat faced backer board: 2-inch-wide fiberglass mesh tape.
- G. Screws: ASTM C1002; self-piercing tapping type, lengths as recommended by gypsum board manufacturer for project conditions.
  1. Provide corrosion resistant screws for glass mat faced gypsum backing board.
- H. Furring Fasteners/Connectors: Manufacturer's recommended system for specific application indicated, complying with ASTM C754.
- I. Hanger Wire: ASTM A641/A641M, soft, Class 1 galvanized.
  1. Ceiling hangers: Minimum 8 gage wire.
- J. Blocking: Provide metal blocking for mounting of wall cabinets, shelves, toilet accessories, etc.



1. Provide 6 inch, 16 gage, steel runner notched to bypass steel studs and secured with two 3/8 inch pan head screws.

## 2.06 ACOUSTICAL MATERIALS

- A. Sound Attenuation Batts: Glass fiber, unfaced blanket/batt: Type I (ASTM C665), passing ASTM E136 combustion test requirements.
  1. Use 2-1/2-inch or 2-3/4-inch batts in 1-5/8-inch studs.
  2. Use 2-1/2-inch or 2-3/4-inch batts in 2-1/2-inch studs.
  3. Use 3-1/2-inch or 4-inch batts in 3-5/8-inch studs.
  4. Use 4-inch batts in 4-inch studs.
  5. Use 6-inch batts or double batts whose thickness totals 6 or more inches in 6-inch studs.
  6. Use 16-inch-wide batts where studs are spaced at 16 inches O.C. 15-1/2 or 15-3/4 inch wide batts are not permitted.
- B. Acoustical Sealants:
  1. Concealed Locations: ASTM C919. Acrylic emulsion latex or water-based elastomeric sealant. Recommended by manufacturer for use in acoustical sealing applications.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that project conditions and substrates are appropriate for work of this section to commence.
- B. Coordinate installation of anchorage devices for suspended ceilings/soffits, verifying that spacing and rated strength are correct for anticipated load conditions.

### 3.02 FRAMING INSTALLATION

- A. Comply with ASTM C754 and manufacturer's instructions.
- B. Fire-rated assemblies: Comply with requirements of tested assemblies.
- C. Studs:
  1. Extend partitions to structure unless otherwise indicated.
  2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
  3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
  4. Slab Deflection: At fire-rated partitions, construct slip-joint head in accordance with UL-witnessed reports and manufacturer's recommendations.
- D. Partition heights:
  1. Where not indicated otherwise, extend partitions from floor to underside of solid structure above.
  2. Where indicated, extend partitions to underside of suspended ceiling or to just above suspended ceiling, as indicated.
    - a. Brace partial height partitions in accordance with design requirements specified in Part 1 of this Section.
  3. Blocking and bracing: Install blocking and bracing as recommended by manufacturer for adequate support of wall-mounted items installed as work of other sections.
- E. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double 20 gage, side-by-side studs at jambs on both sides of opening.
  1. At openings in fire rated partitions, comply with requirements of governing authorities for framing.
- F. Blocking: Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, shelving, and other fixture mounted on partitions. Screw steel blocking channels to studs.

G. Suspended Ceilings and Soffits:

1. Secure hangers to structure or to anchorage devices so that full strength of hanger can be achieved.
  - a. Install ceiling channels at spacing indicated or required, but not greater than permitted by ASTM C754.
  - b. Secure furring members to ceiling channels by means of clips or wire ties.
2. Level ceiling system to a tolerance of 1/8 inch in 12 feet, or to a higher tolerance if required by specific project conditions.
3. Level soffits to a tolerance of 1/8 inch in 12 feet, or to a higher tolerance if required by specific project conditions.
4. Reinforce openings and interruptions in horizontal framing system with additional furring channels. Ensure that entire suspension system is laterally braced.

3.03 ACOUSTIC INSULATION

- A. Acoustic Insulation: After gypsum board has been installed on one side, place insulation tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions. Fill cavities completely, using recommendations and details indicated in USG Corporation's "Gypsum Construction Handbook".

3.04 NOISE, AIR, AND DUST CONTROL

- A. General: Every partition dividing two spaces is a noise, air, and dust control partition.
1. Seal noise, air, and dust control partitions in accordance with the requirements listed below.
  2. Seal gypsum panels used on the interior face of exterior walls in the same manner.
- B. Seal perimeter of partition with acoustical sealant, complying with recommendations and details in USG Corporation's "Gypsum Construction Handbook" and ASTM C919. Do not install sealant under metal runners. Install 1/4-inch or larger round bead of sealant to in-place runners and adjacent substrate including those used at partition intersections. Immediately place gypsum panel so as to compress bead, leaving 1/8 inch of perimeter relief (or other dimension where indicated) between gypsum panel and adjacent construction. Locate the sealant bead so that the bead seals between the gypsum wallboard, the runner, and the adjacent floor, wall, structure, or other substrate.
1. Relief Joints: Install sealant between metal edge trim and adjacent construction. Joint size 1/4 inch unless otherwise indicated.
  2. Install sealant beneath control joints.
  3. Install sealant at metal door frames just before inserting face panel.
  4. Carefully seal around penetrations such as electrical boxes, plumbing, cabinets, ducts, and other openings.

3.05 GYPSUM BOARD INSTALLATION

- A. Comply with ASTM C840 and manufacturer's instructions.. Install to minimize butt end joints, especially in highly visible locations.
- B. Fire-rated assemblies: Comply with requirements of tested assemblies.
- C. Apply ceiling boards prior to installation of wallboards. Arrange to minimize butt end joints near center of ceiling area.
- D. Install wallboards in a manner which will minimize butt end joints in center of wall area. Stagger vertical joints on opposite sides of walls.
- E. Butt all joints loosely, with maximum of 1/16 inch between boards.
- F. Size panels to provide perimeter relief and install over sealant as specified under noise control, above. Do not install panels unless and until sealant is properly installed.
- G. Place wrapped edges adjacent to one another; do not place cut edges or butt ends adjacent to wrapped edges.

- H. Support all edges and ends of each board on framing or by solid substrate, except that long edges at right angles to framing members in non-fire-rated construction may be left unsupported.
- I. Single-Layer: Install gypsum board vertically, with ends and edges occurring over firm bearing.
  - 1. On walls and partitions, plan installation so that the leading edge or end of gypsum board is attached to open end of stud flange first.
- J. Double-Layer Installation: Use gypsum backing board or gypsum wallboard for first layer, placed perpendicular to framing or furring members. Place second layer perpendicular to first layer. Offset joints of second layer from joints of first layer.
  - 1. In ceiling work, install base layer with long edges perpendicular to framing members, with face layer in opposite direction, and with all joints offset.
  - 2. In wall work, install base layer with long edges parallel to framing members with face layer in opposite direction, and with all joints offset.
  - 3. Install face layer by means of screws at least 3/8 inch longer than total thickness of gypsum board layers, spaced as specified for the tested assembly.
- K. Glass Mat Faced Gypsum Backing Board:
  - 1. Install water-resistant backing board on partitions to receive tile.
  - 2. Butt joints together with 1/8 inch space at joints. Layout work and use appropriate length material to avoid end joints. Joints shall occur over framing members. Stagger end joints between adjacent panels.
  - 3. Place uncoated rear face against studs, so that coated front face will receive tile or other finish.
  - 4. Fit panels snugly around penetrations and openings.
  - 5. Drive fasteners tight against and flush with panel surface. Do not countersink fasteners.
  - 6. Locate fasteners not closer than 3/8 inch from edge and ends of panels.
  - 7. Space fasteners at not more than 8 inches on center at perimeter and field, unless closer spacing is indicated on the drawings.

### 3.06 SHAFT WALL INSTALLATION

- A. Comply with manufacturer's printed installation instructions, standard details, and recommendations.
- B. Metal Perimeter Framing:
  - 1. Accurately position runners at floor and ceiling, with short leg to finish room side.
  - 2. Attach runners to structure with appropriate power-driven fasteners, spaced at not more than 24 inches on center.
  - 3. Install metal studs, struts, or vertical runners as recommended by manufacturer at intersection of shaftwall and structural framing, at corners and T-shaped intersections, and at openings.
- C. Shaft Wall Liner:
  - 1. Cut liner panels accurately to a dimension 3/4 inch to 1 inch less than wall height. Install sequentially between special metal studs designed to hold liner panels by friction at shaft side of wall.
  - 2. On walls over 16 feet in height, screw-attach studs to runners top and bottom.
  - 3. When maximum panel length available is less than shaftwall height, position horizontal joint within top third and bottom third of wall, alternating location at adjacent panels.
- D. Door Openings:
  - 1. Comply with manufacturer's details for installation of minimum 20 gage metal struts or studs at head and jambs. Spot grout one-piece metal frames after liner panels have been installed.
  - 2. Support elevator door frames, accessories, and operating mechanisms independently of gypsum board shaftwall system.
- E. Boxes and Recessed Accessories: Maintain fire separation at openings by adding protection behind recessed components in accordance with manufacturer's details for tested assemblies.

- F. Structural Support: Provide supplemental blocking, framing, furring, and reinforcement as recommended by manufacturer and as required to properly support elements attached to non-load bearing shaftwall system.

### 3.07 INSTALLATION OF TRIM AND ACCESSORIES

- A. Comply with manufacturer's recommendations for installation of trim items. Except for items intended by manufacturer to be left exposed or semi-exposed, install trim units for concealment in joint finishing compound. Wherever possible, fasten metal trim items to substrate with same fasteners used to install gypsum board products.
- B. Control Joints: Where control joints are indicated on the drawings, place control joints as shown on the drawings. Where control joints are not indicated on the drawings, place control joints consistent with lines of building spaces and as follows:
  - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
  - 2. Install one-piece control joints at required locations. Do not remove tape until finishing operations are complete.
- C. Corner Beads: Install at external corners, unless details clearly indicate its omission at specific locations. Use longest practical lengths.
- D. Isolation Joints: Where gypsum board construction abuts cabinetry, windows, structural components, and other dissimilar materials, provide isolation by stopping board a minimum of 1/4 inch from structure, for finishing by means of exposed or semi-exposed trim.
- E. Aluminum Trim: Install as indicated on drawings and in accordance with manufacturer's instructions.

### 3.08 JOINT TREATMENT

- A. Finish gypsum board in scheduled areas in accordance with levels defined in ASTM C840.
- B. Do not mix joint compounds except as specifically recommended by manufacturer.
- C. Joint Treatment for Glass Mat Faced Gypsum Backing Board to Receive Tile:
  - 1. At corners install a bead of urethane joint sealant to seal the corner.
  - 2. Fill joints between backing boards with tile setting mortar.
  - 3. Apply self-adhering fiberglass sheathing tape to all joints, corners, and openings; overlap tape intersections for a width equal to tape width.
  - 4. Embed tape in tile setting material.
  - 5. Allow joints to dry before proceeding with tile installation.
- D. Penetrations in Wallboard: Fill cutouts and openings around fixtures and penetrations with joint compound.
- E. Penetrations in Gypsum Backing Board: Seal cut edges with elastomeric sealant specified in Division 7.

### 3.09 CLEANING

- A. Promptly remove any residual gypsum drywall materials from adjacent or adjoining surfaces, leaving spaces ready for subsequent finishing operations and decorating.

### 3.10 FINISH LEVEL SCHEDULE

- A. Level 1: Above finished ceilings concealed from view; from 8 inches (203 mm) above suspended ceilings to top of partition.
  - 1. Embed tape in joint compound at all joints and interior angles; provide accessories only as detailed.
  - 2. Provide surfaces free of excess joint compound; tool marks and ridges are acceptable.
- B. Level 2: Walls scheduled to receive the following:
  - 1. Utility areas; areas behind cabinetry.
  - 2. Application:
    - a. Embed tape in joint compound at all joints and interior angles.

- b. Provide one separate coat of compound at all joints, angles, fastener heads, and accessories.
  - c. Provide surfaces free of excess joint compound; tool marks and ridges are acceptable.
- C. Level 4: Surfaces scheduled to receive the following:
  - 1. Flat or eggshell paint finish specified in Section 09 91 00 - Paints and Coatings.
  - 2. All surfaces not otherwise indicated.
  - 3. Application:
    - a. Embed tape in joint compound at all joints and interior angles.
    - b. Provide three separate coats of compound at all joints, angles, fastener heads, and accessories.
    - c. Provide smooth surfaces free of tool marks and ridges.
- D. Finishing Glass Mat Faced Gypsum Backing Board to Receive Tile: As specified under "Joint Treatment", above.

END OF SECTION 09 21 16



SECTION 09 30 00 - TILE

- A. Specify glass-mat-faced gypsum backing board (Dens-Shield) in Section 09 2116 - Gypsum Wallboard Assemblies.

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
  - 1. Tile.
  - 2. Tile setting materials.
  - 3. Isolation and waterproofing membrane under tile.

1.02 REFERENCES

- A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2017.
- B. ANSI A108.5 - Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
- C. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive.
- D. ANSI A118.4 - American National Standard Specifications for Latex-Portland Cement Mortar.
- E. ANSI A118.6 - American National Standard Specifications for Ceramic Tile Grouts.
- F. ASTM C503/C503M - Standard Specification for Marble Dimension Stone; 2015.
- G. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2017.

1.03 SUBMITTALS

- A. Product Data:
  - 1. Written product information which demonstrates materials to be used on the project comply with contract documents.
  - 2. Manufacturer's installation instructions.
- B. LEED Documentation: Submit information required by Section 01 35 31 for the following targeted credits:
  - 1. Credit MR 4: Materials and Resources - Recycled Content.
  - 2. Credit MR 5: Materials and Resources - Regional Materials.
  - 3. Credit EQ 4.1: Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
- C. Samples for Verification Purposes: Submit the following:
  - 1. Submit each tile type selected mounted on a minimum 12 inch square board with joints filled using selected grout.
  - 2. Trim and accessories: Samples of actual units in selected color.
  - 3. Metal edge trim: 6-inch long samples.
- D. Contractor's Certificate of Inspection of Waterproofing Membrane.
- E. Warranty.

1.04 QUALITY ASSURANCE

- A. Material Source: Furnish each type, finish, and color of tile product and accessory materials from a single supplier.

- B. Tile Work Mock-up: To establish an acceptable standard of quality for comparison during installation, as well as to verify types of materials submitted, construct a 4 foot x 4 foot mock-up for each tile type, setting materials, and grout.
  - 1. Locate mock-ups as instructed by the Architect.
  - 2. Do not start installation work until Architect accepts mock-ups.
  - 3. After installation and when directed by Architect, remove mock-ups from project site.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store tile products and setting materials in manufacturer's sealed packages. Protect material from damage and store in dry location.

#### 1.06 PROJECT CONDITIONS

- A. Provide temperatures in tiled areas during installation and after completion as required by referenced installation standard or manufacturer's instructions, but not less than 50 degrees F.
- B. If necessary to use temporary heaters, vent units to exterior to protect tile work from carbon dioxide accumulation.

#### 1.07 MAINTENANCE

- A. Extra Materials: Deliver supply of maintenance materials to the Owner. Furnish maintenance materials from same lot as materials installed, and enclosed in protective packaging with appropriate identifying labels.
  - 1. Furnish not less than 2 percent of total product installed maintenance stock for each type, color, pattern, and size of tile product installed.

#### 1.08 WARRANTY

- A. Provide manufacturer's standard one (1) year warranty.

### PART 2 PRODUCTS

#### 2.01 SUBSTITUTIONS

- A. Refer to Section 01 60 00 - Product Requirements.

#### 2.02 LEED REQUIREMENTS

- A. Materials and Resources - Recycled Content.
- B. Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants:
  - 1. Provide adhesives complying with South Coast Rule No. 1168 by the South Coast Air Quality Management District.
    - a. Ceramic Tile Adhesives: 65 g/l.

#### 2.03 MATERIALS - GENERAL

- A. Ceramic Tile Standard: ANSI A137.1. Tile grade: "Standard Grade," unless noted otherwise.
- B. Tile Installation Materials Standard: ANSI standard referenced for setting and grouting materials.
- C. Special Purpose and Faience Tile Standard: CTI Test Procedure CTI-69-5 for tile indicated.
- D. Colors, Textures, and Patterns, Tile, Grout, and Other Products: Match colors indicated or as scheduled on drawings.
  - 1. Tile trim and accessories: Match color and finish of adjoining flat tile.
- E. Color Blending: Factory-blend tile products which have a natural color range so products taken from one box will have the same range as products from a separate box.
- F. Tile Mounting: Manufacturer's standard factory back- or edge-mounting.



## 2.04 TILE PRODUCTS

- A. Porcelain Wall Tile; Flat Tile (CT1) Basis of Design:
  - 1. Manufacturer: Stone Source.
  - 2. Pattern: Running Bond, with random mix of CT2; refer to interior elevations.
  - 3. Size: 4" x 12".
  - 4. Color: Bianco, Polished
  - 5. Joint Size: 1/8"
  - 6. Trim units:
    - a. Base.
- B. Porcelain Wall Tile; Flat Tile (CT2) Basis of Design:
  - 1. Manufacturer: Stone Source.
  - 2. Pattern: Random mix in Running Bond pattern of CT1; refer to interior elevations.
  - 3. Size: 4" x 12".
  - 4. Color: Fume, Polished
  - 5. Joint size: 1/8"
- C. Porcelain Floor Tile; Flat Tile (CT3) Basis of Design:
  - 1. Manufacturer: Louisville Tile.
  - 2. Pattern: Stack Bond.
  - 3. Size: 12" x 24".
  - 4. Color: TBD.
  - 5. Joint Size: 3/16"
  - 6. Trim units:
    - a. Base.

## 2.05 STONE THRESHOLDS

- A. General: Fabricate to size to provide transition between tile floor and adjacent floor surface.
- B. Marble Thresholds: ASTM C503/C503M.
  - 1. White, honed marble; Marble Institute of America Group "A."
  - 2. At door openings, install a single full-width piece; notch threshold to door jamb profile.

## 2.06 SETTING, GROUTING, AND WATERPROOFING MATERIAL MANUFACTURERS

- A. Provide products of a single manufacturer, unless otherwise specified, required, and approved.
- B. Manufacturers:
  - 1. Custom Building Products.
  - 2. Laticrete International, Inc.
  - 3. Mapei Corporation.

## 2.07 SETTING MATERIALS

- A. Latex-Portland Cement Mortar: Two-component, dry mortar mix and liquid latex additive, field-mixed; complying with ANSI A118.4.
  - 1. All components premeasured and prepackaged.
  - 2. Liquid latex additive: Acrylic or styrene-butadiene resin water emulsion.
  - 3. Mix in accordance with manufacturer's recommendations.
  - 4. "CustomFlex Ultra-Strength Thin-Set Additive" plus "MultiSet Modified Thin-Set Mortar"; Custom Building Products.
  - 5. "Laticrete 4237 Thin Set mortar Additive" (2.39 g/l) plus "Laticrete 211 Crete Filler Powder;" Laticrete International, Inc.
  - 6. "Kerabond" plus "Keralastic;" Mapei Corporation.

## 2.08 MEMBRANE MATERIALS

- A. Liquid-Applied, Elastomeric, Crack and Sound Isolation, and Positive Waterproofing Membrane:
  - 1. "RedGuard Crack Prevention and Waterproofing Membrane"; Custom Building Products.
  - 2. "Laticrete Hydro Ban or Hydro Barrier"; Laticrete International, Inc.
  - 3. "Maplastic AquaDefense"; Mapei Corporation.
  - 4. Fabric detail reinforcement: Required by this specification - not optional - at coves, corners, changes in plane, cracks, drains, and joints.

## 2.09 GROUTING MATERIALS

- A. Latex-Portland Cement Grout: Two-component, dry grout mix and liquid latex additive (no water), field-mixed; complying with ANSI A118.6.
  - 1. All components premeasured and prepackaged.
  - 2. Liquid latex additive: Acrylic resin water emulsion.
  - 3. Mix in accordance with manufacturer's recommendations.
  - 4. Floors:
    - a. "Prism SureColor Grout"; Custom Building Products.
    - b. "Permacolor-Select"; Laticrete International, Inc.
    - c. "Ultracolor Plus"; Mapei Corporation.
  - 5. Walls:
    - a. "Prism SureColor Grout"; Custom Building Products.
    - b. "Permacolor-Select"; Laticrete International, Inc.
    - c. "Ultracolor Plus"; Mapei Corporation.
- B. Chemical-Resistant, Water-Cleanable Ceramic Tile Setting and Grouting Epoxy: ANSI A118.3.
  - 1. "CEG-Lite 100% Solids Epoxy Grout"; Custom Building Products.
  - 2. "SpectraLock Pro Grout"; Laticrete International, Inc.
  - 3. "Kerapoxy"; Mapei Corporation.
- C. Grout Color: Using brand-name products specified above, provide grout matching the color selected by the Architect. Brand names/colors indicated on the finish schedule or plans, if any, denote color, only, not product.

## 2.10 PATCHING AND LEVELING COMPOUND

- A. Portland cement base, acrylic polymer compound, manufactured specifically for resurfacing and leveling concrete floors.
- B. Have not less than the following physical properties:
  - 1. Compressive strength - 3500 psi.
  - 2. Tensile strength - 1000 psi.
  - 3. Flexural strength - 1000 psi.
- C. Capable of being applied in layers up to two inches thick, being brought to a feather edge, and being troweled to a smooth finish.
- D. Ready for use in 48 hours after application.

## 2.11 MISCELLANEOUS MATERIALS

- A. Tile Cleaner: Acidic tile cleaners are not acceptable. Provide products specifically recommended by grout manufacturer for type of grout and tile used, such as the following:
  - 1. Commercial detergent or tri-sodium phosphate.
  - 2. Dry grout powder.

- 3. Methyl alcohol.
- B. Metal Edge strips: As specified in Section 09 60 10 - Flooring Transitions.
- C. Joint Sealant: Specified in Division 7. Color shall match adjacent grout unless otherwise indicated.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify with the installer that substrate areas where tile is to be installed have been prepared correctly, and that all backing materials have been installed. Correct unacceptable conditions before start of tile work.
- B. Verify that concrete substrates have not been cured with membrane-forming curing compounds. The following types of curing are suitable to receive tile or bonded mortar beds:
  - 1. Continuous moist curing methods.
  - 2. Moisture-retaining sheet materials.
  - 3. Chemical hardening type curing compounds.
  - 4. Membrane-forming curing compounds are acceptable only where thick-bed with cleavage membrane will be installed.
- C. Correct unsuitable substrates before proceeding.

#### 3.02 PREPARATION

- A. Factory-Blending: Before start of installation verify that tile with an anticipated range of colors has been correctly blended to achieve a uniform color range from tile package to tile package.
- B. Patching and Leveling:
  - 1. Mix and apply patching and leveling compound in accordance with manufacturer's instructions.
  - 2. Fill holes and cracks and level concrete floors that are out of required plane with patching and leveling compound.
  - 3. Thickness of compound shall be as required to bring finish tile system to elevation shown.
  - 4. Slope compound to drain where drains are shown.
- C. Floors:
  - 1. Membrane-forming curing compounds, if used, shall be completely removed by abrasive blast cleaning, vigorous wire brushing, or scarifying. Acid cleaning is not acceptable, unless specifically approved by the Architect.
- D. Walls:
  - 1. Apply patching and leveling compound to concrete and masonry surfaces that are out of required plane.
  - 2. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry, that are out of required plane.

#### 3.03 INSTALLATION - GENERAL

- A. Tile Installation Standard:
  - 1. ANSI A108/A118/A136 series, for setting and grouting materials listed.
  - 2. Comply with TCNA (HB) "Handbook for Ceramic Tile Installation" for type of applications indicated.
- B. Set tile firmly in place with finish surfaces in true planes.

1. Seal tile joints water tight around electrical outlets, piping fixtures, and fittings before cover plates and escutcheons are set in place.
2. Completed work shall be free from:
  - a. Hollow sounding areas.
  - b. Loose or cracked or scratched tile.
  - c. Out of plane or misaligned tile.
  - d. Mismatched patterns or colors.
  - e. Grout haze or other stains.
  - f. Other defects.
- C. Install waterproofing to comply with waterproofing manufacturer's instructions as necessary to result in a watertight installation.
- D. Install tile under or behind equipment and fixtures.
- E. Carefully cut, drill, and grind tile to fit around items projecting through tile surface, so that escutcheons or cover plates conceal cut edges, and without marring tile surface.
- F. Joint Patterns: Lay out tile according to patterns indicated on drawings, or if not shown, in a grid pattern with floor joints aligning with wall and trim joints. Install joints straight and of uniform width. Neatly form intersections and returns.
  1. Lay out tile work so that no tile less than one-half full size is used. Make all cuts on the outer edge of the field.
  2. Joint size, unless otherwise indicated:
    - a. As directed by the Architect.
- G. Sealant-Filled Joints: Install joints in the locations listed below, and elsewhere indicated on the drawings. Saw-cut joints are unacceptable. Joint installation method: TCA EJ 171.
  1. Between floor tile and base tile or other hard finish material at walls, curbs, columns, pipes, and similar conditions.
  2. Where changes occur in floor or wall substrates. Locate joint in tile directly over joint in substrate.
  3. Where control, construction, or cold joints occur in floor or wall substrates. Locate joint in tile directly over joint in substrate.
- H. Remove and reset defective work.

#### 3.04 TRIM

- A. Stone Thresholds: Install stone thresholds between tile floors and adjacent flooring or other materials where adjacent finish is not flush with top of tile. Install with thinset mortar where thick mortar bed would be exposed above adjacent floor finish.
- B. Metal Trim: Install metal edge strips in floor joints between tile floors and adjacent flooring or other materials where the finish floors are flush. Thick-set edge strip in mortar bed to line and level, and centered under doors or in openings.
- C. Tile Trim: Install tile trim so that edge of flat tile is not exposed.
- D. Install tile trim in the following locations, unless indicated otherwise of the drawings.:
  1. Base to floor internal corners: Use special shapes providing integral coved vertical and horizontal joint.
  2. Base to floor external corners: Use special shapes providing bullnose vertical edge with integral coved horizontal joint. Use as stop at bottom of openings having bullnose return to wall.

### 3.05 TILE APPLICATIONS

- A. Application 09 30 00.HWLE: Horizontal tile, waterproof membrane, TCNA F122/F122A; latex mortar, epoxy grout, TCNA F115.
  - 1. Waterproof membrane.
  - 2. Bond coat: Latex-Portland cement mortar, ANSI A108.5.
  - 3. Grout: Epoxy, ANSI A108.6.
- B. Application 09 30 00.VLL: Vertical tile, latex mortar, latex grout: TCNA W202E/W202I/W245.
  - 1. High performance gypsum backing board on walls: Specified Section 09 21 16.
  - 2. Bond coat: Latex-Portland cement mortar, ANSI A108.5.
  - 3. Grout: Latex-Portland cement, ANSI A108.10.

### 3.06 FIELD QUALITY CONTROL FOR WATERPROOFING MEMBRANES

- A. Drains:
  - 1. Liquid waterproofing: Extend reinforced detail coating of waterproof membrane into drain body and secure with clamping ring. Allow coating to cure prior to flood testing.
- B. Liquid waterproofing: Prior to flood testing of tile, make test cuts in waterproofing membrane, measure thickness of membrane. Make cuts at 2 drains, 2 wall/floor intersections, and 3 locations on floor. Test locations shall be selected to be representative of conditions encountered. Submit report of thickness measurements together with samples cut from waterproofing to the Architect. Repair test cut locations with fresh waterproofing membrane, and allow to cure before flood testing.
- C. Flood test waterproofing prior to installing tile. Place inflatable plumber's balloon or similar device in piping beneath drains. (Device must contact drain pipe, not drain bowl rim.) Fill waterproofed area with water to a depth of 2 inches measured at shallowest point. Allow to stand at least 24 hours. Installation shall be leak-free.
- D. Submit flood test field report to the Architect.

### 3.07 SEALING OF JOINTS

- A. Rake out joints for installation of sealant specified elsewhere.
  - 1. At thin-set assemblies, rake out joint full depth of tile.
  - 2. At waterproof membrane assemblies, rake out joint down to but not through waterproof membrane. Do not damage membrane.
- B. Install sealant in accordance with requirements specified elsewhere.

### 3.08 CLEANING AND PROTECTION

- A. Clean tile surfaces after installation is complete.
  - 1. Remove grout residue from tile as soon as possible after tile installation and in strict accordance with manufacturer's instructions.
  - 2. Tile that is stained or which contains grout haze after cleaning will be considered defective, and shall be removed and replaced with new tile at no cost to the Owner.
- B. Replace any broken, chipped, marred, or otherwise damaged tile before final acceptance.
- C. Protection: Apply neutral protective cleaner to tile after installation if recommended by tile manufacturer. Overlay completed tile installation with kraft paper for protection from subsequent construction activities.
- D. Do not allow any traffic on completed tile floors for minimum 7 days after completion.
- E. Remove protection, rinse, and dry tile installations before final review and acceptance.



CONTRACTOR'S CERTIFICATE OF INSPECTION OF WATERPROOFING MEMBRANE:

I certify that I have inspected the Waterproofing Membrane Work specified in this Section in its entirety. None of this Work has been covered by subsequent Work, including setting mortar, tile, or other materials specified in this Section or materials specified in other Sections.

Liquid Membrane Waterproofing: Enclosed are samples taken from the liquid waterproofing membrane in Room Number [ ] on [ ] (insert date) and whose thickness has been measured as follows:

Drain 1: \_\_\_\_\_ mils

Drain 2: \_\_\_\_\_ mils

Wall/floor 1: \_\_\_\_\_ mils

Wall/floor 2: \_\_\_\_\_ mils

Floor 1: \_\_\_\_\_ mils

Floor 2: \_\_\_\_\_ mils

Floor 3: \_\_\_\_\_ mils

The waterproofing was flood tested on (insert date) \_\_\_\_\_ and found to be leak-free.

I have inspected the Waterproofing Membrane Work in its entirety. No segment has be left uninspected. Certified this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ by

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(printed name)

on behalf of

\_\_\_\_\_  
(Contractor)

END OF SECTION 09 30 00





SECTION 09 51 00 - SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.
- C. Wood Ceiling System.
- D. Accessories.

1.02 REFERENCES

- A. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- B. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

1.03 SUBMITTALS

- A. Product Data: Provide data on suspension system components and acoustical units.
- B. LEED Documentation: Submit information required by Section 01 35 31 for the following targeted credits:
  - 1. Credit MR 4: Materials and Resources - Recycled Content.
  - 2. Credit MR 5: Materials and Resources - Regional Materials.
- C. Samples: Submit three samples, minimum 6 inches by 6 inches, illustrating material and finish of acoustical units.
- D. Samples: Submit three samples each, 9 inches long, of suspension system main runner and perimeter molding.
- E. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.

1.04 PROJECT CONDITIONS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Install acoustical units after interior wet work is dry.

1.05 EXTRA MATERIALS

- A. Provide 3 percent of total acoustical unit area of each type of acoustical unit for Owner's use in maintenance of project.

PART 2 PRODUCTS

2.01 LEED REQUIREMENTS

- A. Materials and Resources - Recycled Content.

2.02 ACOUSTICAL UNITS

- A. Manufacturers; General:
  - 1. Armstrong World Industries, Inc: [www.armstrong.com](http://www.armstrong.com).
  - 2. CertainTeed: [www.certainteed.com](http://www.certainteed.com).
  - 3. USG: [www.usg.com](http://www.usg.com).
- B. Acoustical Units (AC1):
  - 1. Acoustical Panel: Painted mineral fiber, ASTM E1264, Type III, Class A, with the following characteristics:
    - a. Size: 24 x 24 inches.
    - b. Thickness: 5/8 inch.

- c. Composition: Water felted.
- d. Light Reflectance: Not less than 0.80.
- e. Noise Reduction Coefficient (NRC): Not less than 0.50.
- f. Ceiling Attenuation Class (CAC): Not less than 33.
- 2. Products:
  - a. Armstrong:
    - 1) Acoustical Panel: Dune 1775, tegular edge.
    - 2) Suspension System: Suprafine XL 9/16 Heavy Duty.
  - b. CertainTeed:
    - 1) Acoustical Panel: Sand Micro SHM-150, narrow reveal edge.
    - 2) Suspension System: Elite Narrow Stab System 9/16 Heavy Duty.
  - c. USG:
    - 1) Acoustical Panel: Olympia Micro ClimaPlus 4231, shadow line edge.
    - 2) Suspension System: Centricitee 9/16 Heavy Duty.

## 2.03 WOOD CEILING

- A. Manufacturers; General:
  - 1. Armstrong World Industries, Inc: [www.armstrong.com](http://www.armstrong.com).
  - 2. HunterDouglas Architectural: [www.hunterdouglasarchitectural.eu](http://www.hunterdouglasarchitectural.eu)
  - 3. Rulon International: [www.rulonco.com](http://www.rulonco.com)
  - 4. Approved Equal
- B. Wood Ceiling (WD1):
  - 1. Solid Wood Slat; Wood Dowels, ASTM E 84, Class C, with the following characteristics determined as specified in ASTM E 1264.
    - a. Size: 12"x96"x5 1/4"with Dowel .
    - b. Composition: Wood
    - c. Noise Reduction Coefficient (NRC): Not less than 0.75.
  - 2. Veneer Wood Slat; Wood Dowels
    - a. Size: 12"x96"x5 1/4"with Dowel .
    - b. Composition: Wood
    - c. Noise Reduction Coefficient (NRC): Not less than 0.75.
  - 3. Products:
    - a. Armstrong:
      - 1) Woodworks Grille; 7099, 5 1/4" 3 slats:
        - (a) Color: To be selected by architect.
      - 2) Suspension System: Heavy Duty Prelude XL 15/16 Heavy Duty.
        - (a) Color: Black.
    - b. HunterDouglas:
      - 1) Veneered Wood Grill
        - (a) Species: To be selected by Architect.
        - (b) Matching: Slip Matched.
        - (c) Size: 2438mm x 130mm.
        - (d) Spacing: 89mm between slats
    - c. Rulon:
      - 1) Panel Grille
        - (a) Solid Wood or Veneer Wood Slat
        - (b) Species and/or Color to be selected by Architect
        - (c) Size: 3/4" x 5 1/4"

## 2.04 SUSPENDED ACOUSTIC CLOUD CEILING

- A. Site-fabricated stretched fabric panel ceiling system with continuous perimeter track profile mounted directly to sheetrock substrate. System shall provide for face fabric to be stretched over core materials, leaving fabric floating over core surface.
- B. Manufacturers:

1. Novawall Systems, Inc.; [www.novawall.com](http://www.novawall.com).
- C. System Components:
  1. Perimeter Edge Track - extruded polymer edge track profiles required to conform to panel edge detail desired. Multiple thicknesses over 1" may be achieved by furring as required.
  2. Midwall Track - corresponding midseam panel joint.
  3. Core: 1" fiberglass
  4. Fabric: NOVASPAN 10, 2 colors to be selected by Architect.
    - a. AC2: Color 1
    - b. AC3: Color 2
  5. Mounting Hardware: Manufacturer's standard fasteners for securing framing track directly to gypsum board, wood or plywood substrates. No nailing through fabric accepted.

#### 2.05 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
  1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- C. Touch-up Paint: Type and color to match acoustical and grid units.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

#### 3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:240.
- C. Locate system on room axis according to reflected plan.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners in excess of 2 degrees.
- J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
  1. Use longest practical lengths.
  2. Miter corners.

#### 3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

- C. Lay directional patterned units with pattern parallel to shortest room axis.
  - D. Fit border trim neatly against abutting surfaces.
  - E. Install units after above-ceiling work is complete.
  - F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
  - G. Cutting Acoustical Units:
    - 1. Cut to fit irregular grid and perimeter edge trim.
    - 2. Make field cut edges of same profile as factory edges.
    - 3. Double cut and field paint exposed reveal edges with manufacturer's recommended paint.
  - H. Where round obstructions occur, provide preformed closures to match perimeter molding.
- 3.04 ERECTION TOLERANCES
- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

END OF SECTION 09 51 00

## SECTION 09 60 10 - FLOORING TRANSITIONS

### PART 1 GENERAL

#### 1.01 SUBMITTALS

- A. Product Data.
- B. LEED Documentation: Submit information required by Section 01 35 31 for the following targeted credits:
  - 1. Credit MR 4: Materials and Resources - Recycled Content.
  - 2. Credit EQ 4.1: Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
  - 3. Credit EQ 4.3: Indoor Environmental Quality - Low-Emitting Materials - Flooring Systems.
- C. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each product specified.

### PART 2 PRODUCTS

#### 2.01 SUBSTITUTIONS

- A. Refer to Section 01 60 00 - Product Requirements.

	CARPET	TERRAZZO	RESILIENT FLOORING	WOOD	TILE - AT DOOR	TILE - FIELD	RESINOUS FLOORING	EXPOSED CONCRETE
CARPET	N							
TERRAZZO	A	M						
RESILIENT	F	B	H					
WOOD	K	C	K	N				
TILE - AT DOOR	L	L	L	L	L			
TILE - FIELD	A	C	B	D	N	N		
RESINOUS FLOORING	A	C	C	J	L	B	M	
EXPOSED CONCRETE	G	E	G	J	L	E	C	N

\* NOTE: FLOORING KEYED INTO SLAB.

#### DESCRIPTION

- A Metal Schluter Reno-TK, Size appropriate for material thicknesses.
- B Metal Schluter-Reno-U, Size appropriate for material thicknesses.
- C Metal Schluter-SCHIENE, Size appropriate for material thicknesses.
- D Metal Schluter-RENO-T, Size appropriate for material thicknesses.
- E Metal Schluter-RENO-RAMP, Size appropriate for material thicknesses.
- F Resilient Johnsonite CTA-XX-H, 1/8" to 1/4"
- G Resilient Johnsonite CTA-XX-J, 0" to 1/4"
- H Resilient Johnsonite CTA-XX-X, 0.80" to 1/8"
- J Resilient Johnsonite CTA-XX-D, 0" to 1/2"

K Resilient Johnsonite CD-XX-B, 1/8" to 1/2"

L Marble Threshold.

M Divider Strip.

N No Transition Required.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Coordinate and install transitions between each type of flooring in accordance with the table above and the respective flooring specifications.

END OF SECTION 09 60 10

SECTION 09 65 00 - RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient tile flooring.
  - 1. Luxury vinyl tile
- B. Resilient base.
- C. Installation accessories.

1.02 REFERENCES

- A. ASTM F1861 - Standard Specification for Resilient Wall Base; 2016.
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2017.

1.03 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- B. Test Reports: See requirements specified in Section 09 0561 - Preparation for Adhesively Installed Flooring.
- C. LEED Documentation: Submit information required by Section 01 35 31 for the following targeted credits:
  - 1. Credit MR 4: Materials and Resources - Recycled Content.
  - 2. Credit EQ 4.1: Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
  - 3. Credit EQ 4.3: Indoor Environmental Quality - Low-Emitting Materials - Flooring Systems.
- D. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each product specified.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.05 EXTRA MATERIALS

- A. Provide 5 percent of installed resilient product of each type and color specified.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

- A. Refer to Section 01 60 00 - Product Requirements.

2.02 LEED REQUIREMENTS:

- A. Materials and Resources - Recycled Content.
- B. Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants:
  - 1. Provide adhesives complying with South Coast Rule No. 1168 by the South Coast Air Quality Management District.
- C. Indoor Environmental Quality - Low-Emitting Materials - Flooring Systems.

2.03 MATERIALS - TILE FLOORING

- A. Luxury Vinyl Tile (LVT1): ASTM F 1700, Class 3; Solid Vinyl Floor Tile.

1. Size: Plank (6 x 36)
  2. Thickness: 6mm.
  3. Wear Layer: 20mil (0.020 inch).
  4. Products: See Finish Schedule on Drawings for Basis of Design.
  5. Edge Treatment: Micro-bevel.
  6. Backing: Integral Sound Abatement Pad (1mm thick)
  7. Warranty: 15 year commercial, 15 year Wear Warranty.
  8. Pattern: All arrows in the same direction. Planks should have end joints offset by at least 6" and staggered to create a random appearance.
  9. Installation: No adhesive required.
- B. Luxury Vinyl Tile (LVT2): ASTM F 1700, Class 3; Solid Vinyl Floor Tile.
1. Size: Plank (6 x 36)
  2. Thickness: 4mm.
  3. Wear Layer: 20mil (0.020 inch).
  4. Products: See Finish Schedule on Drawings for Basis of Design.
  5. Edge Treatment: Micro-bevel.
  6. Backing: Pre-applied adhesive.
  7. Warranty: 15 year commercial, 15 year Wear Warranty.
  8. Pattern: All arrows in the same direction. Planks should have end joints offset by at least 6" and staggered to create a random appearance.

#### 2.04 MATERIALS - BASE

- A. Resilient Base: ASTM F1861, Type TP thermoplastic rubber.
1. Height: 4 inches.
  2. Thickness: 0.125 inch thick.
  3. Finish: Matte.
  4. Style: Cove.
  5. Length: Roll, 100-120 feet.
  6. Products:
    - a. BurkeMercer Flooring; Rubbermyte: [www.burkemercer.com](http://www.burkemercer.com).
    - b. Flexco; Base 2000: [www.flexcofloors.com](http://www.flexcofloors.com).
    - c. Johnsonite, Inc; Traditional Rubber Wall DC: [www.johnsonite.com](http://www.johnsonite.com).
    - d. Roppe Corp; 700 Series Wall Base: [www.roppe.com](http://www.roppe.com).
  7. Color: TBD

#### 2.05 ACCESSORIES

- A. Subfloor Filler: Portland cement-based premix latex; type recommended by flooring manufacturers.
- B. Primers and Adhesives: Type recommended by flooring manufacturers.
1. LVT 1: No adhesive required for installation.
  2. LVT 2:
    - a. Comply with low-emitting materials requirements specified above.
    - b. Where high moisture or pH conditions exist, see additional requirements specified in Section 09 0561 - Preparation for Adhesively Installed Flooring.
- C. Sealer and Wax/Finish Products: Types recommended by flooring manufacturer.
- D. Transitions:
1. Products: Refer to Section 09 60 10 Flooring Transitions.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that surfaces are smooth and flat within the tolerances specified for that type of work, are free of substances which would impair bonding of adhesive materials, and are ready to receive resilient product.



- B. Verify that concrete subfloor surfaces are ready for resilient flooring installation by testing for moisture and alkalinity as specified in Section 09 0561 - preparation for Adhesively installed Flooring. If test results are not within limits recommended by flooring manufacturer, follow procedures specified in Section 09 0561.

### 3.02 PREPARATION

- A. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- B. Clean substrate.

### 3.03 INSTALLATION - TILE FLOORING

- A. Install in accordance with manufacturer's instructions.
- B. Mix tile from different containers to ensure shade variations are consistent when tile is placed.
- C. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern, unless indicated otherwise in drawings.
- E. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.
- F. Install transition strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- G. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

### 3.04 INSTALLATION - BASE

- A. Cut vertical joints and fit tightly. Maintain minimum dimension of 18 inches between joints.
- B. At external corners, v-cut back of base strip to two-thirds of its thickness and fold.
- C. Miter cut internal corners.
- D. Install base on solid backing. Bond tightly to surfaces.
- E. Scribe and fit to door frames and other interruptions.

### 3.05 CLEANING

- A. Clean, seal, and wax resilient flooring products in accordance with manufacturer's instructions.

### 3.06 PROTECTION OF FINISHED WORK

- A. Prohibit traffic on resilient flooring for 48 hours after installation.
- B. Protect installed products until completion of project.

END OF SECTION 09 65 00



SECTION 09 84 14 - ACOUSTIC STRETCHED-FABRIC WALL AND CEILING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acoustic stretched-fabric wall system.
- B. Acoustic stretched-fabric ceiling system.
- C. Accessories as required for complete installation.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 10 11 01 - Visual Display Boards: Prefabricated, framed tackboards and markerboards.

1.03 REFERENCE STANDARDS

- A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2017.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- C. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2016.
- D. ASTM E2573 - Standard Practice for Specimen Preparation and Mounting of Site-Fabricated Stretch Systems to Assess Surface Burning Characteristics; 2017.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
  - 4. Specimen warranty.
- C. Shop Drawings: Details indicating typical transitions to other finish surfaces.
- D. Selection Samples: Fabric swatches representing manufacturer's full range of available colors, textures, and patterns.
- E. Verification Samples:
  - 1. For each fabric specified, minimum size 4 inch square, representing actual product in color, texture, and pattern.
  - 2. Actual samples of each frame profile to be used, including transitions between dissimilar profiles.
  - 3. Acoustic material, minimum size 6 inch square.
  - 4. Accessory package.
- F. Test Reports: Certified test data from an independent test agency verifying that wall and ceiling systems meet specified requirements for acoustical and fire performance.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.
- I. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Supply an additional 10 (ten) percent of accessories installed for Owner's use in maintenance of project.
  - 2. Supply an additional 5 (five) percent of fabric installed for Owner's use in maintenance of project.

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect fabric, acoustical backing, and track from excessive moisture in shipment, storage, and handling.
- B. Do not deliver materials to project until wet work such as concrete and plaster has been completed.
- C. Store products in manufacturer's unopened packaging until ready for installation.
- D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

#### 1.07 MOCK-UP

- A. Construct mock-up of acoustic stretched-fabric wall system at location indicated by Architect.
  - 1. Minimum mock-up dimensions; 96 by 96 inches.
  - 2. Approved mock-up may remain as part of the Work.

#### 1.08 WARRANTY

- A. Correct defective work within five year period after Date of Substantial Completion.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Acoustic Stretched-Fabric Wall Systems:
  - 1. Fabricmate Systems; 3 Series Modular Panel: [www.fabricmate.com/#sle](http://www.fabricmate.com/#sle).
  - 2. FabriTRAK Systems, Inc; \_\_\_\_\_: [www.fabritrak.com/#sle](http://www.fabritrak.com/#sle).
  - 3. Novawall Systems, Inc; EcoTRACK: [www.novawall.com/#sle](http://www.novawall.com/#sle). (Basis of Design)
  - 4. Approved Equal.
- B. Acoustic Stretched-Fabric Ceiling Systems:
  - 1. FabriTRAK Systems, Inc; FabriSPAN: [www.fabritrak.com/#sle](http://www.fabritrak.com/#sle).
  - 2. Novawall Systems, Inc; NOVAWALL form: [www.novawall.com/#sle](http://www.novawall.com/#sle). (Basis of Design)
  - 3. Approved Equal.

#### 2.02 ACOUSTIC STRETCHED-FABRIC SYSTEM

- A. Acoustic Stretched-Fabric System: Field installed, fabric is stretched and set into framework and laid over acoustic material anchored to substrate. Framework consists of continuous perimeter and intermediate mounting frames anchored to substrate, and designed to permit removal and replacement of fabric within framed areas without affecting adjacent areas.
  - 1. Surface Burning Characteristics: Flame Spread Index of 25, maximum; Smoke Developed Index of 450, maximum; when whole system is tested in accordance with ASTM E84 using mounting specified in ASTM E2573 for stretched systems.
  - 2. Noise Reduction Coefficient (NRC): 0.80, minimum, when tested in accordance with ASTM C423, Type A mounting per ASTM E795.
- B. Provide materials and systems made of recycled content, at least 90 percent post-consumer or pre-consumer (post-industrial).
- C. Verify that adhesives and sealants used in installation of acoustic stretched-fabric system have acceptable low VOC emission ratings.

#### 2.03 MATERIALS

- A. Frame: Extruded polymer framing system with serrated jaws of sufficient strength to hold fabric in place after repeated applications.

1. Wall Frame Size: 1/2 inch height from wall substrate with minimum 1 inch wide base.
    - a. Wall Frame Shape: Square at perimeter, and square at intermediate abutting joints.
  2. Ceiling Frame Size: 1-3/8 inch height from ceiling substrate with minimum 1 inch wide base.
- B. Acoustic Material:
1. Multi-Density Fiberglass Board, Type \_\_\_\_: Consisting of 1/8 inch thick facing sheet laminated over compressed fiberglass board, Class A fire rated in accordance with ASTM E84.
    - a. Overall Thickness: 1 inch.
- C. Fabric: Heavy-duty fire-retardant commercial fabric, as provided by manufacturer of acoustic stretched-fabric system; color, pattern, and texture as selected from system manufacturer's fabric supplier's standard line of fabric.
- D. Fasteners: As recommended by manufacturer of acoustic stretched-fabric system in accordance with project requirements.
- E. Adhesives: Low VOC or water-based, approved by acoustic stretched-fabric system manufacturer, and complying with requirements of Section 01 61 16.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Begin installation only after substrates have been properly prepared.
- B. Verify that casework, markerboards, door and window jambs, finished ceiling, and other finished items adjacent or abutting the acoustic stretched-fabric system have been properly installed.
- C. When preparation of substrate is the responsibility of another installer, notify Architect of unsatisfactory preparation prior to proceeding with this work.

#### 3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation of this work.
- B. Prepare substrate surfaces using methods as recommended by the manufacturer for achieving acceptable result as required for this work.
- C. Remove wall plates and other obstacles, and properly prepare substrates to receive frames and acoustic material in accordance with manufacturer's instructions.

#### 3.03 INSTALLATION

- A. Install acoustic stretched-fabric system at locations indicated in accordance with approved shop drawings and manufacturer's instructions.
- B. Frames: Install perimeter and intermediate frames using appropriate fasteners for prepared substrate, firmly secured to ensure frames do not separate from substrate.
  1. For tile or masonry substrates, apply continuous bead of adhesive along base of framing in addition to spacing of conical anchors and/or fasteners at 6 to 8 inches on center.
  2. Follow contours of wall and scribe to adjoining work at borders, penetrations, and imperfections.
  3. Install framing around openings and penetrations.
  4. Allow for spacing of framework to accommodate insertion of installation tool.
- C. Acoustic Material: Cut and trim acoustic material to fit snugly within perimeter and intermediate framework.
  1. Apply adhesive and press acoustic material into place, maintaining constant plane.
- D. Fabric: Stretch fabric over acoustic material, locking edges of fabric into frame's serrated jaws using manufacturer's recommended tool. Maintain fabric weave plumb, level and true, in proper relation to building lines, without ripples, waviness, hourglass, or other deleterious effects.
  1. Upon fabric installation, do not employ adhesives or mechanical fasteners of any type, and ensure fabric is free-floating and in contact with acoustic material as necessary.

2. Stapling or gluing of fabric to cores or channel framework is not permitted.
3. Provide tension in fabric sufficient to prevent sagging under anticipated changes in temperature and humidity.
4. At outside corners, wrap as single piece of fabric without joints or seams.
5. At ceiling applications, surface of fabric shall not deviate from established ceiling plane more than 1 inch in 20 feet.

3.04 CLEANING

- A. Clean exposed surfaces of acoustic stretched-fabric system in compliance with manufacturers instructions for cleaning and repair of minor damage to exposed surfaces.
- B. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage to system.

3.05 PROTECTION

- A. Protect installed materials upon completion of this work, using methods that will ensure that the finished work is without damage or deterioration upon Date of Substantial Completion.

END OF SECTION 09 84 14

SECTION 09 91 00 - PAINTS AND COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Paints and Coatings on Interior Substrates.
  - 1. Concrete masonry units.
  - 2. Ferrous metals.
  - 3. Overhead ferrous and non-ferrous metal.
  - 4. Gypsum board.
  - 5. Gypsum board ceilings.
  - 6. Telephone and electrical panel backers.
- D. See Schedules at end of this Section.

1.02 REFERENCES

- A. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- B. SSPC-SP 2 - Hand Tool Cleaning; 1982, with Editorial Revision (2004).
- C. SSPC-SP 3 - Power Tool Cleaning; 1982, with Editorial Revision (2004).
- D. SSPC-SP 7 - Brush-Off Blast Cleaning; 2007.

1.03 SUBMITTALS

- A. Product Data: Provide data on all finishing products including:
  - 1. Manufacturer name.
  - 2. Product Type.
  - 3. Product Name.
  - 4. Product Number.
  - 5. Color.
- B. LEED Documentation: Submit information required by Section 01 35 31 for the following targeted credits:
  - 1. Credit MR 5: Materials and Resources - Regional Materials.
  - 2. Credit EQ 4.2: Indoor Environmental Quality - Low-Emitting Materials - Paints and Coatings.
- C. Samples: Submit two paper chip samples, 4 x 4 inch in size for each surface finishing product and color and sheen scheduled.
- D. Samples:
  - 1. Ferrous Metal and Galvanized Metal: 3 inch (75 mm) square samples of flat metal and 6 inch (150 mm) long samples of solid metal for each color and finish.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.

1.04 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing. Information shall be legible.
- C. Use of off-brand containers or mixing buckets will not be allowed on the site.
- D. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions. Protect from freezing.

#### 1.05 PROJECT CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Application Temperatures for Waterborne Paints: Minimum 45 degrees F for interiors; minimum 50 degrees F for exterior; maximum 90 degrees F (32 degrees C), unless required otherwise by manufacturer's instructions. Maintain interior temperatures until paint is completely dry and cured.
- C. Application Temperatures for Solvent Thinned Paints: Minimum 50 degrees F (10 degrees C) for interiors and exterior; maximum 95 degrees F (35 degrees C), unless required otherwise by manufacturer's instructions. Maintain interior temperatures until paint is completely dry and cured.
- D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.
- E. Ventilation: Ventilate affected areas during paint application. Exhaust solvent vapors outdoors, away from air intakes and people.

#### 1.06 EXTRA MATERIALS

- A. Supply 1 gallon of each color and type of topcoat; store where directed.
- B. Label each container with color in addition to the manufacturer's label.

### PART 2 PRODUCTS

#### 2.01 LEED REQUIREMENTS

- A. Indoor Environmental Quality - Low-Emitting Materials - Paints and Coatings:
  - 1. Provide interior paints and coatings complying with Green Seal Standard GS-11 Paints, First Edition, May 20, 1993, for VOC content limits as follows:
    - a. Non-Flat: 150g/l.
    - b. Flat 50 g/l.
  - 2. Provide anti-corrosive and anti-rust paints applied to interior ferrous metal substrates complying with Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997, for VOC content limits as follows:
    - a. Flat: 250 g/l
    - b. Semi-gloss: 250 g/l.
    - c. Gloss: 250 g/l.
  - 3. Provide clear wood finishes, floor coatings, stains, sealers, and shellacs applied to interior elements complying with South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004 for VOC content limits as follows:
    - a. Clear wood finishes:
      - 1) Varnish: 350 g/l.
      - 2) Lacquer: 550 g/l.
    - b. Floor Coatings: 100 g/l.
    - c. Sealers:
      - 1) Waterproofing Sealers: 250 g/l.
      - 2) Sanding Sealers: 275 g/l.
      - 3) All Other Sealers: 200 g/l.
    - d. Shellac:
      - 1) Clear: 730 g/l.
      - 2) Pigmented: 550 g/l.
    - e. Stains: 250 g/l.

#### 2.02 MANUFACTURERS - PAINTS

- A. Benjamin Moore & Co: [www.benjaminmoore.com](http://www.benjaminmoore.com).
- B. PPG Architectural Finishes, Inc.: [www.ppgaf.com](http://www.ppgaf.com).



C. The Sherwin-Williams Co: [www.sherwin-williams.com](http://www.sherwin-williams.com).

## 2.03 PAINTS AND COATINGS - GENERAL

A. Do not use insecticides in paint materials

## 2.04 ACCESSORY MATERIALS

A. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

### 3.02 PREPARATION

A. General:

1. Start of the surface preparation or paint materials application will be construed as applicator's acceptance of the surfaces as satisfactory for application of materials.
2. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
3. Surfaces: Correct defects and clean surfaces of substances which affect work of this section.
4. Marks: Seal with sealer compatible with primer and finish coats marks which may bleed through surface finishes.
5. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
6. Reduce the gloss of glossy surfaces to be painted.
7. Fill nail holes, cracks, chips, spalls, and similar damaged areas to match adjacent undamaged areas.

B. Concrete Unit Masonry Surfaces to be Painted:

1. Remove dirt, efflorescence, laitance, and other foreign matter.
2. Remove oil and grease with a solution of trisodium phosphate; rinse well and allow to dry.
3. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
4. Allow surfaces to dry at least 30 days before applying paint materials.
5. Fill masonry surface voids. Dried filler shall be uniform and free of pinholes. Do not apply filler over joint sealers.

C. Uncoated Ferrous Metal Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool cleaning in accordance with SSPC-SP 2 or SSPC-SP 3, or abrasive cleaning in accordance with SSPC-SP 7SSPC SP-7. Clean by washing with detergent or solvent in accordance with SSPC-SP 1. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

D. Shop-Primed Ferrous Metal Surfaces to be Finish Painted:

1. Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous.
2. In flat, exposed surfaces to receive semi-gloss or gloss finish, fill dents, holes and similar voids and depressions in flat exposed surfaces with metal filler compound. Finish flush with adjacent surfaces.
3. Clean surfaces with solvent in accordance with SSPC-SP 1.

4. Prime bare steel surfaces immediately upon detection.
- E. Metal Piping: The semitransparent film applied at the mill to some piping and tubing is not considered a shop applied primer. Where indicated to be painted, overcoat with the specified ferrous metal primer.
- F. Gypsum Board Surfaces to be Painted:
  1. Fill minor defects with filler compound. Spot prime defects after repair.
  2. Remove loose dust and dirt by brushing with a soft brush, rubbing with a cloth, or vacuum cleaning. A damp cloth may be used when water based paint materials are to be applied. Allow to dry.
- G. Insulated Coverings to be Painted: Remove dirt, grease, and oil from canvas and cotton.

### 3.03 APPLICATION

- A. Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated.
  1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
  2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
  3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- B. Thinning:
  1. When thinning is required to suit surface, temperature, weather conditions, or application methods, paints may be thinned in accordance with the manufacturer's directions.
  2. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds.
- C. Do not mix paint materials of different manufacturers.
- D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Minimum Coating Thickness:
  1. Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness as recommended by manufacturer. Provide total dry film thickness of the entire system as recommended by manufacturer.
  2. Strip paint to ensure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.
  3. Apply each coat of paint so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. If application thickness or color and opacity of the paint do not achieve complete hiding, apply additional coat(s) to achieve complete hiding without change in contract price.
- H. Back prime and seal ends of interior panel backer boards specified to be finished.

### 3.04 INTERIOR WALL AND CEILING JOINTS

- A. Sealant-Type Expansion Joints in Gypsum Wallboard:
  1. Ensure that backer rod and joint sealant (specified in Division 7) are completed and cured prior to application of paint.
- B. Control and Expansion Joints in Concrete and CMU:
  1. Apply coatings to the joint face (approximately 1/2 inch deep) and allow to cure before installing backer and joint sealant specified in Division 7.

- C. Fillet Joints between Hollow Metal Door Frames and Adjacent Walls (and similar locations):
  - 1. Ensure that backer rod and joint sealant (specified in Division 7) are completed and cured prior to application of paint.

### 3.05 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Paint shop-primed equipment, where indicated.
- B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- C. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### 3.06 REPAIR AND RESTORATION

- A. Reinstall electrical plates, hardware, light fixture trim, escutcheons, and fittings that were removed prior to preparing surfaces or finishing.
- B. Restore to original condition surfaces damaged or marred by painting materials application.
- C. Remove, refinish, or repaint work not complying with approved samples and other specified requirements.

### 3.07 PROTECTION AND CLEANING

- A. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

### 3.08 SCHEDULE - SURFACES TO BE FINISHED

- A. Do Not Paint or Finish the Following Items:
  - 1. Items fully factory-finished unless specifically noted.
  - 2. UL, FMG, or other code required labels; fire rating labels; and equipment name, identification, performance rating, serial number and capacity labels.
  - 3. Stainless steel items.
  - 4. Concealed surfaces including, but not limited to, the following:
    - a. Duct shafts.
    - b. Elevator shafts.
- B. Paint the surfaces described in Schedules at the end of this Section and as follows:
  - 1. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of permanently fixed equipment or furniture, paint surfaces behind permanently fixed equipment or furniture with primer only.
  - 2. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  - 3. Finish exterior field-finished doors on tops, bottoms, and side edges the same as exterior faces.
  - 4. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
  - 5. Paint both sides and edges of plywood panel backers for electrical and telephone equipment before installing equipment.
- C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
  - 1. Paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment occurring in finished areas to match background surfaces, unless otherwise indicated.
  - 2. Paint shop-primed items occurring in finished areas.
  - 3. Paint interior surfaces of air ducts and convectors and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.

### 3.09 INTERIOR PRIMERS, SEALERS, AND FILLERS

- A. Interior Block Filler for Concrete Masonry Units:
  - 1. Benjamin Moore & Co.; 285 Moorcraft Super Craft Latex Block Filler. (57 g/l)
  - 2. PPG Architectural Finishes, Inc.; 6-7 Speedhide Latex Masonry Block Filler. (18 g/l)

3. The Sherwin-Williams Co.; B25W25 PrepRite Acrylic Latex Block Filler. (42 g/l)
  - B. Interior Acrylic Primer for Gypsum Board:
    1. Benjamin Moore & Co.; 231 EcoSpec Interior Latex Primer Sealer. (0 g/l)
    2. PPG Architectural Finishes, Inc.; 6-4900XI Speedhide Zero VOC Interior Primer. (0 g/l)
    3. The Sherwin-Williams Co.; B28W02600 ProMar 200 Zero VOC Interior Latex Primer. (0 g/l)
  - C. Interior Acrylic Primer for Ferrous Metal:
    1. Benjamin Moore & Co.; M04 IMC Acrylic Metal Primer. (54 g/l)
    2. PPG Architectural Finishes, Inc.; 90-712 Pitt-Tech Primer/Finish DTM Industrial Enamel. (123 g/l)
    3. The Sherwin-Williams Co.; B66W1 Direct To Metal Acrylic Primer & Finish. (138 g/l)
  - D. Interior Acrylic Primer for Overhead Ferrous and Non-Ferrous Metal:
    1. PPG Paints: PPG 90-912 Pitt-Tech Plus Int./Ext. DTM Industrial Primer. (90 g/l)
    2. Sherwin-Williams: Pro Industrial Pro-Cryl Universal Primer B66W00310 Series. (96 g/l)
- 3.10 INTERIOR FINISH COATS
- A. Flat Acrylic Finish Coats for Concrete, Plaster, Concrete Masonry Units, Gypsum Board, Wood:
    1. Benjamin Moore & Co.; 219 Eco Spec Interior Latex Flat. (0 g/l)
    2. PPG Architectural Finishes, Inc.; 6-4110XI Speedhide Zero VOC Flat Interior Latex. (0 g/l)
    3. The Sherwin-Williams Co.; ProMar 200 Zero VOC Flat, B30-2600. (0 g/l)
  - B. Eggshell Acrylic Finish Coats for Concrete, Plaster, Concrete Masonry Units, Gypsum Board, Wood:
    1. Benjamin Moore & Co.; 223 Eco Spec Interior Latex Eggshell Enamel. (0 g/l)
    2. PPG Architectural Finishes, Inc.; 6-4310XI Speedhide Zero VOC Interior Eggshell Latex. (0 g/l)
    3. The Sherwin-Williams Co.; ProMar 200 Zero VOC Eg-Shel, B20-2600. (0 g/l)
  - C. Semi-Gloss Acrylic Finish Coats for Concrete, Plaster, Concrete Masonry Units, Gypsum Board, Wood:
    1. Benjamin Moore & Co.; 224 Eco Spec Interior Latex Semi-Gloss Enamel. (0 g/l)
    2. PPG Architectural Finishes, Inc.; 6-4510XO Speedhide Zero VOC Interior Semi-Gloss Latex. (0 g/l)
    3. The Sherwin Williams Co.; ProMar 200 Zero VOC Semi-Gloss B31-2600. (0 g/l)
  - D. Semi-Gloss Acrylic Finish Coats for Ferrous Metal:
    1. Benjamin Moore & Co.; IMC M29 DTM Acrylic Semi-Gloss Enamel. (207 g/l)
    2. PPG Architectural Finishes, Inc.; 90-474 Pitt-Tech Int/Ext Satin DTM Industrial Enamel. (227 g/l)
    3. The Sherwin-Williams Co.; B66-200 Series DTM Acrylic Coating, Semi Gloss. (208 g/l)
  - E. Low Gloss Acrylic Finish Coats for Overhead Ferrous and Non-Ferrous Metal:
    1. PPG Paints: PPG 6-724XI Speedhide Super Tech WB Interior Acrylic Dry-Fog Semi-Gloss Latex. (29 g/l)
    2. Sherwin-Williams: Pro Industrial Waterborne Acrylic Dryfall Eg-Shel, B42W00080 Series. (<50 g/l)
- 3.11 PRIMER, INTERMEDIATE, AND TOP COAT COLORS
- A. Except where coating materials cannot be tinted, tint each successive (primer, intermediate, top) coat of paint a sufficiently contrasting color to facilitate identification of complete coating coverage. The preceding coat may be in the same color family, but shall be noticeably different. Provide additional top coats without change in Contract Price if necessary to achieve complete hiding and uniform sheen.
  - B. Top coat colors are indicated on the drawings and schedules. For approval of actual colors, see sample and mock-up requirements specified above.

- C. Top coat colors of manufacturers listed on the Finish Schedule (or elsewhere) indicate the required color, only, and do not indicate the required brand name product, which shall be as specified in above.
- D. Top Coat Colors:
  - 1. Before submitting samples for approval and before purchasing project quantities of material, confirm with the Architect that colors have not changed based on awarded flooring, tile, and countertop finishes.
  - 2. Match the following colors:
    - a. Paint Color 1 (P1); TBD.
    - b. Paint Color 2 (P2); TBD.
    - c. Paint Color 3 (P3); TBD.
    - d. Paint Color 4 (P4); TBD.
    - e. Paint Color 5 (P5); TBD.
    - f. Paint Color 6 (P6); TBD.
    - g. Paint Color 7 (P7); TBD.
    - h. Paint Color 8 (P8); TBD.

### 3.12 PAINT SYSTEMS - INTERIOR

- A. Concrete Masonry Units:
  - 1. First Coat: Acrylic Block Filler.
  - 2. Two Top Coats: Eggshell acrylic finish.
- B. Ferrous Metals:
  - 1. First Coat: Primer.
  - 2. Two Top Coats: Semi-gloss acrylic finish.
- C. Overhead Ferrous and Non-Ferrous Metal:
  - 1. First Coat: Interior acrylic primer for overhead ferrous and non-ferrous metal.
  - 2. Two Top Coats: Low gloss acrylic finish for overhead ferrous and non-ferrous metal.
- D. Gypsum Board:
  - 1. First Coat: Acrylic primer.
  - 2. Two Top Coats: Eggshell acrylic enamel finish.
- E. Gypsum Board Ceilings:
  - 1. First Coat: Acrylic primer.
  - 2. Two Top Coats: Flat latex paint finish.

END OF SECTION 09 91 00



## **SECTION 09 91 00.13**

### **EXTERIOR PAINTING**

#### **PART 1 GENERAL**

##### **1.01 SCOPE**

###### **A. Work Included**

1. Surface preparation and painting or finishing of all interior and exterior exposed items and surfaces except as otherwise indicated. Work includes, but is not necessarily limited to, the following:
  - a. Hollow metal doors and frames.
  - b. Exposed ferrous metal of any type exterior, including galvanized items.
  - c. Other items noted or specified.
2. Surface preparation, priming and coats of paint specified are in addition to shop priming and surface treatment specified under other sections of the work.

###### **B. Surface Preparation**

1. It is the intention of this specification that new substrates will be ready for decoration as specified herein except for normal construction dust and soiling.
2. Surfaces and materials installed by other trades are required to be acceptable for work specified under Part 3, Surface Preparation. Specifically, new surfaces to be clean, sound, free from loose particles, dirt, loose mortar and grease.

##### **1.02 RELATED SECTIONS**

- A. Sustainable Design Requirements: Section 01 81 13.
- B. VOC Limits: Section 01 81 16.

##### **1.03 DEFINITIONS**

- A. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- B. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

##### **1.04 QUALITY ASSURANCE**

- A. Application: Performed only by skilled, experienced painters.
- B. Provide lead free prime and finish coatings. All top coatings shall be mold and mildew resistant.
- C. Coordination: Provide finish coats compatible with prime paints used. Review other specification sections to ensure compatibility of total coating system with prime paints provided for the various substrates. Provide barrier coats over non-compatible primers or remove primer and reprime as required. Notify the Architect of anticipated problems using coating systems specified on substrates primed in accordance with other section requirements.
- D. Reference Specifications
  - 1. The following Society for Protective Coatings (SSPC) specifications are referenced by code number within this Section.

<u>Code</u>	<u>Method</u>
SP-1	Solvent Cleaning
SP-2	Hand Tool Cleaning
SP-3	Power Tool Cleaning
SP-6	Commercial Blast Cleaning
SP-11	Power Tool Cleaning to Bare Metal
SP-16	Brush-off Blast Cleaning of Non-Ferrous Metals

#### 1.05 SUBMITTALS

- A. Submit a complete selection of manufacturer's color chips indicating color, texture and sheen for approval for each finish specified herein.
- B. Submit a complete schedule for identifying manufacturer and specific brand name or number of products proposed for finishing specified surfaces.
  - 1. Provide percent of solids by volume content data for each paint material.
  - 2. Provide paint label analysis and application instructions for each type paint.
- C. Provide one (1) unopened gallon of each type and color of paint and stain required for maintenance purposes. Provide original, unopened, labeled containers with color samples and a list of project use. Extra materials are not to be used for touch-up by Contractor.
- D. Color/Finish Samples
  - 1. After receiving color chips from the Contractor, the Architect will provide a complete schedule of colors and sheens desired.
  - 2. Obtain schedule well in advance of commencing work and submit samples of specified finishes for approval.
  - 3. Submit duplicate samples on the same kind of materials to which finishes



will be applied. One half of the sample shall show the completed treatment and the other half shall show the successive steps, taken in producing the finish. When approved, samples will be so marked; one set will be retained by the Architect and one set will be returned for the painter's use.

4. No finishes shall be applied on the work until samples are approved. Approved samples shall be strictly duplicated in the work. Additional coatings, if required to reproduce approved samples, shall be applied without additional cost to the Owner.
5. Use representative colors when preparing samples for Architect's review.

E. Statement From Manufacturer

1. Contractor, in submitting the list of proposed subcontractors, shall include for approval, along with the name of the painting subcontractor, the names of the manufacturers whose materials the subcontractor proposes to use in the work.
2. Following tentative approval of the subcontractor and the materials manufacturers, notify the manufacturers, in writing, that the specifications require the manufacturers to submit to the Architect, a statement by a corporate officer of the manufacturer that coatings scheduled by the Architect are proper for the intended use and that the manufacturer's representative will be available to advise the Architect and the Contractor regarding applications of all coatings.

- F. Close-Out Material List: Provide a list of all paint and coating materials used on the project. Include manufacturer, product number, color and room/location where used.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials on the job site in original, new, unopened packages and containers bearing the manufacturer's name and label, and the following information:
1. Name or title of material.
  2. Manufacturer's stock number and date of manufacture.
  3. Manufacturer's name.
  4. Contents by volume, for major pigment and vehicle constituents.
  5. Thinning instructions.
  6. Application instructions.
  7. Color name and number.
- B. Store, protect and handle materials in accordance with manufacturer's recommendations to prevent damage and deterioration. Store paint materials at minimum of 50° F.
- C. Maintain paint material storage space as clean, non-hazardous and orderly. Place waste and soiled paint rags in tightly covered metal containers; safely dispose of at end of each working day. Take every precaution to avoid fire hazards and spontaneous combustion. Provide acceptable type of fire extinguisher

immediately adjacent to paint storage area.

1.06 PROJECT CONDITIONS

- A. Coordinate painting and finishing work with other trades to ensure adequate illumination, ventilation and dust-free environment during application and drying of paint and finish treatments.
- B. Maintain temperature of minimum 50° F for 24 hours before, during and continuously for 48 hours after painting.
- C. Do not apply coatings when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Provide adequate ventilation as required for specified paint and finish treatment materials in spaces scheduled. Maintain for time periods recommended by material manufacturer to provide proper drying.
- E. Provide adequate illumination on surfaces to be finished. Maintain a minimum 80 foot candle lighting level measured mid-height at substrate surface.
- F. Protect adjoining surfaces against damage or soiling.
- G. Maintain work in neat and orderly condition, promptly removing empty containers, wrappings, soiled rags, waste and rubbish from site.
- H. Material Safety Data Sheets (MSDS): Provide documents available to Owner's Representative and construction personnel at the job site. Comply with MSDS requirements.

**PART 2 PRODUCTS**

2.01 ACCEPTABLE MANUFACTURERS

- A. Paint: Brands of paint and stain are specified in "Paint and Material Finish Schedule," only to establish a standard of quality. Other paint brands and manufacturers such as BENJAMIN MOORE; MARTIN SENOUR; PPG PAINTS; PRATT AND LAMBERT; CORONADO PAINT COMPANY, SHERWIN WILLIAMS are acceptable upon proof of satisfactory experience records for the intended use and comparable to VOC content of materials specified.

- 1. Colors: As selected by Architect.

2.02 MATERIAL GENERAL

- A. General: Provide materials that comply with Project Sustainable Design Requirements and Low Emitting Material goals.
- B. Material Compatibility

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

## 2.03 ACCESSORY MATERIAL

- A. Application Equipment: Not required to be new, but shall be adequate for the work and workmanship required herein.
- B. Accessories: Provide all required ladders, scaffolding, drop cloths, masking, scrapers, tools, dusters and cleaning solvents as required to perform the work and achieve the results specified herein.
- C. Secondary products not specified by name (i.e. turpentine, thinners, mineral spirits, fillers, linseed oils, etc.) shall be "best grade" or "first line" products.
  1. Filler material shall be woodworker's option of material that can be tinted and worked so as to match adjacent wood surfaces.

## 2.04 EXTERIOR PAINT AND FINISH MATERIAL SCHEDULE

- A. Apply paint and finish materials to substrate surfaces indicated. Apply touch-up prime coats in addition to shop-applied prime coats. Provide additional job site prime coats when indicated.
- B. Metals - Ferrous: Galvanized and Shop Primed (Semi-Gloss).
  1. SW
    - a. Primer: SW ProCryl Universal Metal Primer BB-310 Series One (1) Coat
    - b. Finish: S-W Pro industrial Acrylic Semi-Gloss Coating B66-650 Series. Two (2) coats.
  2. PPG
    - a. Primer: Pitt-Tech Plus 4020 Acrylic Interior/Exterior Primer/Finish DTM Industrial Primer 4020 PF Series. One (1) coat.
    - b. Finish: Pitt-Tech Plus 4216 HP Acrylic Interior/Exterior Semi-Gloss DTM Industrial Enamel 4216 Series. Two (2) coats.
- C. Metal – Ferrous: Unprimed (Semi-Gloss).
  1. SW
    - a. Primer: SW ProCryl Universal Metal Primer BB-310 Series One (1) Coat
    - b. Finish: S-W Pro industrial Acrylic Semi-Gloss Coating, B66-650 Series . Two (2) coats.

2. PPG
  - a. Primer: 4020 Acrylic Interior/Exterior Primer/Finish DTM Industrial Primer. One (1) coat.
  - b. Finish: 4216 HP Acrylic Interior/Exterior Semi-Gloss DTM Industrial Enamel 4216 Series. Two (2) coats.

### **PART 3 EXECUTION**

#### **3.01 INSPECTION**

- A. Examine substrate surfaces and installation condition. Report condition(s) that might affect proper application.
- B. Do not proceed with painting work until unsatisfactory conditions have been corrected.
- C. Initial application of paint to a surface constitutes acceptance of existing conditions and responsibility for satisfactory performance.
- D. Examine specification sections of other trades and their provisions regarding painting. Surfaces left unfinished shall be painted or finished as part of the work of this Section unless specifically noted otherwise.

#### **3.02 SURFACE PREPARATION**

- A. General
  1. Broom clean and remove excess dust before painting is started in any area.
  2. Broom cleaning is not permitted after operations have begun in a specific area.
  3. Surfaces shall be clean, dry and adequately protected from dampness.
  4. Surfaces shall be free of any foreign materials that will adversely affect adhesion or appearance of applied coating.
  5. Remove any mildew and neutralize the surface prior to applying coating.
- B. Structural Steel and Miscellaneous Ferrous Metal
  1. Bare Metal Surfaces
    - a. Remove grease, oil, dirt and other foreign material prior to prime coat application where necessary according to SP-1, SP-2 and/or SP-3.
    - b. Power tool clean remove rust prior to prime coat application according to SP-11.
    - c. Include all hangers and miscellaneous fabricated items.
  2. Shop Primed Surfaces
    - a. Fill open joints or abrasions in shop prime coat with filler; feather edges, sand smooth, and touch-up with primer compatible with shop primer. Extend primer beyond treated area.

- b. Remove grease, oil, dirt and other foreign material prior to prime coat touch-up where necessary according to SP-1, SP-2 and/or SP-3.
- c. Include all hangers and miscellaneous fabricated items.

C. Galvanized or Zinc-Coated Items

- 1. Pretreat surfaces prior to application of prime coat with phosphate pretreatment, similar to Great Lakes Labs, "Clean and Etch", Dupont's Metal Conditioner #5717 or PPG DX 579, unless prime coat material to be used is recommended by its manufacturer for direct application over zinc treated surfaces of the type at hand. Follow manufacturer's directions.
- 2. Remove dirt or grease on surfaces scheduled for paint finish according to SP-1. Wipe dry with clean cloths.
- 3. Roughen surface with steel wool as necessary to remove gloss.

3.03 APPLICATION

A. General

- 1. Only skilled mechanics shall be used.
- 2. Apply all paint in strict accordance with the manufacturer's instructions. Data sheets take precedence over these specifications if more restrictive.
- 3. Do not apply until preceding coat is dry to manufacturer's recommendations.
- 4. Do not apply to any surface unless it is thoroughly dry.
- 5. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes if moisture content of surface is greater than recommended by manufacturer.
- 6. Do not use material that has exceeded the pot life stated by the manufacturer.
- 7. Apply to the following workmanship requirements:
  - a. Neat appearance of finished surfaces.
  - b. Absence of ridges, sags, runs, drops, laps, unnecessary brush marks, holidays, air bubbles and excessive roller stipple.
  - c. Thorough mixing of paint and limited use of thinners.
  - d. Uniformity of film thickness.
  - e. Proper drying time between coats.
  - f. Protection of unpainted and finished surfaces.
- 8. Coverage and hide shall be complete. When color or undercoats show through final coat, recoat until the paint film is of uniform finish, color, appearance, and coverage, at no additional cost to Owner.
- 9. Edges of paint or finish adjoining other materials or colors shall be sharp and clean without overlapping.

B. Methods

- 1. Application may be by roller, brush, spray or other approved means.
- 2. When utilizing spraying, be careful not to use methods which will affect other trades work in adjacent areas.

C. Mixing

1. Mechanically mix before use.
2. Agitate during application as required.
3. Do not tint or shade in field.

D. Thinning

1. Dilute only as required to achieve suitable application viscosity.
2. Use only type and amount recommended by manufacturer.

E. Approvals: Do not apply succeeding coat of paint until previous coat has been inspected and written approval is given.

F. Protection of Surfaces

1. Provide covers, drop cloths and masking to protect unpainted surfaces previously finish painted. Use special care in protecting electrical and mechanical items which may be damaged by the painting operations (i.e., overspray and solvents that might damage the internals of the item).
2. If possible, remove items not to be painted such as hardware, accessories, electrical plates, lighting fixtures and/or trim, mechanical grilles and louvers and similar items in contact with painted surfaces.
3. Use caution when painting exterior work to avoid wind carrying overspray, drippings, etc., onto adjacent structures, facilities and vehicles.
4. Following completion of painting, reinstall removed items by workmen skilled in the trade involved and remove all covers, masking and drop cloths.

**END OF SECTION**

## SECTION 10 11 01 - VISUAL DISPLAY BOARDS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Factory Assembled Units:
  - 1. Magnetic Glass Markerboards.

#### 1.02 SUBMITTALS

- A. Product Data: Provide manufacturer's data on products specified.
  - 1. Include cross-section details showing each type of product and components; trim, marker/chalk tray, face, core, backing materials and thickness, and key to elevations.
- B. Verification Samples: Submit two samples 2 by 2 inches in size illustrating materials, finish, color, and texture of each product specified.
- C. Manufacturer's printed installation instructions.
- D. Maintenance Data: Manufacturer's cleaning and maintenance instructions covering both routine and long-term operations.
- E. Shop Drawings:
  - 1. Include types of units provided, location within each room, and size of each unit.
  - 2. Include dimensioned elevation drawings of each board assembly indicating joint locations and type of joint where required, and board mounting distances from floors.
  - 3. Show locations and quantities of accessories.
  - 4. Show anchorage and installation details.
- F. Warranty.

#### 1.03 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain visual display boards of each type from a single source.

#### 1.04 WARRANTY

- A. Provide lifetime warranty for porcelain enamel steel markerboard and chalkboard writing surfaces when installed in accordance with manufacturer's instructions.
- B. Warranty shall cover replacement of defective boards due to discoloration, excessive fading color, crazing, cracking or flaking. Warranty does not cover the cost of removal or reinstallation.

### PART 2 PRODUCTS

#### 2.01 SUBSTITUTIONS

- A. Refer to Section 01 60 00 - Product Requirements.

#### 2.02 MANUFACTURERS

- A. Claridge Products: [www.claridgeproducts.com](http://www.claridgeproducts.com).
- B. Clarus Glassboard.
- C. Hightower Magnetic Glass Boards.
- D. Egan Glassboard.

#### 2.03 MATERIALS

- A. Glass Markerboard
  - 1. Glass: 1/4 -inch thick, tempered, low-iron, extra clear, safety writing glass with polished edges
  - 2. Glass Markerboard writing surface: Smooth finish intended for use with dry-erase markers
  - 3. Glass Sizes: Standard Sizes available - 2' x 3', 3' x 4', 4' x 4', 4' x 6', 4' x 8', 4' x 10', 4' x 12', 5' x 4', 5' x 6', 5' x 8', 5' x 10' or custom sizes and shapes
  - 4. Back-Coated Color: Brilliant White
  - 5. Backing: Steel backing permanently adhered to the back of the glass.

- B. Mounting
  - 1. Concealed bracket mount
  - 2. Stand-off edge mount
- C. Accessories:
  - 1. One dry erase marker kit, for every 12 lineal feet of marker board, consisting of 3 different colored markers, 1 eraser, and 8 ounces of cleaning fluid.

#### 2.04 FACTORY ASSEMBLED UNITS

- A. Factory-assembled units in a single frame, of materials specified above.
  - 1. Configuration: As indicated on drawings.

#### 2.05 FACTORY ASSEMBLED UNIT FABRICATION

- A. Laminate facing sheet and backing sheet to core material under pressure, using manufacturer's recommended adhesive.
- B. Where butt jointed spliced panels are required use MDF core.
- C. Provide factory-assembled visual display boards, except where sizes demand partial field assembly.
- D. Assemble units in one piece without joints, wherever possible. Where required dimensions exceed maximum panel size available, provide two or more pieces of equal length, as indicated on approved shop drawings. Assemble to verify fit at factory, then disassemble for delivery and final assembly at project site.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated on drawings.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as instructed by manufacturer.

#### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure units level and plumb.

#### 3.03 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.

END OF SECTION 10 11 01



## SECTION 10 14 00 - SIGNAGE

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

#### 1.02 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

#### 1.03 SUBMITTALS

- A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- B. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
  - 1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
  - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
  - 3. Submit for approval by Owner through Architect prior to fabrication.
- C. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Store tape adhesive at normal room temperature.

#### 1.05 FIELD CONDITIONS

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

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Flat Signs:
  - 1. Best Sign Systems, Inc; \_\_\_\_: [www.bestsigns.com/#sle](http://www.bestsigns.com/#sle).
  - 2. Cosco Industries (ADA signs); ADA Series 1: [www.coscoarchitecturalsigns.com/#sle](http://www.coscoarchitecturalsigns.com/#sle).
  - 3. FASTSIGNS; \_\_\_\_: [www.fastsigns.com/#sle](http://www.fastsigns.com/#sle).
  - 4. Inpro; \_\_\_\_: [www.inprocorp.com/#sle](http://www.inprocorp.com/#sle).
  - 5. Mohawk Sign Systems, Inc; \_\_\_\_: [www.mohawksign.com/#sle](http://www.mohawksign.com/#sle).
  - 6. Seton Identification Products; \_\_\_\_: [www.seton.com/aec/#sle](http://www.seton.com/aec/#sle).

#### 2.02 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 \_\_\_\_\_, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Code Required Signage
  - 1. Refer to drawings for size and type of sign.
  - 2. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers as shown on the drawings, and braille.

3. Stairs/ Elevators: See drawings.
- C. Emergency Evacuation Maps:
  1. Allow for one map per elevator lobby.
  2. Map content to be provided by Owner.
  3. Refer to drawings for size.

#### 2.03 SIGN TYPES

- A. Flat Signs: Signage media without frame.
  1. Edges: Square.
  2. Corners: Square.
  3. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Color and Font: Unless otherwise indicated:
  1. Character Font: Avenir 55 Roman.
  2. Character Case: Upper and lower case (title case). See drawings.
  3. Background Color: Coordinate with NKU Standards.
  4. Character Color: Coordinate with NKU Standards.

#### 2.04 ACCESSORIES

- A. Tape Adhesive: Double sided tape, permanent adhesive.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

#### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until Substantial Completion; repair or replace damaged items.

END OF SECTION 10 14 00

## SECTION 10 21 13 - TOILET COMPARTMENTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Toilet compartments.
- B. Urinal screens.

#### 1.02 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

#### 1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

#### 1.04 SUBMITTALS

- A. Product Data: Provide data on panel construction, hardware, and accessories.
- B. Samples: Submit two samples of partition panels, 8 x 8 inch in size illustrating panel finish, color, and sheen.
- C. Manufacturer's Installation Instructions: Indicate perimeter conditions requiring special attention.
- D. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

### PART 2 PRODUCTS

#### 2.01 SUBSTITUTIONS

- A. Refer to Section 01 60 00 - Product Requirements.

#### 2.02 MANUFACTURERS

- A. Solid Plastic Toilet Compartments:
  - 1. Ampco Products, Inc: [www.ampco.com](http://www.ampco.com).
  - 2. Metpar Corp: [www.metpar.com](http://www.metpar.com).
  - 3. Scranton Products (Santanta/Comtec/Capital); [www.scrantonproducts.com](http://www.scrantonproducts.com).

#### 2.03 GENERAL REQUIREMENTS

- A. Manufacturer shall ensure that accessible units comply with ADA Standards in every respect.

#### 2.04 SOLID PLASTIC COMPONENTS

- A. Toilet Compartment Suspension: Floor-mounted, headrail-braced.
- B. Solid molded phenolic plastic panels, doors, and pilasters.
  - 1. Solid color throughout.
- C. Solid molded high density polyethylene (HDPE) plastic panels, doors, and pilasters.
  - 1. Solid color throughout.
- D. Color: To be selected by Architect.
- E. Finish: Smooth
- F. Door and Panel Dimensions:
  - 1. Thickness: 1 inch.
  - 2. Door Width: 30 inch.
  - 3. Door Width for Handicapped Use: 36 inch wide, out-swinging.
  - 4. Height: 55 inch; locate bottom edge 14 inches above finish floor.
  - 5. Thickness of Pilasters: 1 inch.
- G. Urinal Screens: Wall mounted with two panel brackets.
- H. Brackets: Polished stainless steel.

## 2.05 ACCESSORIES

- A. Pilaster Shoes: Formed chromed steel with polished finish, 3 inch high, concealing floor and ceiling fastenings.
  - 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Head Rails: Hollow chrome-plated steel tube, 1 x 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.
- C. Attachments, Screws, and Bolts: Stainless steel, tamper proof.
- D. Hardware: Polished chrome plated non-ferrous cast metal:
  - 1. Continuous hinges.
  - 2. Thumb turn or sliding door latch with exterior emergency access feature.
  - 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
  - 4. Coat hook with rubber bumper; one per compartment, mounted on door.
  - 5. Provide door pull for outswinging doors.
  - 6. Provide complete ADA compliant hardware for accessible units.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify conditions before starting work.
- B. Verify that field measurements are as indicated.
- C. Verify correct spacing of and between plumbing fixtures.
- D. Verify correct location of built-in framing, anchorage, and bracing.

### 3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

### 3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

### 3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION 10 21 13

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Commercial shower and bath accessories.
- C. Residential toilet, shower, and bath accessories.
- D. Under-lavatory pipe supply covers.
- E. Electric hand/hair dryers.
- F. Diaper changing stations.
- G. Utility room accessories.

1.02 RELATED REQUIREMENTS

- A. Section 10 21 13 - Toilet Compartments.
- B. Section 22 40 00 - Plumbing Fixtures: Under-lavatory pipe and supply covers.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ASTM C1036 - Standard Specification for Flat Glass; 2016.
- E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- G. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004, with Editorial Revision (2016).
- H. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

- A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- B. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Commercial Toilet, Shower, and Bath Accessories:
  - 1. AJW Architectural Products; \_\_\_\_\_: [www.ajw.com/#sle](http://www.ajw.com/#sle).
  - 2. American Specialties, Inc; \_\_\_\_\_: [www.americanspecialties.com/#sle](http://www.americanspecialties.com/#sle).
  - 3. Bradley Corporation; \_\_\_\_\_: [www.bradleycorp.com/#sle](http://www.bradleycorp.com/#sle).
  - 4. Bobrick: [www.bobrick.com/](http://www.bobrick.com/).
- B. Residential Toilet, Shower, and Bath Accessories:
  - 1. Ginger by Brasstech Inc; \_\_\_\_\_: [www.gingerco.com/#sle](http://www.gingerco.com/#sle).

2. Seachrome Corporation; \_\_\_\_\_: [www.seachrome.com/#sle](http://www.seachrome.com/#sle).
3. Approved Equal.
- C. Under-Lavatory Pipe Supply Covers:
  1. Plumberex Specialty Products, Inc; \_\_\_\_\_: [www.plumberex.com/#sle](http://www.plumberex.com/#sle).
- D. Electric Hand/Hair Dryers:
  1. Excel Dryer; Xlerator: [www.exceldryer.com/#sle](http://www.exceldryer.com/#sle).
  2. American Specialties; Turbo-Dri, Model #0197.
  3. Dyson Airblade, Model #AB02.
- E. Diaper Changing Stations:
  1. American Specialties, Inc; \_\_\_\_\_: [www.americanspecialties.com/#sle](http://www.americanspecialties.com/#sle).
  2. Bradley Corporation; \_\_\_\_\_: [www.bradleycorp.com/#sle](http://www.bradleycorp.com/#sle).
  3. Koala Kare Products; \_\_\_\_\_: [www.koalabear.com/#sle](http://www.koalabear.com/#sle).

## 2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- F. Adhesive: Two component epoxy type, waterproof.
- G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

## 2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.

## 2.04 COMMERCIAL TOILET ACCESSORIES

- A. Roll paper Towel Dispenser, Trash Receptacle, Soap Dispenser, Sanitary Napkin Dispenser, Toilet Paper Dispenser to be provided and installed by Owner.
- B. Shelf for personal items
  1. Size: 36" wide x 12" deep
  2. Finish: Plastic Laminate to match toilet compartments or Solid Surface to match counter. Coordinate finish with Owner.
- C. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
  1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
  2. Size: As indicated on drawings.
  3. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
  4. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
- D. Grab Bars: Stainless steel, smooth surface.
  1. Standard Duty Grab Bars:
    - a. Push/Pull Point Load: 250 pound-force, minimum.
    - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
    - c. Finish: Satin.
    - d. Length and Configuration: As indicated on drawings.

## 2.05 COMMERCIAL SHOWER AND BATH ACCESSORIES

- A. Coat Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish. Surface mount to inside of toilet partition door.

## 2.06 RESIDENTIAL TOILET, SHOWER, AND BATH ACCESSORIES

- A. Toilet Paper Holder: Surface mounted, single roll, concealed attachment.
  - 1. Material: Stainless steel; satin finish.
  - 2. Type: Straight post holder.
- B. Towel Bar: Square tubular bar; rectangular mounting posts, concealed attachment.
  - 1. Mounting Post Material: Stainless steel; satin finish.
  - 2. Bar Material: Stainless steel; satin finish.
  - 3. Length: 24 inches at Resident Manager Apartment.
  - 4. Length: 12 inches adjacent to sink for hand towels in all Units.
  - 5. Refer to drawings for mounting heights.
- C. Towel Bar: Double, square tubular bar; rectangular mounting posts, concealed attachment.
  - 1. Mounting Post Material: Stainless steel; satin finish.
  - 2. Bar Material: Stainless steel; satin finish.
  - 3. Length: 32 inches at Residential Units.
- D. Shower Curtain Rod: Straight tube, 1 inch diameter, with mounting flanges for concealed attachment.
  - 1. Material: Stainless steel; satin finish.
  - 2. Length: 48 inches.
  - 3. Length: 60 inches at ADA units -refer to drawings.
- E. Robe Hook: Single-prong, concealed attachment.
  - 1. Material: Stainless steel; satin finish.

## 2.07 UNDER-LAVATORY PIPE AND SUPPLY COVERS

- A. Specified in 22 40 00 - Plumbing Fixtures.

## 2.08 ELECTRIC HAND/HAIR DRYERS

- A. Electric Hand Dryers: Traditional fan-in-case type, with downward fixed nozzle.
  - 1. Operation: Automatic, sensor-operated on and off.
  - 2. Mounting: Surface mounted.
  - 3. Cover: Stainless steel with brushed finish.
    - a. Tamper-resistant screw attachment of cover to mounting plate.
  - 4. Electric Hand Dryer Products:
    - a. ~~Excel Dryer, Inc; XLERATOR: www.exceldryer.com/#xls.~~
    - b. ~~American Specialties, Turbo Dri; #0107.~~
    - c. Dyson; Airblade, #AB02.
    - d. Substitutions: Section 01 60 00 - Product Requirements.

## 2.09 DIAPER CHANGING STATIONS

- A. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
  - 1. Material: Polyethylene.
  - 2. Mounting: Surface.
  - 3. Color: As selected.
  - 4. Minimum Rated Load: 250 pounds.

## 2.10 UTILITY ROOM ACCESSORIES

- A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
  - 1. Drying rod: Stainless steel, 1/4 inch diameter.
  - 2. Hooks: Two, 0.06 inch stainless steel rag hooks at shelf front.

3. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
4. Length: 36 inches.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.

#### 3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

#### 3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated. Refer to drawings for all mounting heights.

#### 3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION 10 28 00



SECTION 10 44 00 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.

1.02 REFERENCES

- A. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 PERFORMANCE REQUIREMENTS

- A. Provide extinguishers classified and labeled by testing firm acceptable to the Fire Marshall for the purpose specified and indicated.

1.04 SUBMITTALS

- A. Product Data.
- B. Maintenance Data: Include test, refill, or recharge schedules and re-certification requirements.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

- A. Refer to Section 01 60 00 - Product Requirements.

2.02 MANUFACTURERS

- A. Fire Extinguishers, Cabinets and Accessories:
  - 1. JL Industries, Inc.: [www.jlindustries.com](http://www.jlindustries.com).
  - 2. Larsen's Manufacturing Co.: [www.larsensmfg.com](http://www.larsensmfg.com).
  - 3. Potter-Roemer: [www.potterroemer.com](http://www.potterroemer.com).

2.03 FIRE EXTINGUISHERS

- A. Provide units labeled by UL (DIR).
- B. Dry Chemical Multi-Purpose Type: Steel cylinder.
  - 1. Size: 4A60BC.
  - 2. Diameter: 5 inches.
  - 3. Finish: Powder coat, red color.

2.04 CABINETS FOR DRY TYPE MULTI-PURPOSE FIRE EXTINGUISHERS

- A. Style: Vertical Duo.
- B. Trim: Flat, 1 inch-wide face.
- C. Semi-Recessed Cabinet Rated for 1 & 2 Hour Walls:
  - 1. Exterior nominal dimensions of 13 inches wide x 28 inches high x 7 inches deep.
  - 2. Finish: Primed for Field Paint Finish
    - a. J.L.; Ambassador Fire-FX 1017 (2-1/2 inch projection).
    - b. Larsen's; Architectural FS 2409-6R (2-1/2 inch projection).
    - c. Potter-Roemer; Alta Steel FRC 7022 DV (2 inch projection)
- D. Door: 0.036 inch thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon catch.
- E. Door Glazing: Tempered Glass, clear, 1/8 inch thick float. Set in resilient channel gasket glazing.
- F. Finish of Cabinet Interior: White enamel.
- G. Cabinet Signage: FIRE EXTINGUISHER in black vertical letters parallel to vertical-duo window.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level, 34 inches from finished floor to inside bottom of cabinet.
- C. Secure rigidly in place.

END OF SECTION 10 44 00

SECTION 10 55 00 - POSTAL SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Central mail delivery boxes.

1.02 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. 39 CFR 111 - U.S. Postal Service Standard 4C; Current Edition.
- C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

1.03 SUBMITTALS

- A. Product Data: Provide manufacturer's specifications and descriptive literature, installation instructions, maintenance information, and current USPS approval documentation.
- B. Shop Drawings: Indicate plans for each unit or groups of units, front elevations with compartment layout and model number, overall dimensions, rough-in opening sizes, construction and anchorage details.
- C. Samples: Submit two sets of manufacturer's available colors.

1.04 WARRANTY

- A. Provide manufacturer's warranty against defects in materials or workmanship for a period of 5 years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 CENTRAL MAIL DELIVERY BOXES

- A. Manufacturers:
  - 1. Florence Manufacturing Company; \_\_\_\_\_: [www.florencemailboxes.com/#sle](http://www.florencemailboxes.com/#sle).
  - 2. Postal Products Unlimited, Inc; \_\_\_\_\_: [www.postalproducts.com/#sle](http://www.postalproducts.com/#sle).
  - 3. Salsbury Industries; \_\_\_\_\_: [www.mailboxes.com/#sle](http://www.mailboxes.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Central Mail Delivery Boxes: Provide products approved for United States Postal Service (USPS) delivery.
  - 1. Materials: Aluminum with stainless steel hardware.
  - 2. Finish: Powder coat in color selected by Architect from manufacturer's standard colors.
  - 3. Unit Types and Sizes: As indicated on drawings.
  - 4. Configurations: See drawings for overall dimensions and layouts.
- C. Wall-Mounted Mailboxes: Fully-recessed, complying with 39 CFR 111 (USPS-STD-4C).
  - 1. Unit A: Front-loading with master door, single-column design, 15 customer compartments, 1 outgoing mail compartment, and 1 parcel compartment.
    - a. Florence Manufacturing Company; Model 4C Recessed Mounted.
    - b. Postal Products Unlimited, Inc; Model 4C Recessed Mounted.
    - c. Salsbury Industries; Model 4C Recessed Mounted.

2.02 COMPONENTS

- A. Locking - Front Loading Master Door: Three-point latching mechanism with USPS master lock furnished and installed by postmaster.
- B. Locking - Customer Compartment Doors: USPS approved cam lock, 3 keys each lock.
- C. Locking - Parcel Compartment Doors: Double-lock arrangement with USPS approved cam lock for customer access, and USPS master lock furnished and installed by postmaster.

- D. Identification - Customer and Parcel Compartments: Sequential numerical or alphabetic characters, top to bottom, left to right; factory-installed.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Install postal specialties in accordance with approved shop drawings, manufacturer's instructions, and USPS requirements.
- B. Adjust and lubricate door hardware to operate properly.

END OF SECTION 10 55 00

SECTION 10 56 17 - WALL MOUNTED STANDARDS AND SHELVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shelf standards, brackets, and accessories.
- B. Closet rods for mounting on brackets.
- C. Shelves.
- D. See drawings for locations and configurations.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking in walls for attachment of standards.
- B. Section 09 21 16 - Gypsum Board Assemblies: Blocking in metal stud walls for attachment of standards.

1.03 REFERENCE STANDARDS

- A. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used.
- B. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products under cover and elevated above grade.
- B. Store products in manufacturer's unopened packaging until ready for installation.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Steel Shelf Standards, Brackets, and Accessories:
  - 1. Closet Rods: Steel tubing for wall mounting in flange fittings.
    - a. Type: Round chrome look, heavy duty; 1-1/16 inch outside diameter, 0.109 inch wall thickness.
    - b. Length: As required for application, up to 12 feet.
    - c. Provide mounting fittings to suit application.
- B. Shelving:
  - 1. Laminate Faced Shelves: Particleboard or medium density fiberboard covered with high pressure decorative laminate on both sides.
    - a. Edge Finish: Matching laminate, all four edges.
    - b. Substrate Thickness: 3/4 inch, nominal.
    - c. Laminate: NEMA LD 3 Type HGL.
    - d. Laminate Color and Pattern: To be selected by Architect from manufacturer's full line.
- C. Fasteners: Screws as recommended by manufacturer for intended application or as otherwise required by project conditions. Finish of exposed to view fasteners to match finish of standards and other components.

2.02 MATERIALS

- A. Closet Rods: Steel tubing for wall mounting in flange fittings.
  - 1. Length: As required for application, up to 12 feet.
  - 2. Provide mounting fittings to suit application.
- B. Laminate Faced Shelves: Particleboard or medium density fiberboard covered with high pressure decorative laminate on both sides.
  - 1. Edge Finish: Matching laminate, all four edges.

- C. Fasteners: Screws as recommended by manufacturer for intended application or as otherwise required by project conditions.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### 3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

#### 3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Mount standards to solid backing capable of supporting intended loads.
- C. Install brackets, shelving, and accessories.

#### 3.04 PROTECTION

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

END OF SECTION 10 56 17

SECTION 10 57 23 - CLOSET AND UTILITY SHELVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall mounted wire closet shelving.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Blocking in walls for attachment of shelving.
- B. Section 09 21 16 - Gypsum Board Assemblies: Blocking in metal stud walls for attachment of standards.

1.03 SUBMITTALS

- A. Shop Drawings: Provide drawings prepared specifically for this project; show dimensions of shelving and attachment to substrates.
- B. Selection Samples: For each color selection required, submit color chips representing manufacturer's full range of available colors and finish.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.
- C. Store flat to prevent warpage and bending.

PART 2 PRODUCTS

2.01 SHELVING APPLICATIONS

- A. Shelf Depth: 12 inches, unless otherwise indicated.
- B. Resident Manager Bedroom Closets:
  - 1. Wall-to-wall shelf with free sliding hanger rod.
- C. Resident Manager Washer/ Dryer Closet
  - 1. Wall-to-wall shelf.

2.02 MATERIALS

- A. Wire Shelving: Factory-assembled coated wire mesh shelf assemblies for wall-mounting, with all components and connections required to produce a rigid structure that is free of buckling and warping.
  - 1. Construction: Cold-drawn steel wire with average tensile strength of 100,000 psi resistance welded into uniform mesh units, square, rigid, flat, and free of dents or other distortions, with wires trimmed smooth.
  - 2. Coating: PVC or epoxy, applied after fabrication, covering all surfaces.
  - 3. PVC Coating: 9 to 11 mils thick.
  - 4. Epoxy Coating: Non-toxic epoxy-polyester powder coating baked-on finish, 3 to 5 mils thick.
  - 5. Standard Mesh Shelves: Cross deck wires spaced at 1 inch.
  - 6. Shelf and Rod Units: Integral hanging rod at front edge of shelf.
  - 7. Free-Sliding Hanging Rod: Integral hanging rod that permits uninterrupted sliding of hangers the full width of the shelf.
- B. Mounting Hardware: Provide manufacturer's standard mounting hardware; include support braces, wall brackets, back clips, end clips, poles, and other accessories as required for complete and secure installation; factory finished to match shelving.
- C. Fasteners: As recommended by manufacturer for mounting substrates.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Inspect areas to receive shelving, to verify that spaces are properly prepared to receive shelf units, and are of dimensions indicated on shop drawings.
- B. Verify appropriate fastening hardware.
- C. Do not begin installation until substrates have been properly prepared.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### 3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

#### 3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, with shelf surfaces level.
- B. Cap exposed ends of cut wires.
- C. Install back clips, end clips at side walls, and support braces at open ends. Install intermediate support braces as recommended by manufacturer.
- D. Mounting Heights:
  - 1. Single Hanging Rod Units: Install shelf at 68 inches above floor.
  - 2. Other Shelves: Install W/D Room shelving at 60" AFF.

#### 3.04 CLEANING

- A. Clean soiled surfaces after installation.

#### 3.05 PROTECTION

- A. Protect installed work from damage.
- B. Touch-up, repair, or replace damaged products before Substantial Completion in a manner that eliminates evidence of replacement.

END OF SECTION 10 57 23



## **SECTION 10 73 16**

### **CANOPIES**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. Provide system engineering, design and manufacture of canopies to the profiles and limits indicated on the drawings. Provide entire system including, columns, beams, roof deck, finish materials, trim and all accessories for complete installations.

##### **1.02 RELATED SECTIONS**

- A. Metal Roofing: Section 07 41 13.
- B. Painting: Section 09 91 00.
- C. Translucent Panels: Section 08 45 15.

##### **1.03 QUALITY ASSURANCE**

- A. Manufacturer must have a minimum of ten years experience in the field of manufacturing and installing extruded aluminum walkway cover systems.
- B. Installer: Approved or certified by manufacturer.

##### **1.04 SUBMITTALS**

- A. Certifications: Provide design calculations or a letter of design certification signed and sealed by an engineer registered by the State of [Ohio] for the structural framing system, roof covering panels and foundation design.
- B. Shop Drawings: Submit anchor bolt layouts, framing plans and necessary sections and details.
  - 1. Provide erection drawings bearing the seal of a professional engineer registered in the State of [Ohio].
  - 2. Provide layouts of roofing panels, edge conditions, panel joints, corners, trims and flashing.
- C. Product Data: Submit for system.

1.05 DESIGN LOADS

- A. The following design loads shall be used in addition to the building dead load:
  - 1. Snow Load: Comply with OBC.
  - 2. Wind Load: As required by OBC @ 80 mph winds, exposure 8.
  - 3. Dead Load: Weight of metal canopy materials.
- B. Load Application
  - 1. Live Loads: Applied on the horizontal projection of the roof in accordance with the OBC.
  - 2. Wind Loads: Applied as pressure and suction in accordance with the OBC.
- C. Combination of Loads: Design building for the following load combinations:
  - 1. Dead load and live load.
  - 2. Dead load and wind load.
- D. Deflection of structural members due to live load: Maximum L/240.
- E. Deflection of roofing panels: Maximum L/240 due to live load or wind load.

1.06 WARRANTY

- A. Provide canopy manufacturer's warranty guaranteeing the system against defects in material or workmanship for two years from date of acceptance and shall repair or replace as required within that time period.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened and labeled packages.
- B. Comply with manufacturer's recommendations for handling and protection during installation.

**PART 2 PRODUCTS**

2.01 DESCRIPTIONS

- A. Basis of Design: Drawings and specifications are based on MAPES Super Lumishade hanger supported canopy with "J" style edge.

2.02 MANUFACTURERS

- A. Canopies manufactured by E. L. BURNS, AMERICAN ALUMINUM PRODUCTS, DITTMER ARCHITECTURAL ALUMINUM, MAPES or PERFECTION ARCHITECTURAL SYSTEMS, INC. are acceptable if their performance and

materials meet the requirements specified herein and their profiles and shapes meet those indicated on the drawings.

2.03 MATERIALS

A. Structural Sections

1. Aluminum: Extrusions, 6063 alloy heat-treated to a T-6 temper. Dip-coat column ends with clear acrylic enamel (to insulate column ends from electrolytic reaction with grout).
2. Steel
  - a. Steel Shapes, Bars and Plates: ASTM A36.
  - b. Steel Plates to be Bent or Cold Formed: ASTM A283, Grade C.
  - c. Steel Tubing: ASTM A500, Grade A, cold-formed; or ASTM A501, hot-formed.

B. Roof Deck: Steel or extruded aluminum interlocking, self-flashing. Provide deck with a positive camber sufficient to off-set deadload deflection.

C. Fasteners

1. Deck Screws: Type 18-8 stainless steel sealed with neoprene "O" ring beneath stainless steel flat washers.
2. Trim Rivets: Aluminum.

D. Grout: 3:1 Portland cement to masonry sand, 2000 pound compressive strength.

2.03 FRAMING CONSTRUCTION

A. Shop weld beams and columns into rigid, one-piece units.

2.05 FINISH

- A. Aluminum Surfaces Factory painted to match Steel members
- B. Steel Members: Solvent clean; provide one coat of vinyl wash-etch primer (Mil. #125-880) and a one mil minimum coating of exterior grade, two-part, polyurethane.
  1. Colors as selected by Architect.

2.06 ACCESSORIES

A. Provide all accessories, fasteners, flashing and other items as necessary for a complete installation.

**PART 3 EXECUTION**

3.01 ERECTION

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

**END OF SECTION**

## **SECTION 10 82 13**

### **ROOF TOP EQUIPMENT SCREENS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Pre-formed [thermoplastic] [painted metal] [perforated metal] panel for enclosing roof top mechanical equipment.
  - 2. Aluminum assembly framing for direct attachment of screening panels to mechanical equipment; no base or curb required unless shown otherwise on drawings.
  - 3. Sliding panels to permit easy access to mechanical equipment for servicing.
- B. Products Not Installed or Furnished in This Section:
  - 1. Touch-up painting required for scratches and screw heads.
  - 2. Field painting of prime painted screens

##### **1.2 REFERENCES**

- A. American Society for Testing and Materials: Standard Specifications for
  - 1. ASTM B 221-96 - Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire Profiles, and Tubes.
- B. The Aluminum Association, Inc.
  - 1. AA ADM-1516166 (1994) - Aluminum Design Manual
- C. American Society of Civil Engineers.
  - 1. ASCE 7-95 - Minimum Design Loads for Buildings and Other Structures.

##### **1.3 SYSTEM DESCRIPTION**

- A. Design Criteria:
  - 1. Manufacturer is responsible for the structural design of all materials, assembly and attachments to resist snow, wind, suction and uplift loading at any point without damage or permanent set.
  - 2. Framing shall be designed in accordance with the Aluminum Design Manual to resist the following loading:
    - a. ASCE 7-95 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers.

##### **1.4 SUBMITTALS**

- A. Product Data: Submit manufacturer's catalog data, detail sheets, specification and other data sufficient to indicate compliance with these specifications.
- B. Shop Drawings: Indicate layouts heights, component connection details, and details of interface with adjacent construction. Mark data to indicate:
  - 1. Roof top mechanical equipment to be enclosed.
- C. Samples:
  - 1. Samples of Materials: [thermoplastic] [painted metal] [perforated metal]
  - 2. Color Selection: Submit paint chart with full range of colors available for Architect's

selection.

- D. Certification: Manufacturer's Certificate of Compliance certifying that thermoplastic panels supplied meet or exceed requirements specified.
- E. Closeout Submittals: Warranty documents, issued and executed by manufacturer, countersigned by Contractor.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with requirements of building authorities having jurisdiction in Project location.
- B. Manufacturer Qualifications: Minimum five (5) years documented experience producing systems specified in this section.
- C. Pre-Installation Meeting:
  - 1. Convene at job site seven (7) calendar days prior to scheduled beginning of construction activities of this section to review requirements of this section.
  - 2. Require attendance by representatives of the installing subcontractor, (who will represent the system manufacturer) and other entities directly affected by construction activities of this section.
  - 3. Notify Architect four (4) calendar days in advance of scheduled meeting date.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
- B. Storage and Handling: Protect materials and finishes during handling and installation to prevent damage.

#### 1.7 PROJECT CONDITIONS

- A. Field Measurements: Take measurements of actual roof top unit for fit without gaps. Indicate measurements on shop drawings fully documenting any field condition that may interfere with the screen system installation.

#### 1.8 COORDINATION

- A. Installer for work under this Section shall be responsible for coordination of panel and framing sizes and required options with the Contractor's requirements.
  - 1. Request information on sizes and options required from the Contractor.
- B. Submit shop drawings to the Contractor and obtain written approval of shop drawing from the Contractor prior to fabrication.

#### 1.9 WARRANTY

- A. If any part of the rooftop equipment screen fails because of a manufacturing defect within one year from the date of substantial completion, the manufacturer will furnish without charge the required replacement part(s). Any local transportation, related service labor or diagnostic call charges are not included.
- B. This warranty does not cover failure of your rooftop equipment screen if it is damaged by the Owner, or if the failure is caused by improper installation. In no event shall Warrantor be liable for incidental or consequential damages.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Products: Envisor Screening System by CityScapes Incorporated, 4200 Lyman Ct. Hilliard, OH 43026. 1-877-727-3367 [www.cityscapesinc.com](http://www.cityscapesinc.com)
- B. Substitutions: Submit in accordance with Section 01 25 00 [01600].

### **2.2 MATERIALS**

- A. Painted Metal Panels: Fabricated from rigid aluminum panels in multiple thicknesses.
  - 1. Minimum thickness: 0.063
- B. Framing: Aluminum Plate, Shapes and Bar: ASTM B 221, alloy 6061-T5 or 6063-T5.
- C. Threaded Fasteners: All screws, bolts, nut and washers shall be Stainless steel.
  - 1. Corner assembly fasteners shall be #10-16 x stainless steel TEK screws. Length as required to develop full holding capacity of screw when fastened to Mechanical Equipment.
  - 2. Provide lock washer or other locking device at all bolted connections.

### **2.3 FABRICATION**

- A. Provide factory-formed panel systems with continuous interlocking panel connections and indicated or necessary components: Form all components true to shape, accurate in size, square and free from distortion or defects. Cut panels to precise lengths indicated on approved shop drawings.
- B. Fabricate all panels to slide horizontally to allow access to unit access panels behind.
- C. Panel Design, Style, Trim:
  - 1. Panel Style: Vertical
  - 2. Panel Design: AcryliCap:[7.2 Rib [Vertical Rib
  - 3. Decorative Top Trim Profile: Step 1
- D. Trim and Closures: Fabricated from 24 gage metal, and finished with the manufacturers standard coating system, unless shown otherwise on drawings.
- E. Framing: Fabricate and assemble components in largest practical sizes, for delivery to the site.
  - 4. Construct corner assemblies to required shape with joints tightly fitted.
  - 5. Supply components required for anchorage of framing. Fabricate anchors and related components of material and finish as required, or as specifically noted.

### **2.4 FINISHES**

- A. Aluminum Framing: Mill finish.
- B. Panel Coating: Manufacturer's standard coating system, factory-applied.
  - 1. Color: Selected from full range of manufacturer's standard colors.
  - 2. [Color: Custom color as selected by Architect.]

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Installer's Examination: Examine conditions under which construction activities of this section are to be performed.
  - 1. Submit written notification to Architect and Screen manufacturer if such conditions are unacceptable.
  - 2. Beginning erection constitutes installer's acceptance of conditions.

### 3.2 INSTALLATION

- A. Install units in accordance with the manufacturer's instructions and approved shop drawings. Keep perimeter lines straight, plumb, and level. Provide brackets, anchors, and accessories necessary for a complete installation.
- B. Fasten structural supports to HVAC units without damaging operation of the unit.
  - 1. Provide corner and mid-span assemblies as required by approved shop drawings so that the panels are supported uniformly.
  - 2. Fastening bottom rail using bolts to permit ease of access to HVAC units.
- C. Insert thermoplastic panels into structural supports, except where fixed attachment points are indicated. Butt thermoplastic panels to adjacent panels for uniform fit. Fasten fixed panels in accordance with the shop drawings.
- D. Metal Separation: Where aluminum materials would contact dissimilar materials, insert rubber grommets at attachment points, thus eliminating where dissimilar metals would otherwise be in contact.
- E. Do not cut or abrade finishes which cannot be restored. Return items with such finishes to shop for required alterations.

### 3.3 ERECTION TOLERANCES

- A. Maximum misalignment from true position:  $\frac{1}{4}$  inch (6 mm).

### 3.4 CLEANING AND PROTECTION

- A. Remove all protective masking from material immediately after installation.
- B. Protection:
  - 1. Ensure that finishes and structure of installed systems are not damaged by subsequent construction activities.
  - 2. If minor damage to finishes occurs, repair damage in accordance with manufacturer's recommendations; provide replacement components if repaired finishes are unacceptable to Architect.
- C. Prior to Substantial Completion: Remove dust or other foreign matter from component surfaces; clean finishes in accordance with manufacturer's instructions.
  - 1. Clean units in accordance with the manufacturer's instructions.

**END OF  
SECTION**



SECTION 12 21 13 - HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Horizontal slat louver blinds.
- B. Operating hardware.

1.02 REFERENCE STANDARDS

- A. WCMA A100.1 - Safety of Window Covering Products; 2018.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the placement of concealed blocking to support blinds. See Section 06 10 00.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating physical and dimensional characteristics.
- C. Shop Drawings: Indicate opening sizes, tolerances required, method of attachment, clearances, and operation.
- D. Samples: Submit two samples, 4 inch long illustrating slat materials and finish, cord type and color.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Blind Assemblies: One of each size.
  - 3. Extra Slats: 20 of each type and size.
  - 4. Extra Lift Cords, Control Cords, and Wands: One of each type.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Horizontal Louver Blinds:
  - 1. Hunter Douglas Architectural; CD Model: [www.hunterdouglasarchitectural.com/#sle](http://www.hunterdouglasarchitectural.com/#sle).
  - 2. Levolor; Stock Aluminum: [www.levolor.com/commercial/#sle](http://www.levolor.com/commercial/#sle).
  - 3. SWFcontract, a division of Spring Window Fashions, LLC; \_\_\_\_:  
[www.swfcontract.com/#sle](http://www.swfcontract.com/#sle).

2.02 BLINDS

- A. Description: Horizontal slat louvers hung from full-width headrail with full-width bottom rail.
- B. Manual Operation: Control of raising and lowering by cord with full range locking; blade angle adjustable by control wand.
- C. Metal Slats: Spring tempered pre-finished aluminum; square slat corners, with manufacturing burrs removed.
  - 1. Width: 1 inch.
  - 2. Thickness: 0.008 inch.
  - 3. Color: As selected by Architect.
- D. Slat Support: Woven polypropylene cord, ladder configuration.
- E. Head Rail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats.
  - 1. Color: Same as slats.
- F. Bottom Rail: Pre-finished, formed steel; with end caps.
  - 1. Color: Same as headrail.
- G. Lift Cord: Braided nylon; continuous loop; complying with WCMA A100.1.

1. Free end weighted.
  2. Color: As selected by Architect.
  - H. Control Wand: Extruded hollow plastic; hexagonal shape.
    1. Non-removable type.
    2. Length of window opening height less 3 inch.
    3. Color: Clear.
  - I. Headrail Attachment: Wall brackets.
  - J. Accessory Hardware: Type recommended by blind manufacturer.
- 2.03 FABRICATION
- A. Determine sizes by field measurement.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that openings are ready to receive the work.

#### 3.02 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with flush countersunk fasteners.

#### 3.03 ADJUSTING

- A. Adjust blinds for smooth operation.

#### 3.04 CLEANING

- A. Clean blind surfaces just prior to occupancy.

#### 3.05 SCHEDULE

- A. All residential unit windows to receive blinds.

END OF SECTION 12 21 13

## SECTION 12 24 13 - WINDOW SHADE SYSTEMS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Manually-operated window shades and accessories.
- B. Motorized window shades and accessories.

#### 1.02 SUBMITTALS

- A. Product Data: Manufacturer's catalog data, product descriptions, installation instructions, detail sheets, and specifications for each type system specified.
  - 1. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, and instructions for operating hardware and controls.
- B. Samples for Verification: Shade fabric sample and paint finish as selected.
- C. Shop Drawings: Show dimensions and interface with other products.
  - 1. Room schedule including field-verified dimensions of each opening to receive window shade system.
  - 2. Use same room designations as indicated on Drawings. Key to typical mounting details.
  - 3. Indicate model number, operator, fabric selection, and mounting type.
  - 4. Indicate control type and provide zone schedule if necessary.
  - 5. Wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.
- D. Closeout Submittals:
  - 1. Warranty.

#### 1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience installing products comparable to those specified in this section.
- B. Mock-up: Provide a mock-up of each window shade system for evaluation of mounting, appearance and accessories.
  - 1. Mock-up may remain as part of the work.
  - 2. Locate mock-up in window designated by the Architect.
  - 3. Do not proceed with remaining work until, mock-up is accepted by the Architect.

#### 1.04 WARRANTY

- A. Roller shade hardware, chain and shade fabric: Manufacturer's standard warranty.
- B. Roller shade motors and motor control systems: Manufacturer's standard warranty.

#### 1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Install roller shades after finish work, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for project when occupied for its intended use.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in manufacturer's original cartons.
- B. Individually package and mark shades with room number and opening number.
- C. Inspect the materials upon delivery to assure that specified products have been received.
- D. Store and handle shades to prevent damage to fabrics, finishes, and operators prior to installation.

### PART 2 PRODUCTS

#### 2.01 SUBSTITUTIONS

- A. Refer to Section 01 60 00 - Product Requirements.

## 2.02 MANUFACTURERS

- A. Mechoshade: [www.mechoshade.com](http://www.mechoshade.com).
- B. Approved Equal.

## 2.03 SHADE SYSTEMS

System 1: Motorized window shade, Fabric 1, regular roll direction, mounted outside window frame, SELECT control.

System 2: Manual window shade, Fabric 1, regular roll direction, mounted outside window frame, SELECT control.

## 2.04 FABRIC

- A. Fabric 1: Solar Control.
  - 1. Mechoshade, 1350, EcoVeil:
    - a. Openness factor: 5%
    - b. Color: TBD

## 2.05 MANUALLY OPERATED WINDOW SHADE SYSTEM

- A. Products:
  - 1. Mechoshade; Mecho/5 System.
  - 2. Approved Equal.
- B. Chain Operation: Bi-directional wrap spring clutch shall allow for shade to stop and hold at any position.
- C. Chain Operator Position: Right-hand side, unless otherwise noted on drawings.
- D. Bead Chain: No. 10 stainless steel.
- E. Clutch mechanism: Fabricated from high carbon steel.
  - 1. Components fabricated from styrene based plastics, polyester or reinforced polyester are not acceptable.

## 2.06 MOTORIZED WINDOW SHADE SYSTEM

- A. Products:
  - 1. Mechoshade; Electroshade.
  - 2. Approved Equal.
- B. Operation: Motorized control system shall allow for shades to be in fully up or fully down position, one stop position aligned with horizontal mullion, and shall allow for local override.
- C. Shade Motors:
  - 1. Tubular, asynchronous (non-synchronous) motors, with built-in reversible capacitor operating at 110v AC (60hz), single phase, temperature Class A, thermally protected, totally enclosed, maintenance free with line voltage power supply equipped with locking disconnect plug assembly furnished with each motor.
  - 2. Conceal motors inside shade roller tube.
  - 3. Maximum current draw for each shade motor of 2.3 amps.
- D. Solar Control: Shades on different elevations within one room or open space shall operate independently.
- E. Control:
  - 1. Integrated with building automation system.
    - a. Group controlled zones as indicated on the Drawings.

## 2.07 SHADE COMPONENTS

- A. Rollers:
  - 1. Shade roller tube shall be extruded aluminum of diameter and wall thickness required to support shade fabric. Maximum allowable deflection  $L/700$ .
  - 2. Rollers shall be easy to remove from support brackets.
- B. Mounting Brackets: Stamped steel, custom fabricated as required for mounting style indicated.

- C. Hembar: Concealed.
  - 1. Shape: Manufacturer's standard.
  - 2. Finish: Match window frame.

#### 2.08 ACCESSORIES

- A. Finish for accessories, unless otherwise noted: Clear anodized aluminum.
- B. Fascia: L-shaped extruded aluminum shall conceal mounting hardware, roller tube, and fabric rolled on tube.
- C. Fascia/Pocket End Caps: Provide end caps where mounting conditions expose outside of roller shade brackets.

#### 2.09 SHADE FABRICATION

- A. Shades mounted outside window frame: Shade fabric shall overlap window opening 3/4 inch.
- B. Shade fabric shall hang flat without buckling or distortion and in the same direction.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Correct unsatisfactory substrates before proceeding.

#### 3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Verify that blocking and framing necessary to carry shade assembly hardware is properly installed and secure.

#### 3.03 INSTALLATION

- A. Install window shade systems level, plumb, square and true according to manufacturer's written instructions and these specifications.
- B. Provide power panels and circuits of sufficient size to accommodate roller shade manufacturer's requirements, as indicated on the mechanical and electrical drawings.
- C. Adjust and balance roller shades to operate smoothly, safely and free from binding or malfunction throughout entire operational range.
- D. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- E. Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

#### 3.04 PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION 12 24 13



SECTION 12 36 00 - COUNTERTOPS AND WINDOW STOOLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid Surface Countertops.
- B. Solid Surface Countertops with Undermount Sinks.
- C. ~~Solid Surface Window Stools.~~
- D. Quartz Surface Countertops.
- E. Quartz Surface Countertops with Undermount Sinks.

1.02 REFERENCES

- A. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- B. PS 1 - Structural Plywood; 2009.

1.03 SUBMITTALS

- A. Product Data: Provide data on specified component products.
- B. LEED Documentation: Submit information required by Section 01 35 31 for the following targeted credits:
  - 1. Credit MR 4: Materials and Resources - Recycled Content.
  - 2. Credit EQ 4.1: Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
- C. Samples: Submit two samples of countertop, 2 x 2 x 1/2 inch in size, illustrating color, texture, and finish.
- D. Shop Drawings: Indicate dimensions, thicknesses, backsplashes, sidesplashes, required clearances, materials, colors, finishes, field jointing, adjacent construction, design load parameters, methods of support, and anchorages.
  - 1. Indicate integration of plumbing components.
- E. Manufacturer's Installation Instructions.
  - 1. Indicate preparation of opening required.
- F. Maintenance Data: Indicate list of approved cleaning materials and procedures required; list of substances that are harmful to component materials.
  - 1. Include instructions for stain removal, surface and gloss restoration.

1.04 QUALITY ASSURANCE

- A. Fabricator: Manufacturer's authorized fabricator.

1.05 PROJECT CONDITIONS

- A. Verify that field measurements are as indicated.
- B. Sequence Work to permit installation of plumbing rough-in.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

- A. Refer to Section 01 60 00 - Product Requirements.

2.02 LEED REQUIREMENTS

- A. Materials and Resources - Recycled Content.
- B. Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
  - 1. Multipurpose Construction Adhesives: not more than 70 g/l.

2.03 SOLID SURFACE MATERIAL

- A. Manufacturers:

1. DuPont Corian.
  2. Formica Corporation.
  3. Wilsonart International.
- B. Solid Surface Sheet: Non-porous blend of polyester or acrylic alloys and fillers.
1. Comply with ISFA 2-01.
  2. Capable of being worked and repaired using standard woodworking tools.
  3. No surface coating. Color and pattern consistent throughout thickness.
- C. Flat Sheet Thickness: 1/2 inch sheet thickness. Provide total thickness indicated on drawings.
- D. Color: As scheduled, or as selected by the Architect from manufacturer's full range.
- E. Joint Adhesive: Manufacturer's standard adhesive to create invisible, nonporous joints with a chemical bond.
- F. Sinks: Refer to Division 15 section for undermount and top mounted sinks.
- G. Bowl Mounting Hardware: Manufacturer's approved bowl clips, brass inserts, and fasteners for attachment of undermount bowls.
- H. Supporting Substrate: Plywood, PS 1 Exterior Type, AC veneer grade, minimum 5-ply; not less than 3/4 inch thick.
1. Join lengths using metal splines.
  2. Provide cutouts in plywood for heat release as required by manufacturer.

#### 2.04 QUARTZ SURFACE MATERIAL

- A. Manufacturers:
1. Cambria USA.
  2. Dupont, Zodiaq.
  3. Cosentino USA, Silestone.
  4. Caesarstone USA, Inc.
- B. Quartz Sheet: Homogeneous quartz and resin matrix.
- C. Thickness: 3 cm (1-3/16" nominal) sheet thickness. Provide total thickness and profile indicated on drawings.
- D. Color: As scheduled, or as selected by the Architect from manufacturer's full range.
- E. Joint Adhesive: Manufacturer's standard two-part epoxy, polyester, or acrylic adhesive to create color matched, nonporous joints, with a chemical bond.
- F. Panel Adhesive: Manufacturer's structural silicone adhesive.
- G. Sink Mounting Hardware: Manufacturer's approved sink clips, brass inserts and fasteners for attachment of undermount sinks.
- H. Sealant: Mildew resistant silicone sealant specified in Section 07 90 00.
1. Color: Match quartz surface.
- I. Sinks: Refer to Division 23 section for undermount and top mounted sinks.

#### 2.05 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
- B. Edge Detail: As indicated on drawings.
- C. Provide holes and cutouts for plumbing accessories as indicated on shop drawings.
- D. Solid Surface:
1. Form joints between components using manufacturer's standard joint adhesive. Joints shall be invisible in appearance and without voids. Attach 4 inch wide reinforcing strip under joints as required by manufacturer.
  2. Rout and finish component edges to a smooth, uniform finish.
  3. Rout cutouts then sand edges smooth.
- E. Quartz Surfaces:



1. Form joints between components using manufacturer's standard joint adhesive. Provide joints no greater than 1/8 inch wide and without voids. Provide 4 inch wide support along entire seam.
2. Machine and finish component edges to a smooth, high gloss, uniform finish.
3. Rout cutouts then finish edges smooth.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Examine substrates. Identify conditions detrimental to proper or timely installation. Do not commence installation until conditions have been corrected.

#### 3.02 INSTALLATION

- A. Install components plumb, level true and straight in accordance with approved shop drawings, project installation details and manufacturer's printed instructions. Shim as necessary using concealed shims.
- B. Provide inconspicuous joints in finished work.

#### 3.03 INSTALLATION - COUNTERTOPS

- A. Attach top securely to base unit or support brackets.
- B. Provide side splashes where countertops abut vertical walls.
- C. Provide back splashes where countertops abut vertical walls.
- D. For solid surface backsplashes, provide hard seamed coved backsplash with 1/4 inch radius.
- E. Seal between wall and back and side splashes with sealant specified in Section 07 90 00.
- F. Adhere undermount sinks to countertop using manufacturer's recommended adhesive and mounting hardware.
- G. Coordinate plumbing installation with Division 23.

#### 3.04 ~~INSTALLATION - WINDOW STOOLS~~

#### 3.05 CLEANING

- A. Clean fabrication surfaces in accordance with manufacturer's instructions.

#### 3.06 PROTECTION OF FINISHED WORK

- A. Protect surfaces from damage until date of Substantial Completion. Replace damaged components that cannot be repaired to Architect's satisfaction.
- B. Review maintenance procedures with Owner's representative upon completion of project.

END OF SECTION 12 36 00



SECTION 12 48 13 - ENTRANCE FLOOR MATS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet mat.

1.02 SUBMITTALS

- A. Product Data: Provide data indicating properties of walk-off surface, component dimensions.
- B. Shop Drawings: Indicate dimensions.
  - 1. For recessed frames located within a dimensionally restricted area, show dimensions of space within which the frame will be installed.
- C. Maintenance Data: Include cleaning instructions, \_\_\_\_\_, and stain removal procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Floor Mats:
  - 1. BASIS OF DESIGN: Waterhog Floor Mats: <http://www.waterhogfloormats.com>.
  - 2. Approved Equal..

2.02 MATS

- A. Carpet Mat: Anti-static, solution dyed polypropylene fabric, with rubber backing.
  - 1. Color: Black Smoke.
  - 2. Size: Refer to drawings.

2.03 FABRICATION

- A. Fabricate mats in single unit sizes; fabricate multiple mats where indicated on drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install walk-off surface after cleaning of finish flooring.

END OF SECTION 12 48 13



## **SECTION 129300**

### **SITE FURNISHINGS**

#### **PART 1 - GENERAL**

##### **0.1 RELATED DOCUMENTS**

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

##### **0.2 SUMMARY**

- A. Section Includes:
  - 1. Benches.
  - 2. Bicycle racks.
  - 3. Trash receptacles.
  - 4. Recycle receptacles.
- B. Related Requirements:
  - 1. Section 033000 "Cast-in-Place Concrete" for attachment to concrete pavement.

##### **0.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. Credit MR 4: Product Data for recycled content indicating postconsumer and preconsumer recycled content and cost.
  - 2. Credit MR 5: Product Data for regional materials indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.
  - 3. Credit MR 7: Product Data and chain-of-custody certificates for products containing certified wood. Include statement indicating cost for each certified wood product.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Samples for Initial Selection: For units with factory-applied finishes.
- E. Samples for Verification: For each type of exposed finish, not less than 6-inch- (152-mm-) long linear components and 4-inch- (102-mm-) square sheet components.

0.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For site furnishings to include in maintenance manuals.

**PART 2 - PRODUCTS**

0.1 BENCHES

- A. Products: Subject to compliance with requirements, provide the following:
1. Per University standards: Forms+Surfaces, Leda Bench, Backed, 3-seat straight bench with arms. Seat slats: FSC certified lpe hardwood. Bench frame: cast aluminum. Size: 75.63" length. Surface mounted.

0.2 BICYCLE RACKS

- A. Products: Subject to compliance with requirements, provide the following:
1. Landscape Forms, Ring Bike Rack, stainless steel, embedded mount.

0.3 TRASH RECEPTACLES

- A. Products: Subject to compliance with requirements, provide the following:
1. Per University Standards: LandscapeForms, Petroskey Litter Receptacle, free standing, hinged lid, standard powder coat color: black. 30-gallon capacity, polyethylene liner included.

0.4 RECYCLE RECEPTACLES

- A. Products: Subject to compliance with requirements, provide the following:
1. Per University Standards: LandscapeForms, Petroskey Recycle Receptacle, free standing, hinged lid, standard powder coat color: black. 30-gallon capacity, polyethylene liner included. Label for "Aluminum, Glass, Plastic".

0.2 GENERAL FINISH REQUIREMENTS

- A. 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.

0.3 ALUMINUM FINISHES

- A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

0.4 STEEL AND GALVANIZED-STEEL FINISHES

- A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.
- B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.
- C. Stainless Steel Finish: No. 6.

**PART 7 - EXECUTION**

0.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

**END OF SECTION 129300**

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## **SECTION 14 24 23**

### **HYDRAULIC PASSENGER ELEVATORS**

#### **PART 1 GENERAL**

##### **1.01 WORK INCLUDED**

- A. Provide all labor, materials, equipment and services necessary to install one holed oil hydraulic passenger type elevators. Install elevator systems as described with all needed accessories as required to provide a complete installation.

##### **1.02 RELATED SECTIONS**

- A. Refer to other sections of these specifications for related work which is not of this section, including electrical service for elevator systems, hoistway, pit and machinery enclosure with access, lighting, ventilation and services.
- B. Electrical Contractor: Provide the following:
  - 1. A fused disconnect switch or circuit breaker per the National Electrical Code with feeder or branch wiring to controller. Size to suit elevator Contractor.
  - 2. A 120 volt A.C., single phase power supply with fused SPST disconnect switch with feeder wiring to each controller for car lights.
  - 3. Convenience outlet and light fixture in pit with switch located adjacent to the access door.
  - 4. Heat or smoke or products of combustion sensing devices, located as indicated with wiring from the sensing devices to elevator controller.
  - 5. Telephone system.

##### **1.03 QUALITY ASSURANCE**

- A. Manufacturer
  - 1. Regularly engaged in designing, engineering, manufacturing, installing and servicing elevators of the type and character specified.
  - 2. Have a history, during the last ten (10) years, of not less than 50 successful installations and satisfied Owners where continuous maintenance service was performed. Such history to be fully documented, upon request, listing project name, date of installation, address, architect, owner, name and phone number of owner's facilities manager or maintenance superintendent.
  - 3. Provide evidence that a service office with qualified service personnel is located within 50 miles of the installation and warehouse parts is maintained within 50 miles. Where service facilities are further than the specified distances, manufacturer to provide response time of not more than 1-1/2 hours to request of service.

- B. Installer: Manufacturer or an authorized agent of the manufacturer with not less than 5 years of successful experience installing similar elevators.
- C. Handicapped Provisions: Comply with National Elevator Industry Inc. (NEII) "Suggested Minimum Passenger Elevator Requirements for the Handicapped", and A.D.A. requirements, including clearances, handrails, locations for signal equipment and similar provisions.
- D. Codes and Standards: Perform all work in accordance with the American National Standard Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks (ANSI A17.1), the National Electrical Code and the OBC.
- E Regulatory Requirements
  - 1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code..
  - 2. OBC.
  - 3. NFPA 70 National Electrical Code.
  - 4. NFPA 80 Fire Doors and Windows.
  - 5. Americans with Disabilities Act - Accessibility Guidelines (ADAAG).
- F. Fire-rated entrance assemblies: Opening protective assemblies including frames, hardware and operation shall comply with ASTM E152, UL 10B and NFPA Standard 80. Provide entrance assembly units bearing UL Class B labels.
- G. Obtain and pay for all required permits, inspections and fees. Arrange for and make required inspections and tests. Obtain certificates and operating permits and turn over to Owner upon acceptance of work.

#### 1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product specifications and installation instructions for each principal component or product, and include certified test reports on required testing. List and describe features of the control system, performances and operating characteristics.
- B. Shop Drawings: Submit plans, elevations and details of car enclosures and hoistway entrances. Include:
  - 1. A comparison of maximum loads imposed on the building structures at points of support and all similar considerations of the elevator work.
- C. Maintenance Manuals: Submit bound maintenance manual for each elevator or type of elevator with operating and maintenance instructions, parts listing, recommended parts inventory listing, purchase source listing, emergency instructions and similar information.

- D. Samples: Submit samples of exposed finishes of car enclosures, hoistway entrances, and signal equipment; 8" squares of materials and 12" lengths of running materials.
- E. Inspection certificates and operating permits required by governing authorities to allow normal, unrestricted use of elevator.
- F. Deliver permit to operate elevator to Architect.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver materials to the site until areas in which they are to be installed are ready to receive them in place for final installation.
- B. Wrap, carton and crate factory finished materials in a manner to protect finishes.
- C. Store, protect and handle materials in accordance with manufacturer's recommendations to prevent damage, soiling or deterioration.
- D. Fully protect movable and operating equipment from weather damage.

1.06 PROJECT CONDITIONS

- A. Painting
  - 1. Paint all equipment that is not factory finished.
  - 2. Provide all ferrous metals installed in the hoistway shop primed with a rust inhibitive primer.
- B. Prohibited Use: Elevators shall not be used for any purpose during the construction period before Substantial Completion.
- C. Hole for Jack Unit: Based on excavation through normal soil or clay which can be removed by manual digging or by standard truck-mounted regular drilling unit. Provide a casing if required to retain the walls of the hole. Remove excavation spoils deposited in the elevator pit.
  - 1. If a physical obstruction or hindrance is encountered below the ground surface, including boulders, rock, gravel, wood, metal, pilings, sand, water, public utilities or any other foreign material, obtain written authorization to proceed with excavating using special excavation equipment.
  - 2. Maintain a daily log of time and material costs involved.
  - 3. The jack hole is to be provided in strict accordance with the elevator contractor's shop drawings.

1.07 MAINTENANCE

- A. Provide full preventative maintenance for a period of one year beginning on the date of final acceptance of work.

1. Frequency: Regular and systematic inspections not less than once every other week.
  2. Duration: One hour per visit.
  3. Personnel: Competent and trained employees of the elevator manufacturer.
  4. Maintenance: Includes necessary adjustments, greasing, oiling, cleaning, supplies and parts to keep equipment in proper operation, except such parts made necessary by misuse, accidents or negligence not caused by the manufacturer.
  5. Work Period: Perform all work during regular working hours of the manufacturer's maintenance personnel.
- B. Maintenance Service: To be performed solely by the successful elevator manufacturer and not assigned or transferred to any agent or subcontractor.
- C. Provide twenty-four hour emergency callback service as part of the maintenance service. If passenger entrapment is involved, a 45 minute response time is required on callbacks.
- D. Contractor to have a service office and full-time service personnel within a 50 mile radius of project site. Service office shall have been functioning with full-time personnel for a minimum period of 5 years before the bid date. Two competent, trained employees of the contractor must live within the 50 mile radius.

1.09 WARRANTY

- A. Provide special project guaranty, signed by the Contractor, Installer and Manufacturer, agreeing to replace/repair/restore defective materials and workmanship of the elevator work for a period of one year after date of completion.
- B. "Defective" is hereby defined to include, but not be limited to, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected and unsatisfactory conditions.
- C. Repairs to be made at no additional cost to the Owner.

**PART 2 PRODUCTS**

2.01 GENERAL DESCRIPTION

- A. Manufacturer
1. Basis of Design: Drawings and specifications are based on holed hydraulic types as follows:
    - a. Elevator 1: Endura by THYSSENKRUPP (Below Ground)
  2. Similar Products/models by OTIS, **CANTON** or SCHINDLER may be bid provided they meet all detailed requirements of the following specification. Any deviation

from these specifications shall be brought to the Architect's attention during bidding. Deviations from the drawings or specifications are at the cost of the Elevator Contractor.

B. Description:

1. Type: Oil hydraulic cylinder type with buried cylinder and casing.
2. Capacity: 3,500 lbs.
3. Car Speed: 150 fpm.
4. Operation: Simplex collective.
5. Travel: 47'-6".
6. Stops: 2.
7. Openings:
  - a. Front: 5
  - b. Rear: 1
8. Opening Size: 3'-6" x 7'.
9. Door Operation: Automatic, D.C. power; safety edge; photo electric control; timing device.
10. Car - Clear Inside: 6'-8" wide x 5'-5" deep by 8'-0".
11. Power Supply: 208 V, 3 phase 60 Hz.
12. Lighting and Machinery: 120 v, 1 phase 60 Hz.
13. Priority Dispatching Floor: 1<sup>st</sup> floor.
14. Button & Fixture Style: Signa4 Signal Fixtures

2.02 MATERIALS, GENERAL

A. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.

B. Steel

1. Shapes and Bars: ASTM A 36.
2. Sheet: ASTM A 366, cold-rolled steel sheet, commercial quality, Class 1, matte finish, stretcher leveled.
3. Finish: Factory-applied baked enamel.

C. Stainless Steel

1. Shapes and Bars: ASTM A 276, Type 304 (18-8).
2. Tubing: ASTM A 269, Type 304 (18-8).
3. Finish: NAAMM No. 4 satin finish.

2.03 HOISTWAY EQUIPMENT

A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed.

B. Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.

- C. Guide Rails: Steel; fastened to the building with steel brackets.
- D. Guide Shoes: Roller guides, with a minimum of three tires, shall be mounted on top and bottom of the car and be held in contact with the guide rail by adjustable devices.
- E. Guide Rail Lubricators: Provide a leakproof reservoir on top of upper guide shoes. Wool felt wiper shall apply an even, uniform flow of lubricant which shall thoroughly cover face of guide rail.
- F. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.
- G. Jack Unit: Sufficient size to lift the gross load to the height specified. Factory test jack to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Jack unit shall consist of the following components:
  - 1. Heavy seamless steel tubing plunger accurately turned and polished.
  - 2. Stop ring shall be electrically welded to the plunger to positively prevent plunger leaving the cylinder.
  - 3. Internal guide bearing.
  - 4. Packing or seal of suitable design and quality.
  - 5. Drip ring around cylinder top.
  - 6. Cylinder made of steel pipe and provided with a pipe connection and air bleeder.
  - 7. Weld brackets to the jack cylinder for supporting the elevator on pit channels. An auxiliary safety bulkhead shall be provided in the lower end of the cylinder.
  - 8. Special Cylinder Protection: Protect jack unit cylinder and underground piping with a protective coating of butyl rubber adhesive and polyethylene spiral wrapping.
  - 9. Provide PVC cylinder protection to protect cylinder from corrosion and contain any oil should the cylinder leak. Seal PVC cylinder against possible infiltration from flooding in the pit.
    - a. Provide system with a means to monitor the annular space between the PVC and the cylinder and to evacuate contaminants from the interior of the PVC.
    - b. Provide a twenty-year guarantee on the hydraulic cylinder under the supplier's maintenance contract.
- H. Automatic Terminal Limits: Place electric limit switches in the hoistway near the terminal landings. Limit switches shall be designed to cut off the electric current and stop the car if it runs beyond either terminal landing.
- I. Leveling Device: Provide elevator with an automatic leveling device which will bring the car to a stop within 1/4" of landing level regardless of load or direction of

travel. Landing level will be maintained within the leveling zone irrespective of the hoistway doors being opened or closed.

- J. Failure Protection: Design electrical control circuit so if a malfunction occurs, due to motor starter failure, oil becoming low in the system, or the car failing to reach a landing in the up direction within a pre-determined time, the elevator car will automatically descend to the lowest terminal landing. If power operated doors are used, the doors will automatically open when the car reaches that landing to allow passengers to depart. The doors will then automatically close and all control buttons, except the "door open" button in the car station, shall be made inoperative.
- K. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary pipe and fittings shall connect the power unit to the jack unit. Provide proper grade oil.
- L. Emergency Terminal Stopping Device: The emergency terminal stopping device shall operate independently of the normal terminal stopping device if it fails to slow down the car at the terminal as intended. Stopping devices shall not be prevented from functioning by a single short circuit caused by a combination of grounds or by other conditions.
  - 1. Normal and emergency terminal stopping devices shall not control the same controller switches unless two or more separate and independent switches are furnished, two of which shall be closed in either direction of travel to complete the circuit to the control valve solenoids in the down direction and to complete the circuit to the pump motor for the up direction of travel.

## 2.04 POWER UNIT

- A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit consisting of the following items:
  - 1. Oil reservoir with tank cover and controller compartment with cover.
  - 2. An oil hydraulic pump.
  - 3. An electric motor.
  - 4. Oil control unit with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and magnetic controller.
- C. Pump: Positive displacement screw type to give smooth operation, especially designed and manufactured for elevator service.
- D. Drive: Drive shall be by direct coupling with the pump and motor submerged in the oil reservoir or by multiple V-belts and sheaves of number and size to insure maximum factor of safety. Drive type shall be determined based primarily on the load on the car, travel, and speed.
- E. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator

service. Duty rating shall comply with specified speeds and loads.

- F. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
1. Relief valve shall be externally adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
  2. Up start and stop valve shall be externally adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
  3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
  4. Lowering valve and leveling valve shall be externally adjustable for drop-away speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling when slowdown is initiated.
- G. Power controller shall contain electrical contactors, electro-mechanical switches and thermal overload relays. Mount components in a NEMA 1 enclosure. Logic control system shall be microprocessor based and protected from environmental extremes and excessive vibrations.
- H. Reduced Voltage Starting: Provide a solid state starter to limit current inrush during starting and to provide gradual acceleration of the motor. Motor starting shall not be initiated by mechanical contacts. Starter shall include a current limit adjustment range of 200 percent to 450 percent of the overload adjustment range. Provide an integral fault detection and diagnostic system.

## 2.05 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening.
1. Manufacturer's standard entrance design, bearing Underwriters' Laboratories "B" labels, and consisting of 14 gauge frames with 2 inch profile, 16 gauge doors, hangers, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.
  2. Elevator wall interface with hoistway entrance assembly shall comply with elevator manufacturer's requirements.
  3. Doors: Flush construction.
    - a. Stainless steel: ASTM A 167, Type 304 stainless steel panels, No. 4 satin finish.
  4. Frames: Formed construction.
    - a. Stainless steel: ASTM A 167, Type 304 formed stainless steel sheet, No. 4 satin finish.



- B. Interlocks: Equip each hoistway entrance with an Underwriters' Laboratories "B" label approved type interlock tested as required by code. Design interlock to prevent operation of the car away from the landing until the doors are locked in the closed position as defined by code and prevent opening the doors at any landing from the corridor side unless the car is at rest at that landing or is in the leveling zone and stopping at that landing.
- C. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway sliding door.
  - 1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
  - 2. Hangers: Provide an adjustable slide to accommodate the up-thrust of the doors.
  - 3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.
- D. Hoistway Sills: Extruded, with grooved surface, 1/4 inch thickness.
  - 1. Aluminum: ASTM B 221 aluminum, mill finish.

## 2.06 CAR ENCLOSURE

### A. Car Enclosure

- 1. Walls: Reinforced 16 gauge cold-rolled steel with two coats factory applied baked enamel finish, with applied horizontal wood core panels covered on both sides with high pressure plastic laminate.
  - a. Laminate: Provide manufacturers premeium laminate selections
- 2. Canopy: Reinforced 14 gauge cold-rolled steel with hinged exit. Finish: Two coats factory applied reflective baked enamel.
- 3. Ceiling: Suspended type, LED lighting with translucent diffuser mounted in a metal frame. Framework shall be finished with a stainless steel, no. 4 brushed finish.
- 4. Cab Columns, Front, and Transom: Stainless steel, satin finish.
- 5. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic shoes sliding in a smooth threshold groove.
  - a. Door Finish: Stainless steel.
  - b. Cab Sills: Extruded, with grooved surface, 1/4 inch (6.4 mm) thickness.
    - 1) Aluminum: ASTM B 221 aluminum, mill finish.
- 6. Handrail: Continuous segmented type metal bar handrail with ends curved to the wall, nominal 1/4" x 2", stainless steel, satin finish, lacquered. Provide at rear and side walls.
- 7. Ventilation: Two speed exhaust fan mounted on the car top.
- 8. Pad Buttons: Provide pad buttons on cab front(s) and walls.
  - a. Provide one set of vinyl protection pads for the project.

9. Finished Floor: TBD.

- B. Car Top Inspection: Provide a car top inspection station with an "emergency stop" switch and constant pressure "up-down" direction buttons to make the normal operating devices inoperative and give the inspector complete control of the elevator. Mount the car top inspection station in the door operator assembly.

## 2.07 DOOR OPERATION

- A. Door Operation: Provide a direct current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. Door movements shall be electrically cushioned at both limits of travel and the door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. Direct drive geared operators, AC controlled units with oil checks, or other deviations are not acceptable.
1. No Un-Necessary Door Operation: Car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as the next car up.
  2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
  3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel will reverse and the door will reopen to answer the other call.
  5. Limited Door Reversal: If the doors are closing and an infra-red beam is interrupted, the doors will reverse and reopen partially. After the obstruction is cleared, the doors will begin to close.
- B. Electronic Passenger Sensing Device with Nudging: Provide at each entrance a solid state electronic detector and an electro-mechanical reversal edge as follows:
1. After a stop is made, doors shall remain open for an adjustable time interval. Closing may be initiated instantaneously by registration of a car call, operation of load weighing device or signal from the service demand integrator.
  2. Doors will remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door movement is obstructed for a predetermined time, a buzzer will sound and doors will close at a reduced speed. If the reversal edge contacts a person or object while closing, doors will immediately stop and resume closing after the obstruction has been removed.

3. Arrange circuitry to inactivate the electronic detector should it fail to operate. However, the electro-mechanical reversing edge will not be deactivated by failure of the electronic detector or its removal from the circuitry by means of a manual switch.
4. Electronic Passenger Sensing Device (Light Ray Device)
  - a. Provide infra-red light ray device in elevator car entrance. Provide complete, operational system.
    - 1) Light Curtain: Minimum 40 beam, evenly spaced from floor to 6'-0" above floor.
    - 2) Control Module: Top of car mounting.
    - 3) Transmitter: Mounted in housing on left or right door jamb.
    - 4) Receiver: Mounted in housing on door jamb opposite transmitter.
    - 5) Housing: Gage as recommended by manufacturer.
    - 6) Electrical: 110 VAC 6VA.

## 2.08 CAR OPERATING STATION

- A. Car Operating Panel: Flush mounted stainless steel panels, containing call button for each landing served, and containing other buttons, switches and controls required for specified car operation and control. These include, but are not limited to, emergency lighting and alarm bell, key operated stop switch, key operated lights and key operated single-speed fan switch, key operated car top inspection switch, key operated independent service key switch, and all necessary safety functions and firefighter service and code required functions.
  1. All key switches are to be keyed in accordance with Owner's finish hardware master keying system; interchangeable core type.
  2. Stainless Steel Panel Finish: #4 satin.
  3. Provide operating device symbols as required by code. Mark other buttons and switches with manufacturer's standard identification, including Braille next to buttons, for required use or function.
  4. Mount controls at height complying with ANSI A117.1 requirements for handicapped.
  5. Provide illuminated buttons, which light up when activated and remain illuminated until call or other function has been fulfilled. Provide non-illuminated buttons with brushed stainless steel finish.
- B. "Hands Free Communication": Push button activated, vandal resistant in a speaker/microphone enclosure complying to A.D.A. requirements.
  1. Provide telephone cabinet in cab. Provide complete with cabling back to controller for connection to building system by Electrical Contractor. Telephone shall be programmable auto dial type with automatic reset time.
- C. Emergency Light: An emergency light and capacity plate shall be integrated into a module. Emergency light shall illuminate automatically upon loss of the building's normal power supply.

2.09 CAR OPERATION SYSTEM

- A. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
- B. Emergency Power: In the event of a normal power supply failure, the elevator system shall be arranged to lower from an emergency power supply. The emergency power supply shall consist of a battery furnished by the elevator contractor. The elevator contractor shall provide circuitry so after normal power failure and establishment of emergency power, each elevator shall lower to a field adjustable return landing and park with the doors closed. If the designated return landing is above the current position, the elevator shall run down to the next lower landing and park with the doors closed.

2.10 HALL STATIONS

- A. Hall Stations, General: Illuminated buttons indicating a call has been registered at that floor for the indicated direction. Faceplates shall be No. 4 satin finish stainless steel. Provide one set of risers.
  - 1. Each terminal station shall contain one illuminating pushbutton.
  - 2. Phase 1 firefighters service keyswitch, with instructions, shall be incorporated into the hall station at the designated level.
- B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.

2.11 MISCELLANEOUS ELEVATOR COMPONENTS

- A. Oil Hydraulic Silencer: Install an oil hydraulic silencer (muffler device) at the power unit location. Silencer shall contain pulsation absorbing material inserted in a blowout proof housing arranged for inspecting interior parts without removing unit from oil line. Rubber hose without blowout proof features will not be acceptable.
- B. Vibration Pads: Mount vibration pads under the power unit assembly to isolate the unit from the building structure.
- C. Sound Insulating Panels: When pump and motor are not submerged, provide panels manufactured of reinforced 14 gauge steel with 1 inch thick 1-1/2 pound fiberglass core attached to interior and mounted on all four open sides of the power unit frame.
- D. Sound Isolating Couplings: When pump and motor are not submerged, install a minimum of two couplings in the oil line in the machine room between pump and jack.

**PART 3      EXECUTION**

**3.01            INSTALLATION**

- A.    Install elevators as specified in accordance with all governing codes, manufacturer's written direction and ANSI A17.1.
- B.    Lubricate all equipment in accordance with manufacturer's written instructions.

**3.02            CLEAN-UP**

- A.    Remove all unused materials and leave cab and all related areas clean.

**3.03            DEMONSTRATION**

- A.    Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.
- B.    Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

**END OF SECTION**