

## SECTION 00 81 13

### GENERAL REQUIREMENTS

#### TABLE OF ARTICLES

1. GENERAL
2. OWNER
3. CONTRACTOR
4. ADMINISTRATION OF THE CONTRACT
5. SUBCONTRACTORS
6. CONSTRUCTION BY OWNER OR SEPARATE CONTRACTORS
7. CHANGES IN THE WORK
8. TIME
9. PAYMENTS AND COMPLETION
10. PROTECTION OF PERSONS AND PROPERTY
11. INSURANCE AND BONDS
12. UNCOVERING AND CORRECTION OF WORK
13. MISCELLANEOUS PROVISIONS
14. TERMINATION OR SUSPENSION OF THE CONTRACT

**ARTICLE 1: GENERAL**

**1.1 CONTRACT DOCUMENTS**

1.1.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary and what is required by one shall be as binding as if required by all. Performance by the Contractor shall be required to an extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results.

1.1.2 Work including material purchases shall not begin until the Contractor is in receipt of a bonafide State of Delaware Purchase Order. Any work performed or material purchases prior to the issuance of the Purchase Order is done at the Contractor's own risk and cost.

**1.2 EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS**

1.2.1 For Public Works Projects financed in whole or in part by state appropriation the Contractor agrees that during the performance of this contract:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, sex, color, sexual orientation, gender identity or national origin. The Contractor will take positive steps to ensure that applicants are employed and that employees are treated during employment without regard to their race, creed, sex, color, sexual orientation, gender identity or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices to be provided by the contracting agency setting forth this nondiscrimination clause.
2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, sex, color, sexual orientation, gender identity or national origin."

**ARTICLE 2: OWNER**

(NO ADDITIONAL GENERAL REQUIREMENTS – SEE SUPPLEMENTARY GENERAL CONDITIONS)

**ARTICLE 3: CONTRACTOR**

3.1 Schedule of Values: The successful Bidder shall within twenty (20) days after receiving notice to proceed with the work, furnish to the Owner a complete schedule of values on the various items comprising the work.

3.2 Subcontracts: Upon approval of Subcontractors, the Contractor shall award their Subcontracts as soon as possible after the signing of their own contract and see that all material, their own and those of their Subcontractors, are promptly ordered so that the work will not be delayed by failure of materials to arrive on time.

- 3.3 Before commencing any work or construction, the General Contractor is to consult with the Owner as to matters in connection with access to the site and the allocation of Ground Areas for the various features of hauling, storage, etc.
- 3.4 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions.
- 3.5 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.
- 3.6 The Contractor warrants to the Owner that materials and equipment furnished will be new and of good quality, unless otherwise permitted, and that the work will be free from defects and in conformance with the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved, may be considered defective. If required by the Owner, the Contractor shall furnish evidence as to the kind and quality of materials and equipment provided.
- 3.7 Unless otherwise provided, the Contractor shall pay all sales, consumer, use and other similar taxes, and shall secure and pay for required permits, fees, licenses, and inspections necessary for proper execution of the Work.
- 3.8 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the Work. The Contractor shall promptly notify the Owner if the Drawings and Specifications are observed to be at variance therewith.
- 3.9 The Contractor shall be responsible to the Owner for the acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons performing portions of the Work under contract with the Contractor.
- 3.10 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work the Contractor shall remove from and about the Project all waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials. The Contractor shall be responsible for returning all damaged areas to their original conditions.
- 3.11 STATE LICENSE AND TAX REQUIREMENTS
- 3.11.1 Each Contractor and Subcontractor shall be licensed to do business in the State of Delaware and shall pay all fees and taxes due under State laws. In conformance with Section 2503, Chapter 25, Title 30, Delaware Code, "the Contractor shall furnish the Delaware Department of Finance within ten (10) days after entering into any contract with a contractor or subcontractor not a resident of this State, a statement of total value of such contract or contracts together with the names and addresses of the contracting parties."
- 3.12 The Contractor shall comply with all requirements set forth in Section 6962, Chapter 69, Title 29 of the Delaware Code.
- 3.13 During the contract Work, the Contractor and each Subcontractor, shall implement an Employee Drug Testing Program in accordance with OMB Regulation 4104 - "Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on "Large Public Works Projects". "Large Public Works" is based upon the current threshold required for bidding Public Works as set by the Purchasing and Contracting Advisory Council.

**ARTICLE 4: ADMINISTRATION OF THE CONTRACT**

4.1 CONTRACT SURETY

4.1.1 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

4.1.2 All bonds will be required as follows unless specifically waived elsewhere in the Bidding Documents.

4.1.3 Contents of Performance Bonds – The bond shall be in the form approved by the Office of Management and Budget. The bond shall be conditioned upon the faithful compliance and performance by the successful bidder of each and every term and condition of the contract and the proposal, plans, specifications, and bid documents thereof. Each term and condition shall be met at the time and in the manner prescribed by the Contract, Bid documents and the specifications, including the payment in full to every person furnishing materiel or performing labor in the performance of the Contract, of all sums of money due the person for such labor and materiel. (The bond shall also contain the successful bidder’s guarantee to indemnify and save harmless the State and the agency from all costs, damages and expenses growing out of or by reason of the Contract in accordance with the Contract.)

4.1.4 Invoking a Performance Bond – The agency may, when it considers that the interest of the State so requires, cause judgement to be confessed upon the bond.

4.1.5 Within twenty (20) days after the date of notice of award of contract, the Bidder to whom the award is made shall furnish a Performance Bond and Labor and Material Payment Bond, each equal to the full amount of the Contract price to guarantee the faithful performance of all terms, covenants and conditions of the same. The bonds are to be issued by an acceptable Bonding Company licensed to do business in the State of Delaware and shall be issued in duplicate.

4.1.6 Performance and Payment Bonds shall be maintained in full force (warranty bond) for a period of two (2) years after the date of the Certificate for Final Payment. The Performance Bond shall guarantee the satisfactory completion of the Project and that the Contractor will make good any faults or defects in his work which may develop during the period of said guarantees as a result of improper or defective workmanship, material or apparatus, whether furnished by themselves or their Sub-Contractors. The Payment Bond shall guarantee that the Contractor shall pay in full all persons, firms or corporations who furnish labor or material or both labor and material for, or on account of, the work included herein. The bonds shall be paid for by this Contractor. The Owner shall have the right to demand that the proof parties signing the bonds are duly authorized to do so.

4.2 FAILURE TO COMPLY WITH CONTRACT

4.2.1 If any firm entering into a contract with the State, or Agency that neglects or refuses to perform or fails to comply with the terms thereof, the Agency which signed the Contract may terminate the Contract and proceed to award a new contract in accordance with this Chapter 69, Title 29 of the Delaware Code or may require the Surety on the Performance Bond to complete the Contract in accordance with the terms of the Performance Bond. Nothing herein shall preclude the Agency from pursuing additional remedies as otherwise provided by law.

4.3 CONTRACT INSURANCE AND CONTRACT LIABILITY

4.3.1 In addition to the bond requirements stated in the Bid Documents, each successful Bidder shall purchase adequate insurance for the performance of the Contract and, by submission of a Bid, agrees to indemnify and save harmless and to defend all legal or equitable actions brought against the State, any Agency, officer and/or employee of the State, for and from all claims of liability which is or may be the result of the successful Bidder's actions during the performance of the Contract.

4.3.2 The purchase or nonpurchase of such insurance or the involvement of the successful Bidder in any legal or equitable defense of any action brought against the successful Bidder based upon work performed pursuant to the Contract will not waive any defense which the State, its agencies and their respective officers, employees and agents might otherwise have against such claims, specifically including the defense of sovereign immunity, where applicable, and by the terms of this section, the State and all agencies, officers and employees thereof shall not be financially responsible for the consequences of work performed, pursuant to said contract.

4.4 RIGHT TO AUDIT RECORDS

4.4.1 The Owner shall have the right to audit the books and records of a Contractor or any Subcontractor under any Contract or Subcontract to the extent that the books and records relate to the performance of the Contract or Subcontract.

4.4.2 Said books and records shall be maintained by the Contractor for a period of seven (7) years from the date of final payment under the Prime Contract and by the Subcontractor for a period of seven (7) years from the date of final payment under the Subcontract.

**ARTICLE 5: SUBCONTRACTORS**

5.1 SUBCONTRACTING REQUIREMENTS

5.1.1 All contracts for the construction, reconstruction, alteration or repair of any public building (not a road, street or highway) shall be subject to the following provisions:

1. A contract shall be awarded only to a Bidder whose Bid is accompanied by a statement containing, for each Subcontractor category, the name and address (city or town and State only – street number and P.O. Box addresses not required) of the subcontractor whose services the Bidder intends to use in performing the Work and providing the material for such Subcontractor category.
2. A Bid will not be accepted nor will an award of any Contract be made to any Bidder which, as the Prime Contractor, has listed itself as the Subcontractor for any Subcontractor unless:
  - A. It has been established to the satisfaction of the awarding Agency that the Bidder has customarily performed the specialty work of such Subcontractor category by artisans regularly employed by the Bidder's firm;
  - B. That the Bidder is duly licensed by the State to engage in such specialty work, if the State requires licenses; and
  - C. That the Bidder is recognized in the industry as a bona fide Subcontractor or Contractor in such specialty work and Subcontractor category.

- 5.1.2 The decision of the awarding Agency as to whether a Bidder who list itself as the Subcontractor for a Subcontractor category shall be final and binding upon all Bidders, and no action of any nature shall lie against any awarding agency or its employees or officers because of its decision in this regard.
- 5.1.3 After such a Contract has been awarded, the successful Bidder shall not substitute another Subcontractor for any Subcontractor whose name was set forth in the statement which accompanied the Bid without the written consent of the awarding Agency.
- 5.1.4 No Agency shall consent to any substitution of Subcontractors unless the Agency is satisfied that the Subcontractor whose name is on the Bidders accompanying statement:
- A. Is unqualified to perform the work required;
  - B. Has failed to execute a timely reasonable Subcontract;
  - C. Has defaulted in the performance on the portion of the work covered by the Subcontract;  
or
  - D. Is no longer engaged in such business.
- 5.1.5 Should a Bidder be awarded a contract, such successful Bidder shall provide to the agency the taxpayer identification license numbers of such subcontractors. Such numbers shall be provided on the later of the date on which such subcontractor is required to be identified or the time the contract is executed. The successful Bidder shall provide to the agency to which it is contracting, within 30 days of entering into such public works contract, copies of all Delaware Business licenses of subcontractors and/or independent contractors that will perform work for such public works contract. However, if a subcontractor or independent contractor is hired or contracted more than 20 days after the Bidder entered the public works contract the Delaware Business license of such subcontractor or independent contractor shall be provided to the agency within 10 days of being contracted or hired.
- 5.1.6 The Contractor may employ additional Subcontractors on the jobsite only after submitting a copy of the Subcontractor's Employee Drug Testing Program to the Owner for approval. A Contractor or Subcontractor shall not commence work until the Owner has concluded its review and determined that the submitted Employee Drug Testing Program complies with OMB Regulation 4104.
- 5.2 PENALTY FOR SUBSTITUTION OF SUBCONTRACTORS
- 5.2.1 Should the Contractor fail to utilize any or all of the Subcontractors in the Contractor's Bid statement in the performance of the Work on the public bidding, the Contractor shall be penalized in the amount of (project specific amount\*). The Agency may determine to deduct payments of the penalty from the Contractor or have the amount paid directly to the Agency. Any penalty amount assessed against the Contractor may be remitted or refunded, in whole or in part, by the Agency awarding the Contract, only if it is established to the satisfaction of the Agency that the Subcontractor in question has defaulted or is no longer engaged in such business. No claim for the remission or refund of any penalty shall be granted unless an application is filed within one year after the liability of the successful Bidder accrues. All

penalty amounts assessed and not refunded or remitted to the contractor shall be reverted to the State.

\*one (1) percent of contract amount not to exceed \$10,000

### 5.3 ASBESTOS ABATEMENT

5.3.1 The selection of any Contractor to perform asbestos abatement for State-funded projects shall be approved by the Office of Management and Budget, Division of Facilities Management pursuant to Chapter 78 of Title 16.

### 5.4 STANDARDS OF CONSTRUCTION FOR THE PROTECTION OF THE PHYSICALLY HANDICAPPED

5.4.1 All Contracts shall conform with the standard established by the Delaware Architectural Accessibility Board unless otherwise exempted by the Board.

### 5.5 CONTRACT PERFORMANCE

5.5.1 Any firm entering into a Public Works Contract that neglects or refuses to perform or fails to comply with its terms, the Agency may terminate the Contract and proceed to award a new Contract or may require the Surety on the Performance Bond to complete the Contract in accordance with the terms of the Performance Bond.

## ARTICLE 6: CONSTRUCTION BY OWNER OR SEPARATE CONTRACTORS

6.1 The Owner reserves the right to simultaneously perform other construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other Projects at the same site.

6.2 The Contractor shall afford the Owner and other Contractors reasonable opportunity for access and storage of materials and equipment, and for the performance of their activities, and shall connect and coordinate their activities with other forces as required by the Contract Documents.

## ARTICLE 7: CHANGES IN THE WORK

7.1 The Owner, without invalidating the Contract, may order changes in the Work consisting of Additions, Deletions, Modifications or Substitutions, with the Contract Sum and Contract completion date being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Professional, as the duly authorized agent, the Contractor and the Owner.

7.2 The Contract Sum and Contract Completion Date shall be adjusted only by a fully executed Change Order.

7.3 The additional cost, or credit to the Owner resulting from a change in the Work shall be by mutual agreement of the Owner, Contractor and the Architect. In all cases, this cost or credit shall be based on the 'DPE' wages required and the "invoice price" of the materials/equipment needed.

7.3.1 "DPE" shall be defined to mean "direct personnel expense". Direct payroll expense includes prevailing wage rates plus a maximum multiplier of 1.35 times DPE. For example, if the prevailing wage rate is \$50/hour, the DPE would be \$67.50/hour (50 x 1.35).

7.3.2 "Invoice price" of materials/equipment shall be defined to mean the actual cost of materials and/or equipment that is paid by the Contractor, (or subcontractor), to a material distributor, direct factory vendor, store, material provider, or equipment leasing entity. Rates for equipment that is leased

and/or owned by the Contractor or subcontractor(s) shall not exceed those listed in the latest version of the "Means Building Construction Cost Data" publication.

7.3.3 In addition to the above:

7.3.3.1 The General Contractor is allowed a fifteen percent (15%) markup for overhead and profit for additional work performed by the General Contractor's own forces.

7.3.3.2 For additional subcontractor work, the Subcontractor is allowed a fifteen (15) percent overhead and profit on change order work above and beyond the direct costs stated previously. To this amount, the General Contractor will be allowed a mark-up not exceeding seven- and one-half percent (7.5%) on the subcontractor's work.

7.3.3.3 Where the Third Tier Contractor is going to be completing the additional work, the Third-Tier contractor will be allowed a markup of fifteen percent (15%) overhead and profit on changes order work above and beyond the direct costs stated previously. To this amount, the Subcontractor will be allowed a markup not to exceed seven and one-half percent (7.5%) on the Third-Tier Contractor's work and the General Contractor will be allowed a markup not to exceed seven and one-half percent (7.5%) of the amount of the Subcontractor's markup.

7.3.3.4 No additional costs shall be allowed for changes related to the Contractor's onsite superintendent/staff, or project manager, unless a change in the work changes the project duration and is identified by the CPM schedule. There will be no other costs associated with the change order.

7.3.3.5 These markups shall include all costs including, but not limited to: overhead, profit, bonds, insurance, supervision, etc.

## **ARTICLE 8: TIME**

8.1 Time limits, if any, are as stated in the Project Manual. By executing the Agreement, the Contractor confirms that the stipulated limits are reasonable, and that the Work will be completed within the anticipated time frame.

8.2 If progress of the Work is delayed at any time by changes ordered by the Owner, by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions, unavoidable casualties or other causes beyond the Contractor's control, the Contract Time shall be extended for such reasonable time as the Owner may determine.

8.3 Any extension of time beyond the date fixed for completion of the construction and acceptance of any part of the Work called for by the Contract, or the occupancy of the building by the Owner, in whole or in part, previous to the completion shall not be deemed a waiver by the Owner of his right to annul or terminate the Contract for abandonment or delay in the matter provided for, nor relieve the Contractor of full responsibility

## **8.4 SUSPENSION AND DEBARMENT**

8.4.1 Per Section 6962(d)(14), Title 29, Delaware Code, "Any Contractor who fails to perform a public works contract or complete a public works project within the time schedule established by the Agency in the Invitation To Bid, may be subject to Suspension or Debarment for one or more of the following reasons: a) failure to supply the adequate labor supply ratio for the project; b) inadequate financial resources; or, c) poor performance on the Project."

8.4.2 "Upon such failure for any of the above stated reasons, the Agency that contracted for the public works project may petition the Director of the Office of Management and Budget for Suspension

or Debarment of the Contractor. The Agency shall send a copy of the petition to the Contractor within three (3) working days of filing with the Director. If the Director concludes that the petition has merit, the Director shall schedule and hold a hearing to determine whether to suspend the Contractor, debar the Contractor or deny the petition. The Agency shall have the burden of proving, by a preponderance of the evidence, that the Contractor failed to perform or complete the public works project within the time schedule established by the Agency and failed to do so for one or more of the following reasons: a) failure to supply the adequate labor supply ratio for the project; b) inadequate financial resources; or, c) poor performance on the project. Upon a finding in favor of the Agency, the Director may suspend a Contractor from Bidding on any project funded, in whole or in part, with public funds for up to 1 year for a first offense, up to 3 years for a second offense and permanently debar the Contractor for a third offense. The Director shall issue a written decision and shall send a copy to the Contractor and the Agency. Such decision may be appealed to the Superior Court within thirty (30) days for a review on the record.”

8.5 RETAINAGE

8.5.1 Per Section 6962(d)(5) a.3, Title 29, Delaware Code: The Agency may at the beginning of each public works project establish a time schedule for the completion of the project. If the project is delayed beyond the completion date due to the Contractor’s failure to meet their responsibilities, the Agency may forfeit, at its discretion, all or part of the Contractor’s retainage.

8.5.2 This forfeiture of retainage also applies to the timely completion of the punchlist. A punchlist will only be prepared upon the mutual agreement of the Owner, Architect and Contractor. Once the punchlist is prepared, all three parties will by mutual agreement, establish a schedule for its completion. Should completion of the punchlist be delayed beyond the established date due to the Contractor’s failure to meet their responsibilities, the Agency may hold permanently, at its discretion, all or part of the Contractor’s retainage.

**ARTICLE 9: PAYMENTS AND COMPLETION**

9.1 APPLICATION FOR PAYMENT

9.1.1 Applications for payment shall be made upon AIA Document G702. There will be a five percent (5%) retainage on all Contractor’s monthly invoices until completion of the project. This retainage may become payable upon receipt of all required closeout documentation, provided all other requirements of the Contract Documents have been met.

9.1.2 A date will be fixed for the taking of the monthly account of work done. Upon receipt of Contractor’s itemized application for payment, such application will be audited, modified, if found necessary, and approved for the amount. Statement shall be submitted to the Owner.

9.1.3 Section 6516, Title 29 of the Delaware Code annualized interest is not to exceed 12% per annum beginning thirty (30) days after the “presentment” (as opposed to the date) of the invoice.

9.2 PARTIAL PAYMENTS

9.2.1 Any public works Contract executed by any Agency may provide for partial payments at the option of the Owner with respect to materials placed along or upon the sites or stored at secured locations, which are suitable for use in the performance of the contract.

9.2.2 When approved by the agency, partial payment may include the values of tested and acceptable materials of a nonperishable or noncontaminative nature which have been produced or furnished for incorporation as a permanent part of the work yet to be completed, provided acceptable provisions have been made for storage.

9.2.2.1 Any allowance made for materials on hand will not exceed the delivered cost of the materials as verified by invoices furnished by the Contractor, nor will it exceed the contract bid price for the material complete in place.

9.2.3 If requested by the Agency, receipted bills from all Contractors, Subcontractors, and material, men, etc., for the previous payment must accompany each application for payment. Following such a request, no payment will be made until these receipted bills have been received by the Owner.

### 9.3 SUBSTANTIAL COMPLETION

9.3.1 When the building has been made suitable for occupancy, but still requires small items of miscellaneous work, the Owner will determine the date when the project has been substantially completed.

9.3.2 If, after the Work has been substantially completed, full completion thereof is materially delayed through no fault of the Contractor, and without terminating the Contract, the Owner may make payment of the balance due for the portion of the Work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment that it shall not constitute a waiver of claims.

9.3.3 On projects where commissioning is included, the commissioning work as defined in the specifications must be complete prior to the issuance of substantial completion.

### 9.4 FINAL PAYMENT

9.4.1 Final payment, including the five percent (5%) retainage if determined appropriate, shall be made within thirty (30) days after the Work is fully completed and the Contract fully performed and provided that the Contractor has submitted the following closeout documentation (in addition to any other documentation required elsewhere in the Contract Documents):

9.4.1.1 Evidence satisfactory to the Owner that all payrolls, material bills, and other indebtedness connected with the work have been paid,

9.4.1.2 An acceptable RELEASE OF LIENS,

9.4.1.3 Copies of all applicable warranties,

9.4.1.4 As-built drawings,

9.4.1.5 Operations and Maintenance Manuals,

9.4.1.6 Instruction Manuals,

9.4.1.7 Consent of Surety to final payment.

9.4.1.8 The Owner reserves the right to retain payments, or parts thereof, for its protection until the foregoing conditions have been complied with, defective work corrected and all unsatisfactory conditions remedied.

## ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY

10.1 The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take all reasonable precautions to prevent damage, injury or loss to: workers, persons nearby who may be affected, the Work, materials and equipment to be incorporated, and existing property at the site or adjacent thereto. The Contractor shall give notices and comply with applicable laws ordinances,

rules regulations, and lawful orders of public authorities bearing on the safety of persons and property and their protection from injury, damage, or loss. The Contractor shall promptly remedy damage and loss to property at the site caused in whole or in part by the Contractor, a Subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable.

- 10.2 The Contractor shall notify the Owner in the event any ~~existing~~ **previously unknown** hazardous material such as ~~lead~~, PCBs, asbestos, etc. is encountered on the project. The Owner will arrange with a qualified specialist for the identification, testing, removal, handling and protection against exposure or environmental pollution, to comply with applicable regulation laws and ordinances. The Contractor and Architect will not be required to participate in or to perform this operation. Upon completion of this work, the Owner will notify the Contractor and Architect in writing the area has been cleared and approved by the authorities in order for the work to proceed. The Contractor shall attach documentation from the authorities of said approval **to the closeout documents to be submitted at the end of the project.**
- 10.2.1 **Any activities with the potential to disturb lead-based materials should be performed by the Contractor in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead.**
- 10.2.1.1 **The Contractor shall notify the Owner in the event they encounter previously unknown material that they suspect may contain "lead". The Owner will arrange with a qualified specialist for identification and testing and advise the Contractor of the results. In the case that testing identifies potential lead based materials, the contractor shall continue performance of the work that has the potential to disturb associated in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead.**
- 10.3 As required in the Hazardous Chemical Information Act of June 1984, all vendors supplying any materials that may be defined as hazardous, must provide Material Safety Data Sheets for those products. Any chemical product should be considered hazardous if it has a warning caution on the label relating to a potential physical or health hazard, if it is known to be present in the work place, and if employees may be exposed under normal conditions or in any foreseeable emergency situation. Material Safety Data Sheets must be provided directly to the Owner along with the shipping slips that include those products.
- 10.4 The Contractor shall certify to the Owner that materials incorporated into the Work are free of all asbestos. This certification may be in the form of Material Safety Data Sheet (MSDS) provided by the product manufacturer for the materials used in construction, as specified or as provided by the Contractor.

#### **ARTICLE 11: INSURANCE AND BONDS**

- 11.1 The Contractor shall carry all insurance required by law, such as Unemployment Insurance, etc. The Contractor shall carry such insurance coverage as they desire on their own property such as a field office, storage sheds or other structures erected upon the project site that belong to them and for their own use. The Subcontractors involved with this project shall carry whatever insurance protection they consider necessary to cover the loss of any of their personal property, etc.
- 11.2 Upon being awarded the Contract, the Contractor shall obtain a minimum of two (2) copies of all required insurance certificates called for herein, and submit one (1) copy of each certificate, to the Owner, within 20 days of contract award.
- 11.3 Bodily Injury Liability and Property Damage Liability Insurance shall, in addition to the coverage included herein, include coverage for injury to or destruction of any property arising out of the collapse of or structural injury to any building or structure due to demolition work and evidence of these coverages shall be filed with and approved by the Owner.

- 11.4 The Contractor's Property Damage Liability Insurance shall, in addition to the coverage noted herein, include coverage on all real and personal property in their care, custody and control damaged in any way by the Contractor or their Subcontractors during the entire construction period on this project.
- 11.5 Builders Risk (including Standard Extended Coverage Insurance) on the existing building during the entire construction period, may be provided by the Contractor under this contract. The Owner shall insure the existing building and all of its contents and all this new alteration work under this contract during entire construction period for the full insurable value of the entire work at the site. Note, however, that the Contractor and their Subcontractors shall be responsible for insuring building materials (installed and stored) and their tools and equipment whenever in use on the project, against fire damage, theft, vandalism, etc.
- 11.6 Certificates of the insurance company or companies stating the amount and type of coverage, terms of policies, etc., shall be furnished to the Owner, within 20 days of contract award.
- 11.7 The Contractor shall, at their own expense, (in addition to the above) carry the following forms of insurance:
  - 11.7.1 Contractor's Contractual Liability Insurance  
Minimum coverage to be:

Bodily Injury	\$1,000,000	for each occurrence
	\$3,000,000	aggregate
Property Damage	\$1,000,000	for each occurrence
	\$3,000,000	aggregate
  - 11.7.2 Contractor's Protective Liability Insurance  
Minimum coverage to be:

Bodily Injury	\$1,000,000	for each occurrence
	\$3,000,000	aggregate
Property Damage	\$1,000,000	for each occurrence
	\$3,000,000	aggregate
  - 11.7.3 Automobile Liability Insurance  
Minimum coverage to be:

Bodily Injury	\$1,000,000	for each person
	\$1,000,000	for each occurrence
Property Damage	\$500,000	per accident
- 11.7.4 Prime Contractor's and Subcontractors' policies shall include contingent and contractual liability coverage in the same minimum amounts as 11.7.1 above.
- 11.7.5 Workmen's Compensation (including Employer's Liability):
  - 11.7.5.1 Minimum Limit on employer's liability to be as required by law.

- 11.7.5.2 Minimum Limit for all employees working at one site.
- 11.7.6 Certificates of Insurance must be filed with the Owner guaranteeing fifteen (15) days prior notice of cancellation, non-renewal, or any change in coverages and limits of liability shown as included on certificates.
- 11.7.7 Social Security Liability
- 11.7.7.1 With respect to all persons at any time employed by or on the payroll of the Contractor or performing any work for or on their behalf, or in connection with or arising out of the Contractor's business, the Contractor shall accept full and exclusive liability for the payment of any and all contributions or taxes or unemployment insurance, or old age retirement benefits, pensions or annuities now or hereafter imposed by the Government of the United States and the State or political subdivision thereof, whether the same be measured by wages, salaries or other remuneration paid to such persons or otherwise.
- 11.7.7.2 Upon request, the Contractor shall furnish Owner such information on payrolls or employment records as may be necessary to enable it to fully comply with the law imposing the aforesaid contributions or taxes.
- 11.7.7.3 If the Owner is required by law to and does pay any and/or all of the aforesaid contributions or taxes, the Contractor shall forthwith reimburse the Owner for the entire amount so paid by the Owner.

#### **ARTICLE 12: UNCOVERING AND CORRECTION OF WORK**

- 12.1 The Contractor shall promptly correct Work rejected by the Owner or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed, and shall correct any Work found to be not in accordance with the requirements of the Contract Documents within a period of two years from the date of Substantial Completion, or by terms of an applicable special warranty required by the Contract Documents. The provisions of this Article apply to work done by Subcontractors as well as to Work done by direct employees of the Contractor.
- 12.2 At any time during the progress of the work, or in any case where the nature of the defects shall be such that it is not expedient to have them corrected, the Owner, at their option, shall have the right to deduct such sum, or sums, of money from the amount of the contract as they consider justified to adjust the difference in value between the defective work and that required under contract including any damage to the structure.

#### **ARTICLE 13: MISCELLANEOUS PROVISIONS**

- 13.1 CUTTING AND PATCHING
- 13.1.1 The Contractor shall be responsible for all cutting and patching. The Contractor shall coordinate the work of the various trades involved.
- 13.2 DIMENSIONS
- 13.2.1 All dimensions shown shall be verified by the Contractor by actual measurements at the project site. Any discrepancies between the drawings and specifications and the existing conditions shall be referred to the Owner for adjustment before any work affected thereby has been performed.
- 13.3 LABORATORY TESTS

- 13.3.1 Any specified laboratory tests of material and finished articles to be incorporated in the work shall be made by bureaus, laboratories or agencies approved by the Owner and reports of such tests shall be submitted to the Owner. The cost of the testing shall be paid for by the Contractor.
- 13.3.2 The Contractor shall furnish all sample materials required for these tests and shall deliver same without charge to the testing laboratory or other designated agency when and where directed by the Owner.
- 13.4 ARCHAEOLOGICAL EVIDENCE
- 13.4.1 Whenever, in the course of construction, any archaeological evidence is encountered on the surface or below the surface of the ground, the Contractor shall notify the authorities of the State Historic Preservation Office and suspend work in the immediate area for a reasonable time to permit those authorities, or persons designated by them, to examine the area and ensure the proper removal of the archaeological evidence for suitable preservation by the Division of Historical and Cultural Affairs.
- 13.5 GLASS REPLACEMENT AND CLEANING
- 13.5.1 The General Contractor shall replace without expense to the Owner all glass broken during the construction of the project. If job conditions warrant, at completion of the job the General Contractor shall have all glass cleaned and polished.
- 13.6 WARRANTY
- 13.6.1 For a period of two (2) years from the date of substantial completion, as evidenced by the date of final acceptance of the work, the contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect of equipment, material or workmanship performed by the contractor or any of his subcontractors or suppliers. However, manufacturer's warranties and guarantees, if for a period longer than two (2) years, shall take precedence over the above warranties. The contractor shall remedy, at his own expense, any such failure to conform or any such defect. The protection of this warranty shall be included in the Contractor's Performance Bond.

#### **ARTICLE 14: TERMINATION OR SUSPENSION OF THE CONTRACT**

- 14.1 If the Contractor defaults or persistently fails or neglects to carry out the Work in accordance with the Contract Documents or fails to perform a provision of the Contract, the Owner, after seven days written notice to the Contractor, may make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor. Alternatively, at the Owner's option, and the Owner may terminate the Contract and take possession of the site and of all materials, equipment, tools, and machinery thereon owned by the Contractor and may finish the Work by whatever method the Owner may deem expedient. If the costs of finishing the Work exceed any unpaid compensation due the Contractor, the Contractor shall pay the difference to the Owner.
- 14.2 "If the continuation of this Agreement is contingent upon the appropriation of adequate state, or federal funds, this Agreement may be terminated on the date beginning on the first fiscal year for which funds are not appropriated or at the exhaustion of the appropriation. The Owner may terminate this Agreement by providing written notice to the parties of such non-appropriation. All payment obligations of the Owner will cease upon the date of termination. Notwithstanding the foregoing, the Owner agrees that it will use its best efforts to obtain approval of necessary funds to continue the Agreement by taking appropriate action to request adequate funds to continue the Agreement."

**END OF SECTION**

### EMPLOYEE DRUG TESTING REPORT FORM

Period Ending: \_\_\_\_\_

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds maintain testing data that includes but is not limited to the data elements below.

Project Number: \_\_\_\_\_

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

Contractor/Subcontractor Name: \_\_\_\_\_

Contractor/Subcontractor Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Number of employees who worked on the jobsite during the report period: \_\_\_\_\_

Number of employees subject to random testing during the report period: \_\_\_\_\_

Number of Negative Results \_\_\_\_\_ Number of Positive Results \_\_\_\_\_

Action taken on employee(s) in response to a failed or positive random test:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

This form is not required to be submitted to the Owner. Included as a reference to show information required to be maintained by the Contractor. The Owner shall have the right to periodically audit all Contractor and Subcontractor test results at the Contractor's or Subcontractor's offices (or by other means to make the data available for inspection by the Owner).

**EMPLOYEE DRUG TESTING  
REPORT OF POSITIVE RESULTS**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds to notify the Owner in writing of a positive random drug test.

Project Number: \_\_\_\_\_

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

Contractor/Subcontractor Name: \_\_\_\_\_

Contractor/Subcontractor Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Name of employee with positive test result: \_\_\_\_\_

Last 4 digits of employee SSN: \_\_\_\_\_

Date test results received: \_\_\_\_\_

Action taken on employee in response to a positive test result:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Authorized Representative of Contractor/Subcontractor: \_\_\_\_\_  
(typed or printed)

Authorized Representative of Contractor/Subcontractor: \_\_\_\_\_  
(signature)

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

**This form shall be sent by mail to the Owner within 24 hours of receipt of test results.**

**Enclose this test results form in a sealed envelope with the notation "Drug Testing Form – DO NOT OPEN" on the face thereof and place in a separate mailing envelope.**

516 N. KING ST, WILMINGTON DE 19801  
NOVEMBER 22, 2024

CUSTOMS HOUSE RENOVATION AND ADDITION  
#MJ0217000003-BP4

**END OF SECTION**

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516 N. KING ST, WILMINGTON DE 19801  
CUSTOM HOUSE RENOVATION AND ADDITION  
#MJ0217000003

**AFFIDAVIT OF  
CRAFT TRAINING COMPLIANCE**

We, the contractor, hereby certify that we and all applicable subcontractors will abide by the contractor and subcontractor craft training requirements outlined below for the duration of the contract. Craft training must be provided by a contractor and/or subcontractor for each craft on a project for which there are Delaware Department of Labor approved and registered training programs or, if the contractor and/or subcontractor meets the requirements under Title 29, Chapter 69, Section 6960A.(b)(1)c.1.-3., payment may be made in accordance with Title 29, Chapter 69, Section 6960A.(b)(1)d. A list of crafts for which there are approved and registered training programs is maintained by the Delaware Department of Labor and can be found at:

<https://laborfiles.delaware.gov/main/det/apprenticeship/DE%20Craft%20Training%20Occupation%20List%20Effective%20JUNE%201%202022.pdf> If you have questions regarding craft training programs, please submit all questions in writing to the Delaware Department of Labor at: [apprenticeship@delaware.gov](mailto:apprenticeship@delaware.gov). ***This Affidavit of Craft Training Compliance must be submitted prior to contract execution.***

In accordance with Title 29, Chapter 69, Section 6960A.(a)(1), a contract relating to a public works project under § 6962 of Title 29 must include a craft training program for each craft in the project if at the time the contractor executes a public works contract, all of the following apply:

- a. A project meets the prevailing wage requirement under Section 6960 of Title 29.
- b. The contractor employs 10 or more total employees.
- c. The project is not a federal highway project, except for the project under Section 6962(c)(11) of Title 29.
- d. There is an apprenticeship program for a craft in the project on the list of crafts under Section 204(b)(2) of Title 19.

Pursuant to Title 29, Chapter 69, Section 6960A.(a)(2), ***a contractor must commit that all subcontractors provide craft training*** if paragraph (a)(1) of this section applies to the subcontractor. Failure to provide required craft training or payment on the project may subject the successful contractor and/or subcontractor(s) to penalties as outlined in Title 29, Chapter 69, Section 6960A.(d)(1)-(3).

**Craft(s):** \_\_\_\_\_

**Contractor Name:** \_\_\_\_\_

**Contractor Address:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Contractor Program  
Registration Number(s)** \_\_\_\_\_



**SECTION 01 10 00**

**SUMMARY OF WORK**

SECTION 011100 - SUMMARY OF WORK

1. RELATED DOCUMENTS

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

2. CONTRACTS

- A. The work will be performed under separate prime contracts managed by the Construction Manager.

3. ALTERATIONS & COORDINATION

- A. Contractor shall be responsible to coordinate their work with the work of others, including, but not limited to, the preparation of general coordination drawings, diagrams and schedules, and control of site utilization, from the beginning of activity, through project close-out and warranty periods.

4. KNOWLEDGE OF CONTRACT REQUIREMENTS

- A. The Contractor and his Subcontractors, Sub-subcontractors and material men shall consult in detail the Contract Documents for instructions and requirements pertaining to the Work, and at his and their cost, shall provide all labor, materials, equipment and services necessary to furnish, install and complete the work in strict conformance with all provisions thereof.
- B. The Contractor will be held to have examined the site of the Work prior to submitting his proposal and informed himself, his Subcontractors, Sub-subcontractors and material men of all existing conditions affecting the execution of the Work.
- C. The Contractor will be held to have examined the Contract Documents and modifications thereto, as they may affect subdivisions of the Work and informed himself, his Subcontractors, Sub-subcontractors and material men of all conditions thereof affecting the execution of the Work.
- D. The Scope of Work for the Contract is not necessarily limited to the description of each section of the Specifications and the illustrations shown on the Drawings. Include all minor items not expressly indicated in the Contract Documents, or as might be found necessary as a result of field conditions, in order to complete the Work as it is intended, without any gaps between the various subdivisions of work.
- E. The Contractor will be held to be thoroughly familiar with all conditions affecting labor in the area of the Project including, but not limited to, Unions, incentive pay, procurements,

living, parking and commuting conditions and to have informed his Subcontractors and Sub-subcontractors thereof.

5. CONTRACT DOCUMENTS INFORMATION

- A. The Contract Documents are prepared in accordance with available information as to existing conditions and locations. If, during construction, conditions are revealed at variance with the Contract Documents, notify the Construction Manager immediately, but no more than three (3) days from the day the variance is first known. Failure to give timely notice shall operate to waive any claim Contractor might otherwise have for an adjustment to Contract Time or Sum as a consequence of such variance.
- B. The Specifications determine the kinds and methods of installation of the various materials, the Drawings establish the quantities, dimensions and details of materials, the schedules on the Drawings give the location, type and extent of the materials.
- C. Dimensions given on the Drawings govern scale measurements and large-scale drawings govern small scale drawings, except as to anything omitted unless such omission is expressly noted on the large-scale drawings.
- D. The techniques or methods of specifying to record requirements vary throughout text, and may include "prescriptive", "open generic/descriptive", "compliance with standards", "performance", "proprietary", or a combination of these. The methods used for specifying one unit of work have no bearing on requirements for another unit of work.
- E. Whenever a material, article or piece of equipment is referred to in the singular number in the Contract Documents, it shall be the same as referring to it in the plural. As many such materials, articles or pieces of equipment shall be provided as are required to complete the Work.
- F. Whenever a material, article or piece of equipment is specified by reference to a governmental, trade association of similar standard, it shall comply with the requirements of the latest publication thereof and amendments thereto in effect on the bid date.
- G. In addition to the requirements of the Contract Documents, Contractor's work shall also comply with applicable standards of the construction industry and those industry standards are made a part of Contract Documents by reference, as if copied directly into Contract Documents, or as if published copies were bound herein.
- H. Where compliance with two (2) or more industry standards, contract requirements, or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, then the most stringent requirements, which are generally recognized to be also the most costly, is intended and will be enforced, unless specifically detailed language written into the Contract Documents clearly indicates that a less stringent requirement is to be fulfilled. Refer apparently equal but different requirements, and uncertainties as to which level of quality is more stringent, to Architect for decision before proceeding.
- I. Reference standards referenced directly in Contract Documents or by governing regulations

have precedence over non-reference standards which are recognized in industry for applicability of work.

- J. Contractor's bid is based on the complete set of Contract Documents including documents not specifically issued as part of the bid pack but referenced in same.

6. SCOPE OF WORK/GENERAL INFORMATION

- A. A Scope of Work for each contract to be awarded on the project follows in this section. When a Contract has been awarded to a Contractor, the successful Contractor will be listed after the title of the Contract. When no Contract has yet been awarded, no Contractor's name will be listed. Previous Scopes of Work include addendum changes.
- B. Contractor is responsible for performing the work listed in the Summary of Work for his contract. Contractor is also responsible for knowing the work that has been assigned to preceding contracts. No additional compensation or extension of time will be allowed a Contractor due to his ignorance of the work assigned to his Contract or to other contracts which may affect his work. The Contractor is responsible, however, for all items which are covered in the Specifications and Drawings relating to their Contract if not specifically mentioned in the Summary of Work.
- C. The Construction Manager will provide on-site a source for temporary electric, temporary water and portable sanitation facilities only. It is each Contractor's responsibility to make the necessary connections, including all material for temporary electric and water. Please note that utility charges for office trailers will be the responsibility of the individual Contractors.
- D. A dumpster will be provided on site for free use by Contractors to dispose of non-hazardous, common, work-related refuse. Clean-up is the responsibility of each Contractor. Clean up shall be performed on a daily basis. Contractors not complying will be advised in writing and back charged for all costs associated with the cleanup of their work.
- E. Contractors are reminded that there are limited storage areas available on site. Off-site storage will be the responsibility of each individual Contractor.
- F. Office trailer permits off site will be the responsibility of each individual Contractor. On site Contractor's field offices, one (1) per Contractor, if required, will be located as directed by the Construction Manager.
- G. Contractor will be prepared to discuss and submit a detailed project schedule seven (7) days after receipt of Notice to Proceed and to begin its submittal process. The Project Schedule is an integral part of this contract. Certain construction sequences and priorities must take place in order to meet the target dates. Concentrated work periods will occur and each Contractor is responsible to staff the project as required by the current Construction Schedule or as directed by the Construction Manager. The Contractor will cooperate with the Construction Manager in planning and meeting the required sequences of work and Project Schedule as periodically updated by the Construction Manager.
- H. All bids must include insurance limits in accordance with Article 11 of Section 007300

SUPPLEMENTARY CONDITIONS.

- I. Hoisting, scaffolding and material handling are the responsibility of each Contractor, unless otherwise noted.
- J. Contractor will be responsible for the layout of its own work. The Construction Manager will provide benchmark and layout of the building line.
- K. Contractor will be responsible to keep clean public roadways soiled by construction traffic on a daily basis. If cleaning is not done, the Construction Manager may perform the cleaning on an overtime basis and backcharge the Contractor responsible.
- L. Contractor Scopes of Work and Schedule are interrelated. Familiarity with each is required.
- M. The Construction Manager will provide testing services for soil, concrete and steel. Other testing as required by the Contract Documents will be in accordance with the technical specifications and/or the individual scope of work. Refer to Specification Section 004500 - QUALITY CONTROL.
- N. Safety is the responsibility of each individual Contractor. The project will be governed under the guidelines of OSHA.
- O. Inter-Contractor shop drawing distribution will be performed by the Construction Manager. Contractor is individually responsible for either coordinating his work with these distributed drawings or notifying the Construction Manager, in writing, of any discrepancies.
- P. Coordination with other trades will be required. The Contractor will be required to attend periodic coordination meetings with other trades where requirements, conflicts and coordination issues will be discussed and resolved. Attendance when requested will be mandatory. If inter-Contractor coordination is not satisfactorily performed, the conflicting Contractors shall mutually share the cost to relocate and/or reinstall their work.
- Q. Contractor shall submit a schedule of values to the Construction Manager prior to the submission of their first invoice for approval through Building Blok.
- R. Contractor is expected to review and coordinate its Work with the complete set of Contract Documents, including all items noted as by his trade whether or not shown on that particular set of drawings. Documents are available at the site for review.
- S. Contractor is responsible for obtaining all necessary permits required for his work, including street permits. Unless otherwise noted, the building permit shall be secured by the Construction Manager. Any subcontractor who will be restricting access to street, right of way or adjacent property must notify the Construction Manager 48 hours in advance.
- T. Contractor's License: Submit a copy of all business licenses required by local and state agencies.
- U. Contractor shall absorb, without additional compensation, any and all costs of working

- beyond normal hours to maintain job progress in accordance with the current construction schedule.
- V. No asbestos or PCB's in or on any material or equipment will be accepted or allowed on this project. All hazardous materials will be treated in accordance with all State and Federal regulations.
  - W. Daily cleanup of the work is the responsibility of each individual Contractor which includes broom cleaning of their debris as required. Contractor will be individually back charged by the Construction Manager for cleanup not satisfactorily performed by the Contractor.
  - X. In the event asbestos is uncovered, the Contractor shall notify the Construction Manager of the areas requiring removal of asbestos. The Construction Manager shall then coordinate the removal with the Owner.
  - Y. This project is to be constructed adjacent to existing buildings. Contractor shall exercise all due precautions to minimize noise, air pollution and any other construction hazards which in any way would cause discomfort or danger to the occupants of the existing building in the area.
  - Z. The Safety Cable System shall not be altered or removed without a written request submitted to the Project Manager with a copy to the Field Manager. It shall be the responsibility of each and every Contractor that is removing or altering the Safety Cable System to maintain the fall protection safety provided by the safety cable and not leave the area unprotected. Each and every Contractor shall be responsible for re-installing the Safety Cable System immediately after work is completed. Each and every Contractor shall be responsible for re-installing the Safety Cable System in accordance with OSHA standards.
  - AA. Normal work hours for this project are from 7:00 a.m. to 3:30 p.m. Any work to be performed outside of these hours must receive prior approval from the Construction Manager. Requests to work beyond normal work hours shall be submitted at least 48 hours prior.
  - AB. Contractor is responsible for having a competent project superintendent/foreman on-site during all work performed under its contract.
  - AC. In the event the Contractor has non-English speaking employees or subcontractors on the project, they shall have a superintendent or foreman on site, at all times, who speaks English and can communicate with Contractor's employees. Should the Contractor fail to meet this requirement, at any time, Construction Manager may direct all Work to stop until the proper supervision is on site. The Contractor will be responsible for maintaining the project work schedule and make up at its own expense, any delay to the Schedule resulting from the work stoppage.
  - AD. Punch List Procedures: Contractor shall be given a copy of the punch list with his appropriate work identified. Contractor shall have nine (9) calendar workdays to complete its punch list work. On the 10th day or as determined by the Construction Manager, the Construction Manager shall employ other contractors, as required, to complete any incomplete punch list work and retain from the appropriate Contractors retainage all costs

incurred.

- AE. Contractor shall provide the necessary safety barricades and railings required to complete their work and comply with all OSHA, local code and contract specifications.
- AF. **Prohibition of Using Photographs on EDiS Projects**: The Contractor and all associated subcontractors agrees to not issue any news release or advertising pertaining to the Work or the Project, including references to the Project on the Contractor's/subcontractor website or other social media outlets, without obtaining EDiS' prior written approval, in each instance. The Contractor, for itself, its employees, vendors and subcontractors, agrees to not use the name of the Owner, the Project, EDiS or any photographs, videos, or other images of the Project in connection with any of Contractor's business promotion activities, advertising, website, social media outlets, or operations, without EDiS' prior written approval in each instance.

CONTRACT NO. 4-01 – INTERIOR MASONRY

- A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 040100	Brick Repair
Section 040110	Masonry Cleaning
Section 040141	Stone Masonry Repair
Section 042000	Unit Masonry
Section 092400	Stucco Replacement
Section 099726	Mineral Silicate Coatings

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide interior masonry units, reinforcing, accessories and related work. This contract includes all masonry work except the work provided by Contract 3-09 Exterior Masonry and CMU Shafts. This contractor owns coordination with the Contract 3-09 contractor and must review and understand the scope of work for Contract 3-09 Exterior Masonry and CMU Shafts.
2. Provide caulking of masonry to masonry and to dissimilar materials.
3. Provide integral masonry flashings, expansion joints, insulation and other related items as required.
4. Provide grouting of door frames at all masonry openings.
5. Provide weather protection and temporary heat as required to perform the work and maintain the project schedule. This would include tenting, tarping, heating (providing fuel and equipment), installation, maintenance and removal. Kerosene is not an acceptable fuel for work within the interior spaces.
6. Provide scaffolding as required to complete the work.
7. Provide layout of the work including responsibility for all elevations and dimensions as they affect other Contractor's work.
8. Provide lintels either required by this Contract or install loose lintels furnished by others. Include bolting or welding on lintels as per details.
9. Provide mixing stations as required to perform your work. The station locations shall be coordinated with the CM (include 3 separate locations and the relocation/remobilization of the station 3 times) The mixing area shall be protected as required by DNREC and it shall be this

contractor's responsibility to maintain the station area at all times. Remove all components and restore the area when the work of this contract is complete.

10. Provide fill at hollow concrete masonry units.
11. Setting of reinforcing steel in interior block walls.
12. Cutting, fitting and building into masonry work, embedments provided by others.
13. Interior exposed masonry walls shall be cleaned and scraped thoroughly; a second pass of scraping and refining the cleaning shall be included in the base bid. CM to review and coordinate second pass with the masonry foreman in the field.
14. Supply and manage dumpsters for use in removal of masonry debris created by this contract work. The project dumpsters may not be used for masonry debris.
15. Provide temporary generators and services as required to provide temporary power, water etc. as needed for your course of work.
16. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
17. Provide hot dip galvanized partition top anchors, 1/4" steel plates, and H&B anchors at all interior partitions per details on A071.
18. Provide pre-formed neoprene sponge plugs at top of CMU walls that are not fire rated per details on A071.
19. Provide fire sealant at top of CMU walls that are fire rated per details on A071. Also include these sealants at all steel penetrations through the provided masonry.
20. Provide bond beams including reinforcing and fill.
21. Carefully remove existing masonry down to the floor at windows E2.4, E2.10, E3.4, and E3.10 as shown on drawings A204 and A205.
22. Provide 8" CMU infill at existing window openings at T-2 locations and notes on drawings A204 and A205. Include the removal of the existing security bars at these locations.
23. Create openings in existing multi-wythe brick walls per note T-3 on drawings A204 and A205. At each wythe of brick furnish and install galvanized steel angle lintels to create new openings. Repairs will be needed at all openings, using grout/mortar to stabilize the cut masonry.
24. Provide 8" CMU infill, fully grouted and reinforced, at existing window openings per note T-5 on drawings A204 and A205. Include the removal of the existing security bars at these locations.
25. Clean, repair, and repoint existing granite at entire perimeter of existing building per drawings

A204 and A205.

26. Demolish the existing stucco system on the Custom House and install a new stucco system as shown on the drawings and specified in Specification Section 09 24 00 Stucco Replacement. The replacement of the stucco on the existing masonry chimneys is not part of this contract. This work is being performed by Contract 3-09 Exterior Masonry & CMU Shafts.
27. Inside the existing Custom House lead-based paints and coatings have been identified. Any activities with the potential to disturb lead-based materials should be performed by the Contractor in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead. The Contractor shall notify the Owner in the event they encounter previously unknown material that they suspect may contain "lead". The Owner will arrange with a qualified specialist for identification and testing and advise the Contractor of the results. In the case that testing identifies potential lead-based materials, the contractor shall continue performance of the work that has the potential to disturb associated in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead.
28. Included within this contract's base bid an allowance of \$20,000 for work to be determined by the owner and construction manager. Any unused allowance funds will be returned to the owner by means of a credit change order.

CONTRACT NO. 4-02 – MISCELLANEOUS METALS, STAIRS, AND RAILS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 055000	Metal Fabrications
Section 055100	Metal Stairs
Section 055313	Bar Grating
Section 057313	Glazed Decorative Metal Railing
Section 057500	Decorative Formed Metal
Section 108213	Metal Screen Wall

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide interior and exterior stairs, loose lintels, misc. metal angles, plates, handrails, railings, metal ladders and accessories. Refer to the Bid Package 2 Structural drawings. Structural steel is not part of this contract. This contract includes all miscellaneous metal work except the work provided by Contract 2-02 Structural and Miscellaneous Steel. This contractor owns coordination with the Contract 2-02 contractor and must review and understand the scope of work for Contract 2-02 Structural and Miscellaneous Steel.
2. Furnish loose steel lintels, angles, plates and embedded items to the Concrete and Masonry contractors.
3. Provide miscellaneous rough hardware, iron shapes, framing and support angles.
4. Provide gratings.
5. Provide corner guards.
6. Elevator sill angles, provide and coordinate anchoring systems, bolts etc. and installation with other trades.
7. Provide glazed decorative metal railing at the Grand Stair as specified in Section 057313.
8. Provide snap-together column covers as specified in Section 057500 Decorative Formed Metal.
9. Provide metal screen wall around the mechanical area on the roof as specified in Section 108213 and as shown on drawing A340. Contract 3-08 metal panels is responsible for all other panels.
10. Provide all decorative metal fencing and gates as shown on Architectural Site Plans A-091 through A-095. Include complete installation and coordination with electrical and special systems contractor for the locking interface and card access.

11. Fabricate the Generator Docking Station and heavy-duty bollards as shown on drawing A095. These will be turned over to the Contract 4-12 Miscellaneous Concrete Contractor for installation.
12. Galvanizing and other special coatings as required.
13. Anchoring devices, fasteners, inserts and other related items associated with the installation of the above items.
14. Field touch-up paint.
15. No electrical power for welders will be provided.
16. Verify all field dimensions prior to fabrication.
17. No electrical power for this contractor's equipment or welders will be provided. Electrical power to be provided as needed by this contractor.
18. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
19. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is \$2,500 and shall be included in your base bid proposal.
20. Provide all delegated design as indicated. Provide data and submittal information related to the scope of this contract signed and sealed by a Professional Engineer as required by the contract documents.
21. Included within this contract's base bid an allowance of \$20,000 for work to be determined by the owner and construction manager. Any unused allowance funds will be returned to the owner by means of a credit change order.

CONTRACT NO. 4-03 – CARPENTRY AND GENERAL WORKS

- A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 034900	Glass-Fiber-Reinforced Concrete (GFRC)
Section 060050	Repair of Exterior Carpentry
Section 061053	Miscellaneous Rough Carpentry
Section 061073	Exterior Misc Rough Carpentry
Section 079510	Exterior Expansion Control
Section 080152	Wood Windows Restoration
Section 081110	Exterior Hollow Metal Doors and Frames
Section 081113	Interior Hollow Metal Doors and Frames
Section 081416	Flush Wood Doors
Section 083113	Access Doors and Panels
Section 083613	Sectional Doors
Section 087100	Door Hardware
Section 088300	Mirrors
Section 089119	Fixed Louvers
Section 098300	Acoustic Finishes
Section 101100	Visual Display Units
Section 101423	Panel Signage
Section 102113.14	Stainless-Steel Toilet Compartments (Incl. blocking and supports)
Section 102600	Wall and Door Protection (coordinate blocking and supports)
Section 102800	Toilet, Bath, and Laundry Accessories (Incl. blocking and supports)
Section 104413	Fire Protection Cabinets (Incl. blocking and supports)
Section 104416	Fire Extinguishers
Section 107516	Ground-Set Flagpoles
Section 111400	Pedestrian Control Equipment
Section 112423	Maintenance Safety Equipment

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide labor and materials to perform the work related to all carpentry and general work.
2. Provide glass-fiber-reinforced concrete (GFRC) brackets, soffits, fascia and balustrade at historical balcony. This contract also includes GFRC panel frames, anchors, and connection hardware.
3. Provide labor and materials needed for the repair and restoration miscellaneous carpentry work related to the existing building enclosure as described in Section 060050.

4. Provide all rough carpentry related to the exterior skin of the building and roof areas, including wood nailers and blocking, roof blocking, curb blocking, roof ladder blocking, MEP blocking coordinated with MEP trade, fire shutter blocking etc. as required. Provide blocking on steel channel as indicated on 3/S203.
5. Provide all rough carpentry related to the interior of the building including blocking, wood nailers, etc. for the installation of fire extinguishers, doors, door hold opens, wall mounted closers, wall door stops, windows, toilet accessories, cabinets, toilet compartments, visual display units, casework, millwork, AED cabinets, fire extinguisher cabinets, roller shades, rollup doors, coiling doors, TV monitors and AV mounts/equipment, etc. including fire treating as required.
6. Provide wood framing, LVL joists, 2x4 sleepers, shims, and ¾" T&G cement board to construct the floor in the existing attic of the Custom House. See drawings S200 for details.
7. At the Existing Historic Stairs in the Custom House:
  - a. Install new stained wood wall-mounted handrails at locations where missing:
    1. Between 3rd floor and mezzanine.
    2. Between mezzanine and attic access landing.
    3. Match existing profile and brackets.
8. Provide and install plywood back boards on all wall areas, floor to ceiling in all electric, MDF and IDF rooms. Backboards to be ¾ inch plywood, painted one side with white fireproof paint and fire caulked to the walls tightly.
9. Provide exterior wall expansion control systems, exterior wall expansion joint covers, and exterior soffit expansion control systems as indicated on the drawings and as specified in Specification Section 07 95 10. The exterior roof expansion control is the responsibility of Contract 3-02 Roofing.
10. Provide wood window restoration and or replacement as indicated on drawings A204 and A205, and Specification Section 08 01 52. Carpenter to caulk interior and exterior of all wood windows.
11. Provide all interior caulking including any cover assemblies and expansion joints.
12. Furnish and install metal and wood doors and frames, including receipt of doors and frames at the curb side. This Contractor shall receive the doors, frames and hardware and inventory immediately. This Contractor is responsible for safe keeping of all materials and shall provide written documentation that all materials were received. All hardware shall be secured in a fully locked and protected area by this contractor.
13. Furnish and install access doors, panels, and frames that are identified on the door schedule. Access panels required for the work of the Mechanical, Electrical, Plumbing, and Fire Protection contractors are furnished by those contractors to the Drywall contractor for framing and final installation.
14. Provide all sectional doors as required by the contract documents and as specified in Specification Section 08 36 13. To include but not be limited to any exterior or interior sectional door systems.

- a. Hardware, openers, buttons and controllers required for a complete system shall be provided by this Contractor.
  - b. Provide additional supports for sectional doors. Structural members identified on the structural drawings are not part of this contract scope. Provide ancillary steel, connectors, all thread and other misc. items as required.
  - c. Coordinate all electrical and special systems requirements for the work of this contract with the appropriate contractors.
  - d. Provide low-voltage wiring required for sectional doors automatic door operations. Include all raceways, boxes and switches required for a complete installation.
  - e. Provide keyed switches for both electric and low voltage to match building keying.
  - f. Provide appropriate specified seals, and weatherstripping at all edges. Top, sides and bottom. Seals shall maintain water tightness when installed.
  - g. Ensure that all sectional doors fully open the entire height of the door opening and close with the bottom edge touching the ground. Doors will fit square in the openings with no gaps along the top, bottom or sides when the door is closed.
  - h. Provide all sensing and safety devices as specified for each sectional door to provide a complete assembly.
15. Furnish and install finish hardware related to all hollow metal and wood doors, including receipt of hardware at the curb side. The Carpentry and General Works Contractor is responsible for coordinating door hardware with their work to ensure each opening is properly prepped for hardware being supplied. All low voltage wiring within the hollow metal and wood doors and frames to be installed by the Carpentry & General Works Contractor. Conduits and raceways in the walls will be provided by the Electrical Contractor, as well as final power connections to the equipment power supply. Final connections of low voltage wiring to hardware will be by the Carpentry & General Works Contractor. This contractor to coordinate the work of the Electrical Contractor and Special Systems Contractor to provide a complete installation.
16. Furnish only the finish hardware for the aluminum doors to Contract 4-06 Curtain Wall/Glazing/Storefronts Contractor. The Carpentry and General Works Contractor shall coordinate the hardware and door materials with the Curtain Wall/Glazing/Storefront Contractor prior to ordering materials.
17. The Carpentry and General Works Contractor will participate in all coordination meetings with the Owner, CM, Curtain Wall Contractor, and Special Systems Contractor as required to properly coordinate all doors, frames, hardware and connections, prior to ordering of materials.
18. The Carpentry and General Works Contractor to coordinate with the Special Systems Contractor and Electrical contractor to ensure that all cut outs, plates, receivers, blocking, etc. that are required to be built into the doors and frames are fully coordinated. In person attendance at review and coordination meetings for the doors, hardware, special systems, raceway and electrical connections shall be the responsibility of this Contractor.
19. The Carpentry and General Works Contractor shall provide all magnetic hold open hardware, including extension arms as required. Coordinate and install hold open/closers with fire alarm interface. The power wiring will be by the Electrical Contractor. Fire alarm tie ins will be by the Electrical Contractor.

20. Provide harness lengths to reach above accessible ceilings. Coordination of this work and the lengths required is the responsibility of the Carpentry and General Works Contractor. Provide any harness adapters and connectors as needed to have a splice free system.
21. Provide cylinders and keying of all lock sets for the entire project. Keying for Aluminum Entrance doors to be coordinated and provided by this contract. Provide Owner with a complete schedule of all keying and pin schedules as required.
22. Provide a key box system to hold up to 25% over the amount of keys being supplied.
23. Provide hex keys, flat keys, or special tools for hardware not keyed to building hardware.
24. Construction door cylinders shall be provided by this contractor for use during construction. Plan and include the cost of providing (3) three separate levels of cylinders (green, red, blue) to allow areas to be secured separately as required by the CM. Provide (25) keys per color system.
25. Provide qualified technical field assistance to the Electrical Contractor and Special Systems Contractor as required to facilitate the installation of the materials supplied by your course of work.
26. As changes are made to the hardware schedule, whether due to issued ASI's, RFI's, architectural changes etc., this Contractor shall make updates to the hardware schedule and re-issue so the schedule is always updated and submitted to EDiS.
27. Provide all mirrors as indicated on the drawings and in Specification Section 088300.
28. Provide all fixed louvers, including insulated panels, flashings, steel frames, caulking/sealants and covers if identified. Louvers must be installed so water does not accumulate beyond face of louver. This contractor to maintain these louvers until project is substantially complete. Caulking of louvers at exterior and interior wall assemblies is the responsibility of this contractor. Flashing details must be submitted and approved by the design team.
29. Provide Drapery Track and Curtains as indicated on the drawings and in Specification Section 098300. The acoustic plaster finish system in this specification is not part of this scope.
30. Provide Visual Display Units as indicated on the drawings and in Specification Section 10 11 00.
31. Provide all Panel Signage as indicated on the drawings and in Specification Section 10 14 23. This includes the exterior aluminum plaque and exterior aluminum lettering.
32. Provide all Stainless-Steel Toilet Compartments as indicated on the drawings and in Specification Section 10 21 13.14. Include any supplementary required for a complete installation.
33. Provide all Wall and Door Protection as indicated on the drawings and in Specification Section 10 26 00. This includes vinyl wall protection VWP-1 shown on the finish drawings.

34. Provide all Toilet, Bath, and Laundry Accessories as indicated on the drawings and in Specification Section 10 28 00. This contract shall include installing all owner supplied toilet accessories and specialties.
35. Provide all Fire Protection Cabinets and Fire Extinguishers as indicated on the drawings and in Specification Sections 10 44 13 and 10 44 16. Include labeling of extinguishers and cabinets. Coordinate with other trades for opening size and placement. This contractor to provide blocking for fire extinguisher cabinets.
36. Provide all Pedestrian Control Equipment as indicated on the drawings and in Specification Section 11 14 00.
37. Provide all Ground-set Flagpoles as indicated on the drawings and in Specification Section 10 75 16.
38. Provide all Maintenance Safety Equipment as indicated on the drawings and in Specification Section 11 24 23.
39. All field trimming required to adjust to the existing in place conditions shall be part of this contractors scope of work. Field measuring and verification is to be included.
40. Anchoring devices, fasteners, inserts and other related items associated with the installation of the above items.
41. Verification of field dimensions is the responsibility of this Contractor.
42. Provide three Knox Boxes coordinated with the local fire company for installation at locations identified by the owner/CM.
43. Provide temporary protection at all elevator door openings at each floor. Include the required mesh protection fabric and the necessary wooden framing that allow easy access by other trades. This temporary protection must meet the requirements provided by the elevator contractor. Include maintenance for a period of 12 months from initial installation.
44. Provide and maintain perimeter netting at each floor level including all floor openings. This work shall include toe boards at all locations. Perimeter rail or cable to be provided by the steel contractor.
45. Provide and maintain temporary handrails per OSHA standards at all stair assemblies. The below section is a guideline and does not replace the OSHA regulations Stairs having two or more risers or rising more than 30 inches (76 cm), whichever is less, shall be equipped with: At least one handrail; and one stair rail system along each unprotected side or edge. The height of stair rails shall be not less than 36 inches from the upper surface of the stair rail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread. Handrails shall provide an adequate handhold for employees grasping them to avoid falling. Handrails that will not be a permanent part of the structure being built shall have a minimum clearance of 3 inches (8 cm) between the handrail and walls, stair rail systems, and other objects. Mid rails, and intermediate vertical members, or equivalent intermediate structural members, shall be provided between the

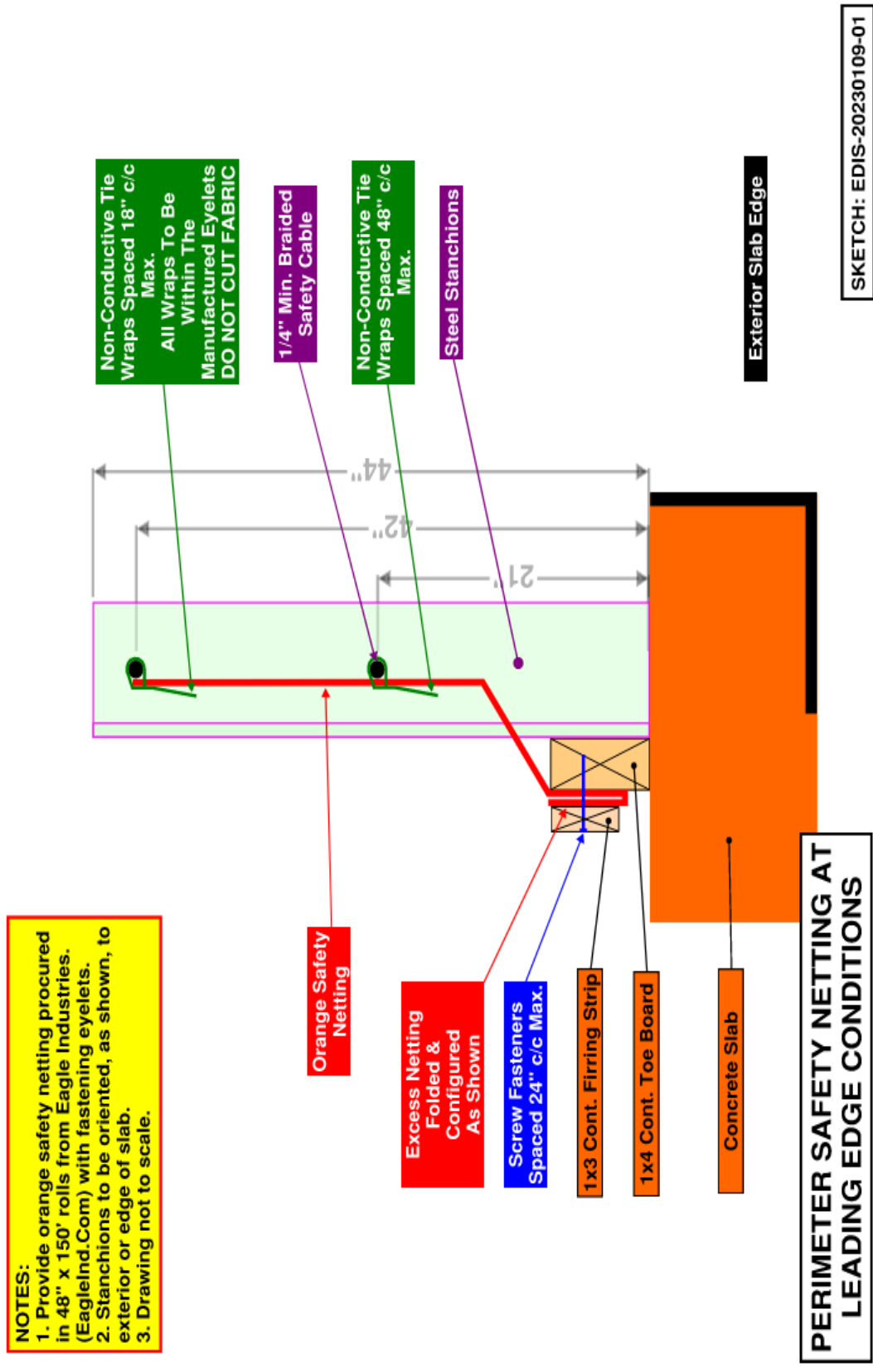
top rail of the stair rail system and the stairway steps. Mid rails, when used, shall be located at a height midway between the top edge of the stair rail system and the stairway steps. When intermediate vertical members, such as balusters, are used between posts, they shall not be more than 19 inches (48 cm) apart.

46. Provide wood infill of stair pans and landing pans. Each tread to have abrasive edge tape applied immediately after installation of infill.
47. Provide temporary rails at all exterior opening on the building until permanent window/doors/curtainwall etc. are installed.
48. Provide temporary protective wooden covers and marking for any floor openings, holes, shafts etc. Include labelling of the covers with clear and readable markings or stickers.
49. Provide an exterior temporary scaffold-stair system to provide access to all floors and the roof from grade. The scaffold must provide a landing with stairs at the roof area. Scaffolding is to be raised above the roof parapet with an extended landing to provide safe access and egress to the roof. Each scaffold leg should have adjustable base plates to accommodate the installation of roofing material without the disassembly of the unit. An 8-foot plywood "wall" must surround the bottom of the stairway with a hinged plywood door installed with a hasp to accept a lock. The scaffold must be installed per OSHA regulations, inspected and tagged for use. Access is to be maintained until contractor is directed to remove by EDiS. Scaffold shall remain until permanent access is installed.
50. Provide and maintain a complete scaffold system for the courtroom ceiling installation. Scaffolding is to be extended over perimeter walking areas to provide complete access to all walls and ceilings. The scaffolding will be equipped with access stairs and safety rail around the perimeter. The scaffold will include a hoisting system for all trades to utilize to raise materials to the working platform for installation. Coordination and allowing full access to other trades so they can perform their work will be included and part of this Contractor's obligation. Contractor is to include set-up, maintenance, inspections, rental, and dismantlement/removal. This contractor is to include three (3) months of rental for the scaffolding. Any time above or below this duration is to be covered on a unit cost basis. All contractors shall provide signed waiver forms to the controlling contractor (this contractor) before they may access the scaffold system.
51. On the existing Custom House building, remove a 10' x 10' area of the existing standing seam metal roof and plywood sheathing. This will allow for steel delivery by the Structural Steel Contractor. After the steel is placed in the building patch back with new materials to match existing materials. The standing seam metal roof does not have to be replaced. Install temporary roofing material to achieve a watertight installation that will last until the new standing seam metal roof is installed.
52. Layout of the work including responsibility for all elevations and dimensions as they affect other Contractor's work.
53. Provide all work related to the building mockup, blocking, installation of door frame, doors, hardware, flashings, fasteners etc. as it relates to mocking up of the systems included in the Carpentry Scope.

54. This Contractor shall include in the base bid 400 hours of Journeyman carpenter time for work to be directed by the Construction Manager.
55. This Contractor must provide additional crews as needed to maintain the project schedule.
56. This Contractor shall at a minimum provide, maintain, and inspect for the length of the project, one temporary fire extinguisher for each 3,000 sq. ft of the protected building area. Travel distance from any point of the protected area to the nearest fire extinguisher shall not exceed 100 feet. In multistory buildings, at least one fire extinguisher shall be located adjacent to the stairway. Fire extinguishers shall be at least 10lb, Multi-Purpose (ABC) dry chemical, UL labeled, with a rating of 3a:40bc. Maintain for the duration of the project until substantial completion to insure coverage and compliance.
57. Provide, maintain and remove a prefabricated manufactured trash chute from the 2<sup>nd</sup> and 3<sup>rd</sup> floors to the dumpster below. This chute shall be maintained and all safety barriers, restraints etc. managed until substantial completion of the project.
58. This contractor shall provide and include all costs associated with installing temporary doors on the exterior of the building (all openings) and a cattle chute on the 2<sup>nd</sup> and 3<sup>rd</sup> floors for accepting deliveries on the 2<sup>nd</sup> and 3<sup>rd</sup> floors. Safety equipment, gates, railings and tie-offs as required by OSHA safety standards shall be included.
59. Provide wood safety barricades to extend the top of roof parapets to OSHA required height during construction. Coordinate removal and replacement of wood safety barricades with metal wall cap installation. Provide manufactured safety rails around roof perimeter that complies with OSHA standards.
60. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is \$2,500 and shall be included in your base bid proposal.
61. This contractor shall deliver all materials to the project site in an orderly organized manner. Deliveries will not be received unless the Carpentry Contractor is on site. The Owner and EDiS will not receive any materials. Additionally provide 48-hour notice prior to delivery. All deliveries are to be between 8:00 AM and 2:00 PM (allow time for check-in of all hardware when scheduling).
62. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
63. Inside the existing Custom House lead-based paints and coatings have been identified. Any activities with the potential to disturb lead-based materials should be performed by the Contractor in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead. The Contractor shall notify the Owner in the event they encounter previously unknown material that they suspect may contain "lead". The Owner will arrange with a qualified specialist for identification and testing and advise the Contractor of the results. In the

case that testing identifies potential lead-based materials, the contractor shall continue performance of the work that has the potential to disturb associated in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead.

64. Include within this contract's base bid an allowance of \$50,000 for work to be determined by the owner and construction manager. Any unused allowance funds will be returned to the owner by means of a credit change order.



CONTRACT NO. 4-04 – DRYWALL AND INTERIOR METAL FRAMING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 051200	Structural Steel (related work)
Section 054000	Cold-Formed Metal Framing
Section 055000	Metal Fabrications (related work)
Section 061000	Miscellaneous Rough Carpentry
Section 072100	Thermal Insulation
Section 078413	Penetration Fire Protection
Section 079200	Joint Sealers
Section 092116.23	Gypsum Board Shaft Wall Assembly
Section 092216	Non-Structural Metal Framing
Section 092900	Gypsum Board
Section 098300	Acoustic Finishes
Division 21	Fire Suppression (coordination)
Division 22	Plumbing (coordination)
Division 23	Heating, Ventilating, and Air Conditioning (coordination)
Division 26	Electrical (coordination)

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide interior metal studs, framing, furring, insulation, gypsum wallboard, taping, spackling and specified wall finishes. (Level 5 where identified) Include all trims and finish pieces for a complete installation. This contract includes interior and exterior framing work except the work provided by Contract 3-01 Exterior Structural Stud Assembly. This contractor owns coordination with the Contract 3-01 contractor and must review and understand the scope of work for Contract 3-01 Exterior Structural Stud Assembly.
2. Provide aluminum plate sub-frame system with clips fixed to CFMF, shims, girts, and gusses to support aluminum plate cladding. Refer to A324 for an example.
3. Provide Structural Metal Stud Support Walls in the Custom House attic as shown on drawing A105 and Structural drawings. Include the wood blocking on top of the walls under the existing roof structure.
4. Provide batt insulation, both thermal and acoustical and related work. This contractor shall provide all insulation in the exterior walls of the building system. Coordinate all insulation work and interior drywall work with Contract 3-01 Exterior Structural Stud Assembly Contractor.
5. Provide Fireproofing at the exterior wall and the edge of slab as shown in the typical wall sections. Sealants required to complete this system shall be provided by this contractor.

6. Provide fire rated horizontal shaft wall closures at the floor slabs at the locations shown on the drawings.
7. Acoustical sealants, fire safing and fire caulking as required for penetrations and top of wall conditions. Bidders are advised to pay particular attention to top of wall conditions, fire and smoke safing of slabs and acoustical sealants.
8. Provide all backing boards (cement board) for tile areas and as required by the contract documents. Coordinate with Contract 4-07 Ceramic Tiling Contractor for requirements of this work.
9. Removal of spray fireproofing to expose points of attachment to structural steel is to be performed in a workmanlike manner. Removal of spray fireproofing in excess of 3" greater than the attached item will require repatching which will be back charged to this Contractor.
10. This contractor shall coordinate with the other trades for all box outs, penetrations, framed openings etc. as required.
11. Install access panels furnished by other contractors (assume 100 total). Assume access panels will be 30"x 30" for framing purposes.
12. Provide Seamless Acoustical Plaster System AWP-1, as indicated on drawings and in Specification Section 09 83 00. The drapery and track system are not in this contract.
13. Coordinate the work of this contract with the Carpentry and General Works Contractor for wood blocking and support installation.
14. Coordination of door and interior framed openings with the Carpentry and General Works Contractor who will install the door and lite frames.
15. Include fire taping and sealing at perimeter edge and as shown or indicated in the contract documents.
16. Provide architectural expansion joint systems, including joint covers materials at concrete slab, drywall and masonry construction (interior only).
17. Scaffolding, lifts and material handling equipment for the course of this work.
18. Comebacks and out-of-sequence work may be required and as such should be included. Include (4) additional mobilization/return trips for touch up and repairs. Each trip shall include 16 hours of carpenter/finisher time as well as materials required for general patching.
19. Provide trash and debris removal daily. This means everything leaves the building and goes to the dumpsters. No piling of trash inside the building will be permitted. This contractor shall provide cleaning of the floor areas of all drywall spackle, mud, finishes etc. that are used by this contractor. Review and acceptance by the CM will be required.

20. Include all necessary field measurements.
21. Include three (3) passes per floor to “touch-up” mechanical penetrations to ensure ratings required. The first pass will be required prior to ceiling grid installation and the second pass will be required prior to final inspection for Certificate of Occupancy.
22. Provide temporary lighting as necessary to complete scope of work.
23. Provide all delegated design as indicated. Provide data and submittal information related to the scope of this contract signed and sealed by a Professional Engineer as required by the contract documents.
24. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is \$2,500 and shall be included in your base bid proposal.
25. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
26. Inside the existing Custom House lead-based paints and coatings have been identified. Any activities with the potential to disturb lead-based materials should be performed by the Contractor in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead. The Contractor shall notify the Owner in the event they encounter previously unknown material that they suspect may contain “lead”. The Owner will arrange with a qualified specialist for identification and testing and advise the Contractor of the results. In the case that testing identifies potential lead-based materials, the contractor shall continue performance of the work that has the potential to disturb associated in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead.
27. Include within this contract’s base bid an allowance of \$30,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner by means of a credit change order.

CONTRACT NO. 4-05 – FIREPROOFING AND INTUMESCENT PAINT

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 051200	Structural Steel Framing (coordination)
Section 053100	Steel Decking (coordination)
Section 078100	Applied Fire Protection
Section 078413	Penetration Firestopping
Section 099646	Intumescent Painting

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide all fireproofing, both exposed and concealed as required by the contract documents. See the Life Safety drawings for specific descriptions on the location of 1-hr and 2-hr rated assemblies.
2. Provide all intumescent and special coatings required by the code documents, identified in contract drawings, plans and details.
3. Clean up on a daily basis, all over spray materials. Remove all excessive water from spraying operation.
4. This contractor shall be responsible for protecting all non-metallic piping within the building envelope from overspray of the applied fireproofing, intumescent coatings, fire caulking and fire safing as it pertains to the scope of your course of work. The contractor shall be familiar with and comply with the NFPA regulations, including but not limited to the following 6.3.7.5 Firestopping materials intended for use on nonmetallic piping penetrations shall be investigated for compatibility with the nonmetallic pipe materials. 6.3.7.5 Protection plan shall be submitted and reviewed with the CM prior to implementation.
5. Inspection of the fireproofing for compliance will be provided by a third-party inspector provided by the owner.
6. Protect fireproofing according to advice of fireproofing manufacturer and installer from damage resulting from construction operations or other causes so that fireproofing will be without damage or deterioration at time of Substantial Completion.
7. Coordinate installation of fireproofing with other work in order to minimize the need for other trades to cut or remove fireproofing. As other trades successively complete installation of their work, maintain protection of structure afforded by fireproofing by patching any areas which have been removed or damaged prior to concealment of fireproofing by other work.

8. Prepare all surfaces including priming of substrate as required.
9. Repair or replace work which has not been successfully protected.
10. This contractor to include and submit as a shop drawing for review a detailed shop drawing of all areas of fireproofing and the required coatings on floor plans and elevations, to clearly illustrate where the fireproofing materials and special coatings will be applied. This shop drawing will be shared with the Steel contractor for review and incorporation into their steel and joist preparation plan. (no primer, coatings, primers etc.)
11. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
12. Inside the existing Custom House lead-based paints and coatings have been identified. Any activities with the potential to disturb lead-based materials should be performed by the Contractor in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead. The Contractor shall notify the Owner in the event they encounter previously unknown material that they suspect may contain "lead". The Owner will arrange with a qualified specialist for identification and testing and advise the Contractor of the results. In the case that testing identifies potential lead-based materials, the contractor shall continue performance of the work that has the potential to disturb associated in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead.
13. Include within this contract's base bid an allowance of \$20,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner by means of a credit change order.

CONTRACT NO. 4-06 – CURTAIN WALL/GLAZING/STOREFRONTS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 054000	Cold-Formed Metal Framing (coordination)
Section 055000	Metal Fabrication (as required for work)
Section 078446	Curtain Wall Fire Resistant Joint System
Section 079200	Joint Sealants
Section 079205	Exterior Joint Sealant
Section 084213	Aluminum-Framed Storefronts
Section 084313	Glazed Aluminum Storefront
Section 084413	Glazed Aluminum Curtain Wall
Section 085653	Bullet-Resistant (BR) Windows
Section 087100	Door Hardware
Section 088010	Exterior Glass and Glazing
Division 26	Electrical (coordination)
Division 28	Electronic Safety and Security (coordination)

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide aluminum-framed storefronts, glazed aluminum storefront, glazed aluminum curtain wall, glass and glazing systems complete.
2. Provide curtain wall systems, including all Delegated Design requirements required to provide a complete system. Coordinate your work with the envelope systems and contractors to insure sealing of the units for a tight seal. (pressure caps and Blueskin seals)
3. Provide automatic aluminum door systems, including hardware, low voltage wiring, coordination of power and all hardware. Coordinate with Division 26 and Division 28 for access of their work into your framing system.
4. Provide spandrel panels and associated insulation behind the panels.
5. Provide an aluminum shadow box over the main entrance. Include 2" mineral wool, See drawing A-324.
6. Provide Bullet-Resistant Windows as shown on the drawings and as specified in Specification Section 085653.
7. Provide Glass Privacy Film, PF-1.
8. The finish hardware for the aluminum doors will be furnished by Contract 4-03 Carpentry and

General Works Contractor. Contract 4-06 Curtain Wall/Glazing/Storefronts Contractor will coordinate with the Carpentry and General Works Contractor for delivery and acceptance of the hardware. Contract 4-06 Contractor will perform and document an inventory of all materials received. This contractor will immediately advise the Carpentry and General Works Contractor and the CM of any missing or damaged materials in the inventory.

9. This Contractor shall coordinate the hardware and door materials with the Carpentry and General Works Contractor prior to the ordering of materials. Including but not limited to all coordination meetings with the Owner, CM, Curtain Wall Contractor, and Special Systems Contractor as required to properly coordinate all doors, frames, hardware and connections, prior to ordering of materials.
10. This Contractor is responsible for coordinating door hardware with their work to ensure each opening is properly prepped for the hardware being supplied. All low voltage wiring within the aluminum doors and frames to be installed by the Curtain Wall/Glazing/Storefront Contractor. Conduits and raceways in the walls will be provided by the Electrical Contractor, as well as final power connections to the equipment power supply. Final connections of low voltage wiring to hardware will be by the Curtain Wall/Glazing/Storefront Contractor. This contractor to coordinate the work of the Electrical Contractor and Special Systems Contractor to provide a complete installation.
11. Provide all glass and glazing at the exterior of building.
12. Provide interior glass and glazing systems for doors, partitions, vision panels, etc. Coordinate with the Carpentry and General Works Contractor.
13. Coordinate glass types with partition and door fire ratings. Contact Construction Manager with any discrepancies.
14. Provide custom break metal trim and infill where required to make the installation complete.
15. Provide all caulking and sealants, including any Preformed Sealants, required for your systems. All exterior caulking of your system and caulking to adjacent exterior surfaces by this contractor. The caulking and Sealant contractor shall caulk interior surfaces to your Alum frames.
16. Mock-ups as required by the Drawings and Specifications.
17. All work of this contract shall be coordinated thoroughly with Division 26 Electrical and Division 28 Electronic Safety and Security.
18. Hoisting/scaffolding/cranes and all other material handling or access equipment. This contractor owns all material and manpower handling.
19. Coordinate edge of slab tolerances and field verify all rough openings. Field verification of edge of slab details is required by this contractor.
20. Any openings that are missing glass (due to this contractor's issues) during construction shall have plywood installed to secure and weatherproof the building by this contractor.

21. Cleaning up of all trash and debris related to this contract shall be performed daily and removed to the dumpsters. All material shall always be stored neatly and orderly.
22. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is \$2,500 and shall be included in your base bid proposal.
23. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
24. Include within this contract's base bid an allowance of \$20,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner by means of a credit change order.

CONTRACT NO. 4-07 – CERAMIC TILING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 035416	Hydraulic Cement Underlayment
Section 090561	Common Work Results for Flooring Preparation
Section 093013	Tiling

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide ceramic tile, porcelain tile, porcelain tile panels, base material and thresholds as required by the contract documents, complete.
2. Provide the following wall bases, transitions, and thresholds as indicated on A820 Finish Legend & Details:
  - a. Wall bases – WTB-1
  - b. Floor transitions – none
  - c. Marble Threshold – TR-7
3. Provide all mortar bed installations as directed by the specifications and drawings.
4. Provide grout, including epoxy grout and custom colors as specified.
5. Provide grout sealant according to the grout manufacturer's instructions.
6. Provide waterproofing membrane, crack-isolation systems, and crack suppression membrane as required by contract documents.
7. Provide metal transition strips/trim (i.e. Schluter strips) installed as part of the tile installation. Size the trim according to the tile thickness to ensure no sharp edges of the tile are visible/touchable.
8. Cutting and fitting around work installed by others.
9. Provide patching and leveling of “new” concrete system to be included in this contract’s base bid. Contractor to review concrete floor installation tolerances and report any deficiencies in tolerance prior to mobilizing for any tile installation.
10. Patching and leveling of “existing” concrete floors in the existing Customs House using hydraulic cement underlayment.
11. Provide cleaning and protection of finished products until acceptance by Construction Manager.

This contract shall include the material and labor to cover all ceramic tile areas with Ramboard panels (not roll material or corrugated plastic panels). Seams to be taped and sealed for effective protection.

12. Provide attic stock, delivered and unloaded into the owner's storage room.
13. This contractor to coordinate work of this contract with Contract 4-04 Drywall and Interior Metal Framing Contractor installing cement backer boards to receive your tile.
14. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
15. Include within this contract's base bid an allowance of \$15,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner.

CONTRACT NO. 4-08 – ACOUSTICAL AND SPECIALTY CEILINGS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 072100	Thermal Insulation
Section 079200	Joint Sealants
Section 095100	Acoustical Ceilings
Section 095113	Acoustical Panel Ceilings

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide acoustical ceiling tile systems, and mineral fiber acoustical ceiling panel systems to include suspension system, hangers and all required components for a complete system.
2. Provide specialty ceiling systems complete, including framing, supports and necessary components.
3. Provide all delegated design as indicated in Section 09 51 13. Provide data and submittal information related to the scope of this contract signed and sealed by a Professional Engineer as required by the contract documents.
4. Provide acoustical lay in insulation blankets as identified in the contract documents.
5. Supplemental suspension hangers at large ducts above ceilings and at openings for lighting fixtures shall be provided and coordinated to minimize exposed clips, anchors, and wires.
6. Continuous acoustical sealant on back of vertical leg before installing moldings as indicated.
7. Furnish and install hold down clips where required by governing regulations for fire resistant ratings.
8. Provide all material handling, scaffolds, lifts, spyder cranes, access to work etc. as required for the scope of this contract's work.
9. Expansion joints for all acoustical ceilings, specialty ceilings and acoustical systems.
10. Provide ceiling grid layout on floor for cassette and duct placement in ceiling grid system.
11. This contractor shall review all documents, shop drawings, plans, and drawing model for ceiling height issues. All issues shall be reported to the EDiS prior to installing wall angles.
12. Reflected ceiling layout plans and shop drawings for approval and installation must be provided

for all ceiling systems, clouds, acoustical panels, etc.

13. This Contractor shall cut openings in ceilings for sprinkler heads, lights, mechanical diffusers and grilles, etc. Coordinate work with other trades.
14. Attic stock as per the contract documents, delivered, inventoried, and moved to a storage area within the building at the owner's direction.
15. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is \$2,500 and shall be included in your base bid proposal.
16. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
17. Include within this contract's base bid an allowance of \$10,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner via credit change order.

CONTRACT NO. 4-09 – FLOORING

- A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 035416	Hydraulic Cement Underlayment
Section 090561	Common Work Results for Flooring Preparation
Section 096429	Wood Strip and Plank Flooring
Section 096513	Resilient Base and Accessories
Section 096519	Resilient Tile Flooring
Section 096813	Tile Carpeting
Section 124813	Entrance Floor Mats and Frames

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide flooring in accordance with the contract documents.
2. Prepare subfloor for finished flooring including leveling and patching. Base bid shall include all flashing patching and surface preparation required to perform the work of this Contractor.
3. Provide patching and leveling of “new” concrete system to be included in this contract’s base bid. Contractor to review concrete floor installation tolerances and report any deficiencies in tolerance prior to mobilizing for any flooring installation.
4. Patching and leveling of “existing” concrete floors in the existing Customs House using hydraulic cement underlayment.
5. Provide Wood Strip and Plank Flooring as indicated on the drawings and specified in Specification Section 096429. This includes the acoustic underlayment.
6. Provide rubber threads, nosings, and risers as indicated on project documents. Provide matching 2’x2’ rubber tile at stair landings as indicated on project documents.
7. Provide Resilient Base and Accessories.
8. Provide resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
9. Provide Rubber Stair Treads and Landings at Stairs A and B. Provide Safety Nosings at Stair C.
10. Provide all Resilient Tile flooring.

11. Provide Tile Carpeting.
12. Provide Area Rug AR-1
13. Provide Entrance Floor Mats and Frames.
14. Provide the following wall bases, transitions, and thresholds as indicated on A820 Finish Legend & Details:
  - a. Wall Bases – RB-1, RB-2
  - b. Floor Transitions – TR-4, TR-5, and TR-6.
  - c. Marble Threshold – TR-7
15. Provide all moldings, transitions and edge strips as required.
16. Provide finish floor material in elevator cab as specified.
17. Provide cleaning and protection of finished products until acceptance by Construction Manager. This contract shall include the material and labor to cover all flooring with Ramboard panels (not roll material or corrugated plastic panels). Seams to be taped and sealed for effective protection.
18. Seaming diagrams are required to be submitted for approval.
19. Provide mock up's as defined by the contract documents.
20. Attic stock to be delivered to the site, inventoried and then moved to a storage area within the building at the direction of the owner.
21. This contractor shall own all material handling and means to unload, move and lift materials to all locations.
22. Provide cutting and fitting around the work of others.
23. This contractor shall protect the adjacent work of other trades while performing the scope of this contract.
24. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
25. Include within this contract's base bid an allowance of \$15,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner by means of a credit change order.

CONTRACT NO. 4-10 – GENERAL LABOR AND CLEANUP

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification Sections:

Division 0 Procurement and Contracting Requirements  
Division 1 General Requirements

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. This contractor shall provide General Labor on this project under the direction of the Owner and Construction Manager.
2. Within the Base Bid for this contract \$7,500 worth of material handling tools. To include but not limited to, wheeled bins for trash removal, shovels, brooms, trash bags etc. purchased materials shall be tracked with receipts and verified. Any funds left unspent will be returned to the owner via a credit change order. All tools purchased under this allowance shall be organized and turned over to the owner at completion of the work.
3. The contract shall include a total of 4,000 manhours of general labor to be scheduled by the Construction Manager (CM). The CM to determine the start date of this contract. This work may be scheduled anytime within the scheduled date range without penalty or additional costs to the Owner or the CM.
4. A unit price will be provided by this contractor that will pertain to any hours that may be deducted or added to this contract.
5. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
6. The Owner and CM have the right to request replacement of any personnel provided to fulfil this contract, without obligation or explanation.

CONTRACT NO. 4-11 – RESINOUS MATRIX TERRAZZO FLOORING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 035416	Hydraulic Cement Underlayment
Section 090561	Common Work Results for Flooring Preparation
Section 096623	Resinous Matrix Terrazzo Flooring

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide terrazzo flooring, terrazzo base, and terrazzo stair treads as specified in Section 09 66 23.
2. Provide moisture vapor emission control membrane prior to terrazzo application is to be included in this contract's base bid.
3. Provide the following wall bases and transitions as indicated on A820 Finish Legend & Details:
  - a. Wall base – TZB-1
  - b. Floor Transitions – TR-1, TR-2, and TR-3.
4. Provide slip- and stain-resistant sealer as specified in Section 09 66 23.
5. Prepare subfloor for finished flooring including leveling and patching. Include in the base bid, leveling and patching as per the manufacturer's recommendations for the resinous terrazzo flooring. Include shot blasting, grinding, and moisture barriers as required for a complete installation.
6. Provide patching and leveling of "new" concrete system to be included in this contract's base bid. Contractor to review concrete floor installation tolerances and report any deficiencies in tolerance prior to mobilizing for any flooring installation.
7. Patching and leveling of "existing" concrete floors in the existing Customs House using hydraulic cement underlayment.
8. Provide crack suppression membrane as required. Crack suppression, control joints and expansion joints shall be clearly identified in a shop drawing of all terrazzo areas for design team approval.
9. Provide standard and custom samples for approval. Include a minimum of 100 sf in-field mockups for each color and pattern for final selection and approval.

10. Cutting and fitting around work installed by others.
11. Protection of surrounding surfaces and work of others.
12. Provide cleaning and protection of finished products until acceptance by Construction Manager. This contract shall include the material and labor to cover all terrazzo areas with Ramboard panels (not roll material or corrugated plastic panels). Seams to be taped and sealed for effective protection.
13. Attic stock, delivered, unloaded and moved to the owner's storage area within the building.
14. Provide joint sealants required for terrazzo installation.
15. Protect materials from damage and contamination in storage or delivery, including moisture, heat, cold, direct sunlight, etc.
16. Maintain temperature of storage area between 60- and 80-degrees F (15 and 26 degrees C).
17. Keep containers sealed until ready for use.
18. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with Resinous Terrazzo materials. Include all bead blasting required to perform the work of this contract.
19. Close spaces to traffic during Terrazzo application. Coordinate traffic on unpolished Terrazzo with CM and construction schedule.
20. Maintain proper ventilation of the area during application and curing time period.
21. The contractor must provide additional crews as needed to maintain the project schedule.
22. Provide at least 48-hour notice prior to any delivery. All deliveries are to be between 8:00 AM and 2:00 PM.
23. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. Owner and EDiS will not be responsible for any lost tools, materials or equipment.
24. Include within this contract's base bid an allowance of \$10,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner.

CONTRACT 4-12 MISCELLANEOUS CONCRETE

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 032000	Concrete Reinforcing
Section 033000	Cast-In-Place Concrete

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide miscellaneous concrete items and grouting as described in the Scope of Work and defined on the contract documents. Include all preparations and excavation, backfill, stone subbase, forms, and reinforcing required.
2. Provide concrete infill for the stair pans and landing pans. Remove and dispose of the temporary wood at the treads and landings installed by Contract 4-04 Carpentry and General Works.
3. Install the Generator Docking Station and heavy-duty bollards as shown on drawing A095. These will be fabricated by the Contract 4-2 Miscellaneous Metals, Stairs, and Rails Contractor.
4. Provide 4" thick housekeeping pad for the fire pump. This Contractor will be responsible for laying out all concrete work for this contract course of work.
5. Provide all MEPF pads shown on the project documents. Coordinate with MEPF trades for specific requirements
6. This Contractor to furnish and install reinforcing steel, admixtures, curing compound, sealers, accessories, bolsters, ties and braces as required in the Contract Documents and for the performance of the work of this contract.
7. All work of this contract shall be considered "out of sequence" as such the contractor shall price each element of work as a mobilization and if required "short load" concrete delivery.
8. This contractor is responsible for providing material handling equipment, concrete pumps, cranes, ramps, chutes, buggies, etc. for the work of this contract. The owner and EDiS will not be responsible for any additional material handling costs above the base bid proposal.
9. Provide sealants/caulking as required.
10. This contractor shall provide installation of sleeves required for MEP lines. Coordinate with Arch and MEP documents for extent of this work.
11. Provide grouting of floor expansion joints once they are set and adjusted by installing

contractors.

12. Grouting of all elevator sill angles will be the responsibility of this contractor.
13. Provide all door stoops, pads, entrance/exit concrete complete as provided for the Architectural and MEP drawings. If the concrete is shown in the structural drawings, it shall be part of Contract 2-01 Foundations. This will be out of sequence work, contractor to include (5) re-mobilization to perform work out of sequence, this shall include premium costs for short load concrete pours as well.
14. Include re-dressing the stone after the MEP contractors have installed their UG work. As related to the work detailed for this contract.
15. Placement of related items furnished under other Specification Sections.
16. All blockouts and embedment's required by plans and specifications.
17. This Contractor is responsible for grouting all structural steel base or leveling plates as defined by the scope of this contract.
18. Include all weather, frost protection, and water pumping as required. This Contractor is also responsible for the premiums required for hot water, heated aggregate and admixtures for cold weather concrete.
19. Provide dewatering as it relates to the work of this contract.
20. All concrete testing will be completed by the Construction Manager; however, it will be the responsibility of this Contractor to furnish all samples.
21. Provide at least 48 hours' notice prior to any delivery. All deliveries are to be between 8:00 AM and 2:00 PM.
22. Provide and maintain a DNREC approved mobile concrete washout required by the scope of this contract's work.
23. Provide daily fine cleanup of the work is the responsibility of each individual Contractor which includes broom cleaning of their debris as required. Daily Fine clean up, on a daily basis, shall be defined as those means/methods utilized to perform the daily cleaning tasks without producing dust, noise and stacking of stored materials. Furnish fine clean up on a daily basis. All debris must be removed from the work area at the end of each workday to the appropriate dumpster. Cleaning of roadways shall be included and performed daily while this contractor is on site performing the work of this contract.
24. All materials excavated for installation of footings and foundations shall immediately be protected with appropriate moisture protection.
25. BIM coordination is "not" part of this contract scope.

26. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
27. This contractor shall include an allowance amount of \$15,000 within the base bid for work to be identified by Owner and the CM. All unused portions of this allowance to be returned to the owner by means of a credit change order.

CONTRACT NO. 4-13 – PAINTING

B. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 050170	Metal Restoration
Section 079200	Joint Sealants
Section 080152	Wood Window Restoration
Section 090190	Maintenance Exterior Repainting
Section 097200	Wall Coverings
Section 099000	Painting and Coating
Section 099610	Exterior High-Performance Coatings
Section 099733	Concrete Floor Sealer

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide all painting and vinyl or fabric wall covering (all walls and ceilings indicated on the finish schedule) include all preparation of surfaces, trims and finish wood locations. This contractor shall provide “all” interior and exterior painting complete.
2. Inside the existing Custom House lead-based paints and coatings have been identified. Any activities with the potential to disturb lead-based materials should be performed by the Contractor in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead. The Contractor shall notify the Owner in the event they encounter previously unknown material that they suspect may contain “lead”. The Owner will arrange with a qualified specialist for identification and testing and advise the Contractor of the results. In the case that testing identifies potential lead-based materials, the contractor shall continue performance of the work that has the potential to disturb associated in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead.
3. At the Existing Historic Stairs in the Custom House:
  - a. Strip all metal stair parts. Notify the Construction Manager if damage is found.
  - b. Remove adhered abrasive tread coverings.
  - c. Refinish all metal stair parts. Provide 4 separate paint colors as listed here:
    1. Match wall color on supports that cross the stairwell, as noted below.
    2. Ballusters
    3. Treads & landings
    4. Risers & ornate stringers
  - d. Strip historic stained wood handrails on iron ballusters and refinish.
  - e. Clean existing wood wall-mounted handrails (they are not original 1855 rails).
4. Provide sealing of all interior joints between dissimilar materials that require sealants before painting.

5. Provide Tack Board Surface TB-1.
6. Provide Fire and Smoke Identify markings on all walls that require marking per governing jurisdictions. Coordinate marking walls with the CM on site.
7. Paint all exposed block work and concrete work as shown on the room finish schedule and contract documents. Include painting of the elevator shaft from F.F. down to the bottom of pit (white)
8. Prime, stain or seal, all wood trim and doors as required by the contract documents.
9. Paint exposed piping (sprinkler, plumbing, gas piping, electrical) and ductwork in accordance with the contract documents. Include preparation work for all items specified.
10. Provide supplementary ventilation as required in enclosed spaces.
11. Paint and caulk all hollow metal frames and doors as shown on the door schedule.
12. Paint metal stairs and railings.
13. Prefinished items will not be painted by this Contractor.
14. Paint all semi-exposed wood blocking as indicated on the drawing.
15. Include "preparation" of all surfaces and items required to be covered by the scope of this contract.
16. This contractor shall allow a touch up pass from drywall contractor/mason contractor between prime coat and first coat of finish as well as a pass between intermediate coat and final coat of finish.
17. This contractor shall protect all areas, materials and work of others from overspray from the work of this contract.
18. Minor patching prior to application of finishes shall be included in the base bid.
19. Access, lifts, ladders etc. to be provided by this contractor.
20. Provide painting of all exterior bollards and gates that are not prefinished.
21. Paint gas lines at both the interior and exterior of the building.
22. All lintels shall be painted by this contractor if specified in project documents.
23. Paint all railings and handrails that are not prefinished.
24. This contractor shall provide sealing/hardener of concrete floors, including scraping, and thoroughly cleaning of the floors prior to installation of the sealer/hardener materials.

Coordination with other finishes will require additional mobilization be provided for this installation.

25. Provide cleanup of your work areas and storage areas on a daily basis. Removal of spent paint cans and buckets is the responsibility of this contractor.
26. Provide at least 48-hour notice prior to any delivery. All deliveries are to be between 8:00 AM and 2:00 PM.
27. The contractor must provide additional crews as needed to maintain the project schedule.
28. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
29. Include within this contract's base bid an allowance of \$20,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner by means of a credit change order.

CONTRACT NO. 4-14 – ROLLER WINDOW SHADES

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 061053	Miscellaneous Rough Carpentry
Section 122413	Roller Window Shades
Division 26	Electrical

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide manually operated roller shades as indicated on the contract documents.
2. Provide motor operator roller shades as indicated on the contract documents. Include all wiring, boxes, switches, controls, motors, connectors, contactors and remote switches as specified.
3. Coordinate the work with other trades to provide rough-in for electrical wiring as required for installation of motorized shades.
4. Do not fabricate shades until field dimensions for each opening have been taken.
5. Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
6. Motorized Shade Controls: Do not install wall controls until the final surface finishes and painting is complete.
7. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
8. This contractor shall include any blocking not identified or specified in the Carpentry and General Works Contractor's scope.
9. The onsite Electrical Contractor shall provide line voltage powered junction boxes and this contractor to provide the final connections and all low voltage wiring, motors, capacitors, switches and controls. Include any required conduit for the low voltage wiring runs.

10. Provide all material handling and access equipment required for your work. Including scaffolds and lifts as necessary. CM will not receive or unload any of this contract's materials.
11. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.

CONTRACT NO. 4-15 – CUSTOM MILLWORK

- A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 064023	Interior Architectural Woodwork
Section 066116	Solid Surfacing Fabrications
Section 079200	Joint Sealants
Section 123600	Countertops

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide labor and materials to perform the work related to all custom casework, custom millwork, countertops, backsplashes and windowsills. Coordinate rubber base after installation with flooring contractor.
2. Provide custom solid-surface countertops and backsplashes. Countertops are to be fabricated in one piece with shop-applied edges unless otherwise noted.
3. Provide plastic laminate countertops.
4. Provide Wall Bases HWB-1 and HWB-2 at all locations shown on the drawings.
5. Provide all field trimming required to adjust to conditions on site.
6. Coordinate power and data requirements and locations with the electrical contractor for locations and sizes of holes needed. Grommets provided by this contractor.
7. Include all venting of cabinets and casework/millwork as indicated in the contract documents.
8. Provide courtroom mock-up as indicated on project documents.
9. Coordinate cutting holes in casework/millwork with other trades and provide grommets at all openings.
10. Coordinate blocking requirements with Carpentry contract.
11. Provide joint sealants integral to casework/millwork and to dissimilar materials.
12. Provide at least 48-hour notice prior to any delivery. All deliveries are to be between 8:00 AM and 2:00 PM.
13. The contractor must provide additional crews as needed to maintain the project schedule.

14. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
15. Include within this contract's base bid an allowance of \$10,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner by means of a credit change order.

CONTRACT NO. 4-16 – MANUFACTURED CASEWORK

- A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 064023	Interior Architectural Woodwork
Section 066116	Solid Surfacing Fabrications
Section 079200	Joint Sealants
Section 123600	Countertops

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide labor and materials to perform the work related to all custom casework, custom millwork, countertops, backsplashes and windowsills. Coordinate rubber base after installation with flooring contractor.
2. Provide custom solid-surface countertops and backsplashes. Countertops are to be fabricated in one piece with shop-applied edges unless otherwise noted.
3. Provide plastic laminate countertops.
4. Provide all field trimming required to adjust to conditions on site.
5. Coordinate power and data requirements and locations with the electrical contractor for locations and sizes of holes needed. Grommets provided by this contractor.
6. Include all venting of cabinets and casework/millwork as indicated in the contract documents.
7. Coordinate cutting holes in casework/millwork with other trades and provide grommets at all openings.
8. Coordinate blocking requirements with the Carpentry and General Works Contractor.
9. Provide joint sealants integral to casework and to dissimilar materials.
10. Provide at least 48-hour notice prior to any delivery. All deliveries are to be between 8:00 AM and 2:00 PM.
11. The contractor must provide additional crews as needed to maintain the project schedule.
12. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.

13. Include within this contract's base bid an allowance of \$5,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner by means of a credit change order.

CONTRACT NO. 4-17 – FIRE PROTECTION

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 078413	Penetration Fire Stopping
Section 210010	Fire Protection General Provisions
Section 210050	Fire Protection Basic Materials and Methods
Section 210800	Commissioning of Fire Protection Systems
Section 211000	Sprinkler and Standpipe Systems
Section 213113	Electric-Drive, Centrifugal Fire Pumps
Division 22	Plumbing
Division 26	Electrical
Division 32	Exterior Improvements

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide piping, fittings, couplings, valves and sprinkler heads to provide a complete Fire Sprinkler and Standpipe Systems.
2. Provide the fire pump, fire pump controller, jockey pump controller, and all related work that shall be part of this contract. Wiring of pump and controller will be by the Electrical Contractor.
3. The 4" thick housekeeping pad for the fire pump will be provided by Contract 4-12 Miscellaneous Concrete Contractor. This Fire Protection Contractor will be responsible for laying out all concrete work.
4. Permits, testing, inspections required for the Fire Protection work are to be provided by this contractor.
5. Design of the system, submissions to the Fire Marshall, review with Fire Marshall and expediting the permit for the Fire Suppression system is a priority of this contract scope.
6. Excavation and backfill related to fire protection work as detailed below is the responsibility of this Contractor. (Geo-Tech reports included for this contractor's review)
7. Backfilling is the responsibility of this Contractor. Soil types shall be in accordance with project documents. Backfill materials shall be covered after excavation and protected. If materials become wet and unusable this contractor shall remove the material from site and provide stone dust (#10 stone dust) to backfill all piping trenches and remove unsuitable material off site.
8. Provide fire main from +/- 5 feet outside building including connection in the building. The final connection of your fire line and the line provided by the site contractor shall be the Fire

Protection contractor's responsibility. Provide a registered plumbing contractor licensed to perform the tie in as part of the base bid.

9. This contractor will flush the underground system with the assistance of the site contractor and provide written documentation to the CM.
10. Inside the existing Custom House lead-based paints and coatings have been identified. Any activities with the potential to disturb lead-based materials should be performed by the Contractor in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead. The Contractor shall notify the Owner in the event they encounter previously unknown material that they suspect may contain "lead". The Owner will arrange with a qualified specialist for identification and testing and advise the Contractor of the results. In the case that testing identifies potential lead-based materials, the contractor shall continue performance of the work that has the potential to disturb associated in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead.
11. All cored walls require sleeves and are required to be sealed per contract documents. Any mess from the coring operation shall be immediately cleaned up by this contractor and shall not affect any installed finishes. If this work is not performed efficiently, the work will be performed by the owner and backcharged to this contractor.
12. Provide thrust blocks and/or restraints related to the Fire Sprinkler and Standpipe Systems and the Fire Pump System.
13. Provide sleeve assemblies for work of this contract that penetrate the foundation walls, interior footings or any concrete footings shall be provided to the masonry and concrete contractor for installation. This contractor shall coordinate and assist with the sleeving install. Sleeves are to be sealed per contract documents.
14. Firesafing of all penetrations is a requirement of this contract.
15. Flow and tamper switches to be supplied by this Contractor and wired by the Electrical Contractor. It is the Fire Protection Contractors responsibility to provide flow and tamper switches to meet applicable state and local codes as well coordinate with the MEP contract documents.
16. If a water meter is required when the review process and permitting is completed, this contractor shall purchase, pay for, install and coordinate all work with the required authorities.
17. The Fire Protection Contractor will coordinate the need for and compatibility of their system with the emergency generator, supplied by others.
18. Pipe identification and labeling are a requirement of this contract. Valve labels, etc. are required as per the contract documents.
19. This contractor shall be onsite while the walls are being constructed for layout and installation of valve cabinets, concealed, piping, etc.

20. The work of this contract will require out-of-sequence installations. This should be considered and included in your base bid.
21. Furnish all access panels required for the work of this contract to the drywall contractor for framing and final installation. The access panels shall meet the requirements of the contract documents, be lockable, and fire rated where required.
22. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is \$2,500 and shall be included in your base bid proposal.
23. Provide As-built drawings in both hard copy and BIM format.
24. Provide the necessary coordination with trades to avoid interferences with other work and make corrections at no extra charge.
25. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
26. Include within this contract's base bid an allowance of \$10,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner by means of a credit change order.

CONTRACT NO. 4-18 – PLUMBING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 078413	Penetration Fire Stopping
Section 083113	Access Doors and Panels
Division 21	Fire Suppression (coordination)
Division 22	Plumbing
Division 23	Heating Ventilating and Air Conditioning (coordination)
Division 26	Electrical (coordination)
Division 32	Exterior Improvements
Section 310513	Earthwork

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide a complete plumbing and piping system as indicated by the contract documents. All plumbing work/systems are to be fully coordinated with all other Mechanical, Electrical, and Fire Protection trades as well as the other trades involved with the project.
2. Provide plumbing system pumps, plumbing specialties, water heaters, plumbing fixtures, heat tracing, etc.
3. Provide all pipe insulation, insulation coverings, valve insulation, labeling, and identification of plumbing lines.
4. Provide heat tracing for plumbing systems. The Electrical Contractor will be responsible for providing power to the heat tracing system.
5. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.
6. Division 26 of the specifications should be reviewed as it relates to the power wiring to trap primers and controls within this contract's scope of work. Coordinate this work with the Electrical Contractor.
7. Permits, testing, inspections required for the Plumbing system work are to be provided by this contractor. This contractor shall pay all permit and inspection fees for the work of their contract.
8. This Contractor shall be responsible for designating an individual within their organization, intimately familiar with this project and assigned on site, to act as the System Start-up Coordinator. This individual must be pre-approved by the Construction Manager. This individual's responsibilities shall include, but not be limited to, coordinating the start-up of all

plumbing equipment, including the coordination between the Electrical Contractor, the Controls Contractor, and all testing, adjusting and balancing work. This individual shall report on a weekly basis, in written form, to the Construction Manager. These reports shall include a summary of current conditions including manufacturers' start-ups, systems' deficiencies noted to date and the remediation of same, coordination issues between trades, system interfacing and forecasting, as necessary to project the completion of each individual system within the building.

9. Excavation and backfill for underground plumbing work as detailed below is the responsibility of this Contractor. Soil types shall be in accordance with the contract documents.
10. Backfilling is the responsibility of this Contractor. Soil types shall be in accordance with project documents. It is the intent to use on-site material and not imported fill. The use of this on-site material shall conform with the compaction requirements identified in Section 310513. Excavated materials shall be covered immediately and protected from moisture mitigation. If Materials become unusable, this contractor shall own purchasing #10 stone dust to utilize as backfill in all trench or structure locations. Excess unsuitable materials from plumbing excavations shall be removed from the site by this contractor. (includes water meter pit installation) it is not acceptable for any UG piping to be in the stone layer installed by the concrete contractor, all UG piping must be installed in the subbase with adequate soil coverage.
11. The Concrete Contractor shall furnish, install and maintain stone fill under slab. The Sitework Contractor shall leave the building pad site at subgrade to within +/- 1/4" in preparation to receive stone fill. The Plumbing, Mechanical and Electrical contractors shall complete their work under the slab on grade and shall be responsible to return the pad to the subgrade elevation left by the Sitework Contractor. The Concrete Contractor shall then adjust the select material to final subgrade, fine grade the slab and place the vapor barrier and stone fill. This contractor is responsible for all horizontal and vertical piping associated with vapor barrier system. Note: while working on the building pad area this contractor shall utilize track drive equipment only. No rubber tire equipment will be allowed. Preservation of the building pad shall be the responsibility of this contractor. The onsite testing and inspection agency provided by the owner will monitor the excavation, travel and backfilling operation.
12. Equipment bases and housekeeping pads identified on the structural drawings are to be provided by the 4-12 Misc Concrete contractor. Any required pads or bases for the scope of this contract not identified in the documents will be provided by this contractor.
13. Inside the existing Custom House lead-based paints and coatings have been identified. Any activities with the potential to disturb lead-based materials should be performed by the Contractor in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead. The Contractor shall notify the Owner in the event they encounter previously unknown material that they suspect may contain "lead". The Owner will arrange with a qualified specialist for identification and testing and advise the Contractor of the results. In the case that testing identifies potential lead-based materials, the contractor shall continue performance of the work that has the potential to disturb associated in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead.
14. Provide penetrations through walls, floors, etc. including cutting, patching and fire safing. All cored walls require sleeves and are required to be sealed per contract documents. Any mess from

the coring operation shall be immediately cleaned up by this contractor and shall not affect any installed finishes. If this work is not performed efficiently, the work will be performed by the owner and backcharged to this contractor.

15. Provide sleeve assemblies for work of this contract that penetrates the foundation wall, interior footings or any concrete footings shall be provided to the masonry and concrete contractor for installation. This contractor shall coordinate and assist with the sleeving install. All sleeves must be provided with the appropriate seals, this contract owns sealing the sleeves related to this contract's work.
16. This Contractor to provide all components of Vapor Mitigation System above the vapor barrier including but not limited to pipe stub-ups thru Drago wrap, risers, monitoring points, solid schedule 40 PVC piping, and riser roof caps. This Contractor shall also provide underslab perforated schedule 40 PVC piping. Contractor to coordinate riser piping such that the most direct route to the roof is achieved with minimal elbows. Reference drawings ENV101 – ENV108.
17. All Contractor employees working on the underslab utilities must be 40-Hour HAZWOPER Certified.
18. Valve tags, charts, and labeling shall be part of this contractor's responsibility.
19. Testing and balancing shall be provided by the Contract. 4-20 Testing, Adjusting, and Balancing Contractor. However, the Plumbing Contractor shall coordinate and communicate with the testing and balancing contractor for all testing required on the plumbing system.
20. Clean up shall be provided daily; all trash, debris, crates, boxes etc. shall be moved out of the building to the dumpsters each day. No storage of trash will be allowed inside the building or courtyards.
21. All guarantees and warranties begin at the substantial completion of the entire project. Maintain equipment prior to substantial completion. This Contractor must include in their bid the cost to provide the 2-year general warranty, and any extended warranties specified.
22. This contractor shall provide all necessary material handling equipment, cranes, scaffolds, hoisting and rigging equipment and supplies for work associated with this contract.
23. Coordination with the ATC contractor is required by this contractor.
24. Roof drains, pans, sumps and all related anchoring, support and adjustment elements that are required per the contract documents.
25. This contractor is responsible for providing, setting, bracing, anchoring, and aligning all floor drains, floor basins etc. required by the contract documents. The Plumbing Contractor shall have a plumber on site 100% of the time when the Concrete Contractor is pouring S.O.G. floors or elevated slabs. Drains that are misaligned will be demolished, removed, and replaced by the Plumbing Contractor. Including but not limited to replacing and re-engineering floor reinforcement and paying the concrete contractor to re-pour the slab areas.

26. Piping work associated with the emergency generator (including fuel piping, exhaust piping, regulators etc.). Include initial fill up of fuel tanks if Diesel and provide and coordinate the gas piping system is natural gas fueled. The DNREC permit submission will be provided by the Electrical contractor. However, this contractor must supply any required documentation for the permitting as well as coordinate all work with electrical contractor and other trades.
27. Fuel detection/monitoring system in accordance with local codes.
28. Gas piping, meter and pressure regulator valve. (proper sizing of the regulators is the responsibility of this contractor.) Include anchoring this equipment to the concrete pad provided by the concrete contractor and anchoring the piping and stand to the exterior wall.
29. Trap priming system, including detailed submittals of the system and then provide as-builts of the location of the rack installations. Photos marked with locations to be provided by this contractor.
30. All utilities will be brought to within +/- 5 feet of the building line by others. The Plumbing Contractor is responsible for connecting the utilities from +/- 5 feet outside the building line and completing the system within the building. This contractor shall own the underground line with the assistance of the Site Contractor, including any chemical treatment required by the City of Wilmington, or any other regulatory agency. Reports shall be submitted to CM.
31. Provide complete water sterilization, testing and reporting. Include within your proposal (2) additional testing mobilizations for potential Phase utilization.
32. Install Owner pre-purchased equipment identified within the contract documents.
33. Furnish all access panels required for the work of this contract to the drywall contractor for framing and final installation. The access panels shall meet the requirements of the contract documents, be lockable, and fire rated where required.
34. This contractor shall be on site to coordinate when walls are being installed for penetrations and sleeve installations. If penetrations and sleeves are missing, this will be the responsibility of this contractor to cover the associated costs of fixing.
35. Final connection of kitchen equipment and appliances is the responsibility of this Contractor.
36. As-built drawings both hard copy and BIM submission as part of the project closeout.
37. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is \$2,500 and shall be included in your base bid proposal.
38. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. Owner and EDiS will not be responsible for any lost tools, materials or equipment.
39. Provide the necessary coordination with trades to avoid interferences with other work and make

corrections at no extra charge.

40. Include within this contract's base bid an allowance of \$20,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner by means of a credit change order.

CONTRACT NO. 4-19 – HVAC AND CONTROLS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 077200	Roof Accessories
Section 078413	Penetration Fire Stopping
Section 083113	Access Doors and Panels
Division 21	Fire Suppression (coordination)
Division 22	Plumbing
Division 23	Heating Ventilating and Air Conditioning
Division 26	Electrical (coordination)
Division 28	Electronic Safety and Security (coordination)

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide a complete mechanical system as indicated on the Drawings and in the Specifications. Coordinate all work with associated trades, Plumbing, Fire Protection, Electrical and Electronic Safety and Security.
2. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.
3. This contractor shall include all piping, fittings, and connections required for the installation of the complete HVAC system.
4. Provide ductwork, flex duct, grilles, registers, diffusers, dampers, etc. including detailed layout for the drywall and ceiling contractors.
5. This contractor shall provide all required fire dampers, connections and remote controllers for the HVAC system.
6. Coordinate damper size, location and type of damper with contract documents, pay special attention to architectural drawings and finish surfaces. Fire dampers are to be included as part of this contractor's scope.
7. Provide pipe insulation, duct insulation, duct sealing, insulation coverings, valve insulation, labeling and identification of mechanical piping, ductwork, shafts, connections to systems etc.,
8. Provide all VFD's complete for electrical contractor to install.
9. Provide electric baseboard heaters. Contract 4-21 Electrical, Lighting, and Fire Alarm System Contractor will provide power to the units and make final connections.

10. Provide heat tracing for HVAC systems. The Electrical Contractor will be responsible for providing power to the heat tracing system.
11. Provide a Building Automation System as shown on the drawings and specified in Specification Section 230900 Instrumentation and Control for HVAC systems in its entirety. Coordinate with all other trades as required. Provide all instrumentation, controls, coordination of work, testing as required to provide a complete BAS system for this project.
12. Provide roof curbs, rails, etc. for equipment and systems that are part of this contract. This contractor is responsible for loading their own materials onto the roof. Layout and installation by this contractor, coordinate with the Carpentry and General Works Contractor for blocking and the Roofing Contractor for flashing and roofing details. Include any doghouses or raceways for service lines, including coordination of flashing.
13. Provide roof equipment, pipe, conduit and duct support racks by this Contractor as specified in Section 077200.
14. Division 26 of the specifications should be reviewed as it relates to the power wiring and other requirements for HVAC equipment including the coordination of furnishing and installing motor starters as provided in the specifications.
15. Permits, testing, inspections required for the mechanical piping and HVAC work are to be provided by this contractor. This contractor pays all fees.
16. This Contractor shall be responsible for designating an individual within his organization, intimately familiar with this project and assigned on site, to act as the Mechanical Systems Start-up Coordinator. This individual must be pre-approved by the Construction Manager. This individual's responsibilities shall include, but not be limited to, coordinating the start-up of all mechanical equipment, including the coordination between the Electrical Contractor, the Controls Contractor, and all testing, adjusting and balancing work. This individual shall report on a weekly basis, in written form, to the Construction Manager. These reports shall include a summary of current conditions including manufacturers' start-ups, systems' deficiencies noted to date and the remediation of same, coordination issues between trades, system interfacing and forecasting, as necessary to project the completion of each individual system within the building.
17. The Concrete Contractor shall furnish, install and maintain stone fill under slab. The Sitework Contractor shall leave the building pad site at subgrade to within +/- 1/4" in preparation to receive stone fill. The Plumbing, Mechanical and Electrical contractors shall complete their work under the slab on grade and shall be responsible to return the pad to the subgrade elevation left by the Sitework Contractor. The Concrete Contractor shall then adjust the select material to final subgrade, fine grade the slab and place the vapor barrier and stone fill. The Plumbing Contractor is responsible for all horizontal and vertical piping associated with the vapor barrier system. Note: while working on the building pad area this contractor shall utilize track drive equipment only. No rubber tire equipment will be allowed. Preservation of the building pad shall be the responsibility of this contractor. The onsite testing and inspection agency provided by the owner will monitor the excavation, travel and backfilling operation.

18. Equipment bases and housekeeping pads that are not included in 4-12 and identified on the structural documents will be provided by the Misc. Concrete contract. This contract shall provide detailed shop drawings and field layout of the pads/bases for installation by the concrete contractor. Failure to properly coordinate this work will result in the Mechanical contractor installing the pads at no cost to the owner or any other contractor. Any bases or pads related to the scope of this contract, not identified on the drawings will be provided by this contractor (complete installation)
41. Inside the existing Custom House lead-based paints and coatings have been identified. Any activities with the potential to disturb lead-based materials should be performed by the Contractor in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead. The Contractor shall notify the Owner in the event they encounter previously unknown material that they suspect may contain "lead". The Owner will arrange with a qualified specialist for identification and testing and advise the Contractor of the results. In the case that testing identifies potential lead-based materials, the contractor shall continue performance of the work that has the potential to disturb associated in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead.
42. Provide penetrations through walls, floors, etc. including cutting, patching and fire safing. All cored walls require sleeves and are required to be sealed per contract documents. Any mess from the coring operation shall be immediately cleaned up by this contractor and shall not affect any installed finishes. If this work is not performed efficiently, the work will be performed by the owner and backcharged to this contractor.
43. Provide sleeve assemblies for work of this contract that penetrates the foundation wall, interior footings or any concrete footings shall be provided to the masonry and concrete contractor for installation. This contractor shall coordinate and assist with the sleeving installation. All sleeves must be provided with the appropriate seals, this contract owns sealing the sleeves related to this contract's work.
19. Valve tags, charts, and labelling shall be part of this contractor's responsibility.
20. Clean up shall be provided daily; all trash, debris, crates, boxes etc. shall be moved out of the building to the dumpsters each day. No storage of trash will be allowed inside the building or courtyards.
21. All guarantees and warranties begin at the substantial completion of the entire project. Maintain equipment prior to substantial completion. This Contractor must include in their bid the cost to provide the 2-year general warranty, and any extended warranties specified.
22. This contractor shall provide all necessary material handling equipment, cranes, scaffolds, hoisting and rigging equipment and supplies for work associated with this contract.
23. This contractor shall be on site to coordinate when walls are being installed for penetration and sleeve installations. If penetrations and sleeves are missing, this will be the responsibility of this contractor to cover the associated costs of fixing.

24. Provide temporary heat and ventilation installation, maintenance and removal. Refer to Division 1, Specification Section 015123 - TEMPORARY HEATING, COOLING, & VENTILATION, for specific scope. The new equipment WILL NOT be used for temporary heating. This contractor will furnish, install, and maintain the temporary heating equipment. Temporary heating equipment will be provided under base bid. Temporary heating fuel consumption associated with the temporary heating will be charged against the allowance below.
25. Furnish all access panels required for the work of this contract to the drywall contractor for framing and final installation. The access panels shall meet the requirements of the contract documents, be lockable, and fire rated where required.
26. Final connection of kitchen equipment and appliances related to the mechanical piping and HVAC system provided by this contractor. Coordination with other trades (Special Systems, Electrical, Fire Alarm etc.) for final interconnections of these systems shall be provided by this contractor.
27. Provide (2) sets of filters for construction use. Include changing out the filters during the construction phase. Additionally include a complete change out of all filters prior to turn over to the owner (these filters shall be separate from the attic stock filters required) Providing a complete filter listing as part of the closeout documents is required.
28. As-built drawings both hard copy and BIM submission as part of the project closeout.
29. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is \$2,500 and shall be included in your base bid proposal.
30. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. Owner and EDiS will not be responsible for any lost tools, materials or equipment.
31. Provide the necessary coordination with trades to avoid interferences with other work and make corrections at no extra charge.
32. This contractor shall provide all raceways, conduits, pull strings and boxes required for the complete ATC system.
33. Coordinate and work alongside the commissioning team until the project is fully accepted. Include multiple trips to the site with testing equipment, ten (10.)
34. Include within this contract's base bid an allowance of \$75,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner by means of a credit change order.

CONTRACT NO. 4-20 – TESTING, ADJUSTING, AND BALANCING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

Technical Specification sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Division 21	Fire Protection
Division 22	Plumbing
Division 23	Heating Ventilating and Air Conditioning
Division 26	Electrical

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide water and air testing and balancing of HVAC systems. The contractor shall prepare, at a minimum, a preliminary balance report for the City of Wilmington Final Inspection.
2. Provide water testing and balancing of plumbing systems.
3. This contract includes all Division 0 and Division 1 General Requirements. All commissioning requirements are identified in Division 1 and are a requirement of this contract.
4. Submissions will be reviewed once, and any resubmittals will be reviewed once. Any other submittals will be billed to the contractor at the Engineers standard rates. Please thoroughly review all submissions prior to forwarding to avoid these costs.
5. Provide complete signed and sealed testing report prior to substantial completion and final inspection as required by New Castle County.
6. This contractor has been allotted 30 days to complete all the work and provide a final, sealed balancing report to the Construction Manager. This contractor will need to work closely with the Construction Manager and all MEP trades to sequence work so that the completion of the balancing is completed in a manner that does not delay acceptance from the City of Wilmington or Owner.
7. Provide confirmation of duct testing completed by Mechanical Contractor.
8. This contractor must provide all lifts, or scaffold means to access all elements.
9. Provide at least 48-hour notice prior to any delivery. All deliveries are to be between 8:00 AM and 2:00 PM.
10. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. Owner and EDiS will not be responsible for any lost tools, materials or equipment.

CONTRACT NO. 4-21 – ELECTRICAL, LIGHTING, AND FIRE ALARM SYSTEMS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

Technical Specification Sections:

Division 0	Procurement and Contracting Requirements
Division 1	General Requirements
Section 078413	Penetration Fire Stopping
Section 083113	Access Doors and Frames
Division 22	Plumbing (coordination of work)
Division 21	Fire Protection (coordination of work)
Division 23	HVAC (coordination of work)
Division 26	Electrical
Division 27	Communications
Division 28	Electronic Safety and Security

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide a complete electrical system, lighting, addressable fire alarm system and infrastructure for all Division 21, Division 27 and Division 28 as indicated on the contract documents.
2. Provide Transformer and Generator system complete. Include all infrastructure, raceways, duct banks (including all excavation, backfill, identification systems, trace wiring, etc.) This contractor shall be fully responsible for preparing, submitting, paying all fees and coordinating the DNREC required permitting for the Generator. Coordinate with Owner as required.
3. Provide a Lightning Protection System, including the delegated design and UL certification. Coordinate with the Carpentry and General Works Contractor and Roofing Contractor.
4. Provide complete infrastructure system for all Division 27 and Division 28 systems.
5. Divisions 22 and 23 of the specifications should be reviewed as it relates to the power wiring and other requirements for Plumbing and HVAC equipment including the coordination of furnishing and installing motor starters and controllers as detailed in the Specifications and on the Drawings.
6. This contractor shall provide all conduits, raceways and boxes required for thermostat and sensor installation.
7. Contract 4-19 HVAC and Controls Contractor will supply all VFD's to the electrical contractor for installation and powering.
8. Provide all smoke dampers, power and remote controllers as required by the contract documents.

9. Excavation and backfill for underground electrical work as required below is the responsibility of this Contractor. Soil types shall be in accordance with project specifications and the Geo-Tech report. Geo-Tech reports included for review and acceptance.
10. Backfilling is the responsibility of this Contractor. Soil types shall be in accordance with project documents. It is the intent to use on-site material and not imported fill. The use of this on-site material shall conform to the compaction requirements identified in Section 312300. Excavated materials shall be covered immediately and protected from moisture mitigation. If Materials become unusable, this contractor shall own purchasing acceptable off-site materials.
11. The Concrete Contractor shall furnish, install and maintain stone fill under slab. The Sitework Contractor shall leave the building pad site at subgrade to within  $\pm 1/4"$  in preparation to receive stone fill. The Mechanical and Electrical Contractors shall complete their work under the slab on grade and shall be responsible to return the pad to the subgrade elevation left by the Sitework Contractor. The Concrete Contractor shall then adjust the select material to final subgrade, fine grade the slab and place the vapor barrier and stone fill. Note: while working on the building pad area this contractor shall utilize track drive equipment only. No rubber tire equipment will be allowed. Preservation of the building pad shall be the responsibility of this contractor. The onsite testing and inspection agency provided by the owner will monitor the excavation, travel and backfilling operation.
12. Provide all excavation, layout, concrete, reinforcing for duct banks, light standards, above ground conduit encasement, equipment bases, and any other concrete work specifically related to the electrical work. This shall include services from the roadways and all communication duct banks as required. Include requirements of DP&L, the City of Wilmington, County, State and local codes for concrete encasement.
13. All exterior underground raceways and infrastructure are to be installed by this contractor as required by the contract documents. (Cameras, security, electric etc.)
14. Provide temporary electric installation, maintenance and removal. Refer to Division 1, Specification Section 015113 - TEMPORARY ELECTRIC, for specific scope.
15. This contractor shall provide temporary transformers as required to provide electrical power generation until permanent service is installed by Delmarva power. Include all permits, cabling, switch gear, breakers etc.to provide a complete temporary power system capable of supplying the electrical loads required for the project.
16. This contractor shall include in the base bid temporary exterior lighting installed and maintained to accommodate a minimum of 3-foot candles for the exterior of the building for the purpose of site security. The lights must be installed to meet the requirements for exterior use and illuminated during low light hours. These lights will be utilized until permanent exterior lighting has been installed and powered. Supplying the temporary power for this lighting is part of this contract. Include providing temporary power and lighting as needed for the entire duration of the project. This includes the necessary power outlets required for all contractor use. Power must be available within a reasonable distance at all times.
17. Provide temporary power connection to the EDiS construction trailer on King Street. The trailer is

currently fed from the temporary service to the Custom House. The new temporary service will be fed from a location on King Street. Coordinate with DP&L for available power source. Remove the temporary service at the end of the project.

18. Rough in and final connection and related work for equipment provided under other contracts (i.e. kitchen, elevators, HVAC, sprinkler, motorized doors, vertical walls, etc.)
19. Provide rough-in and final connection and related work for equipment provided under other contracts (i.e. kitchen, elevators, HVAC, sprinkler, motorized doors, etc.).
20. Provide power circuits to all systems installed by the Special Systems Contractor including, but not necessarily limited to the following: Intercom/Public Address System, Fire Alarm System, Structured Cable IT Systems, Access Control System, CCTV System, Audio and Audiovisual Systems.
21. Provide conduits, raceways, and pull strings for all systems installed by the Special Systems Contractor including, but not necessarily limited to the following: Intercom/Public Address System, Fire Alarm System, Structured Cable IT Systems, Access Control System, CCTV System, Audio and Audiovisual Systems.
22. Provide conduits, raceways, and pull strings for low-voltage wiring at doors receiving electronic or security hardware, including associated electronic card readers. Low voltage wiring from the controller to hardware shall be provided by the installing doors and frames contractors. Electrical contractor to install power supply and make final power connections. Final connections of low-voltage wiring to hardware to be provided by the Special Systems Contractor. Magnetic Door Hold-Opens are to be furnished by the Doors, Frames, Hardware contractor to the Electrical Contract for installation including power. The Special Systems contractor will make final connections for the relay to the fire alarm.
23. Provide all permits and inspections. Pay all fees associated with the permits and inspection.
24. Penetrations through walls, floors, etc. including cutting, patching and fire safing.
25. Testing and Commissioning of all Electrical Systems, as related to the scope of work for this contract shall be provided. Reporting and verification documentation shall be supplied to Owner and EDiS.
26. This contractor shall provide all supplemental hangers and fasteners for lighting installation to the building structure.
27. Cleaning up on a daily basis shall be provided by this contractor. All work areas shall be organized and cleaned up to the dumpsters each day.
28. All guarantees and warranties begin at the substantial completion of the entire project. Maintain equipment prior to substantial completion. This Contractor must include in their bid the cost to provide the 2-year general warranty, and any extended warranties specified.
29. Hoisting, rigging and scaffolding required to perform your scope of work shall be provided by

this contractor.

30. Provide all primary service work from DP&L's connection point on the East side of King Street to the transformer pad. This includes all utility company related costs/fees for this work. Coordination with the utility company is the responsibility of this contractor.
31. Provide a complete fire alarm system. Water flow devices are supplied and installed by the Sprinkler Contractor and wired by this Contractor. Include tie-in to fire sprinkler flow and tamper switch. (fire dampers, smoke detectors, remote testing switches are all part of this contract)
32. Provide power connections to all heat tracing and insulation systems as required. Contract 4-19 HVAC and Controls Contractor will provide the heat trace.
33. Coordinate closely with the work of the Special Systems contractor. This contract (electrical) provides all infrastructure, conduit and raceways required for the Special Systems work. Provide pull strings and boxes for all systems. (voice, data, communication, fire alarm, AV systems, Audio systems, and public address system, clock system etc.) Include all required sleeving, sealing and fire sealing for raceways and conduits through walls, floors, ceilings etc. for this work)
34. Provide Lightning protection with master UL certification. Coordinate with the Carpentry and Roofing contractors.
35. Coordinate and provide a complete grounding system for the entire project. This includes but is not limited to the building columns, interior spaces, exterior wall assemblies, Electrical rooms, IDF and IDF rooms)
36. As-built drawings in both hard copy, electronic and final BIM modelling per contract documents.
37. Perform certification testing for all wiring and systems supplied by this contract scope.
38. Provide all BIM services as specified in Section 013700 BIM Execution Plan. As part of the coordination process all contractors are responsible for obtaining a Revizto license. The cost of this license is \$2,500 and shall be included in your base bid proposal.
39. Provide access doors and frames for all access to Structured Cable components or equipment that require routine or periodic maintenance. Installation of access doors and frames provided by the Metal Stud & Drywall Contractor.
40. This is not a secure site. All contractors are responsible for concealing, locking and /or removing any materials on a daily basis. The Owner and EDiS will not be responsible for any lost tools, materials or equipment.
41. Include within this contract's base bid an allowance of \$50,000 for work to be determined by the owner and construction manager. Unused allowance funds to be returned to the owner.

END OF SECTION

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## SECTION 01 14 00

### WORK RESTRICTIONS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 CONTRACTOR USE OF PREMISES

- A. General: During the construction period the Contractor shall have use of designated areas of the premises for construction operations, including use of designated areas of the site.
- B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
  - 1. Owner Occupancy: There is no owner occupancy.
  - 2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to emergency vehicles at all times. Do not block adjacent driveways and entrances except as expressly noted on the plans as acceptable to block during construction. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

##### 1.3 OCCUPANCY REQUIREMENTS

- A. Partial Owner Occupancy: Partial owner occupancy is not anticipated for this project.

##### 1.4 RESTRICTIONS

- A. Work Hours: No work-between the hours of 6:00 PM and 7:00 AM shall be permitted without the Construction Manager first obtaining written permission of the owner (DFM), then if approved by owner, written permission of the Town to be obtained.

#### LEGAL HOLIDAYS

- A. The Contractor will not be permitted to work on Sundays or days which are legal holidays in the State of Delaware, except in cases of emergency, and only with the Construction Manager obtaining written permission of the owner (DFM), then if approved by owner, written permission of the Town to be obtained.
- B. If the Contractor desires to work upon any such legal holidays, he or she shall notify the Construction Manager who will coordinate with the owner (DFM) and the Town in writing at least two (2) days in advance of such holiday stating that he or she desires to work and the location of the proposed work.

- C. The owner (DFM) and Town reserves the right to deny or approve the Contractor's request. Any requests by the Construction Manager would be addressed to the owner (DFM) and Town Manager.

1.5 CONTRACTOR ACCESS, STORAGE, AND STAGING

- A. Access, storage and staging shall remain within the property boundaries until arrangements are made with the neighboring property owners.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

**END OF SECTION**

## SECTION 01 21 00

### ALLOWANCES

#### 1. RELATED DOCUMENTS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.
- B. Refer to provisions in AIA Document A232 – 2019 EDITION, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, CONSTRUCTION MANAGER AS ADVISOR EDITION, for requirements in addition to those specified in Division 1.
- C. Refer to Scope Information Sheets for all contracts bound in the Project Manual under Section 011100 - SUMMARY OF WORK. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- D. For work being constructed under separate prime contracts, provisions of this Section apply to each contract being bid.
- E. Include in the Contract Sum all lump sum and unit cost allowances stated in the Contract Documents.
- F. Designate in the construction progress schedule the delivery dates for products specified under each allowance.
- G. Designate in the Schedule of Values the quantities of materials required under each unit cost allowance.

#### 2. ALLOWANCES FOR PRODUCTS

- A. The amount of each allowance includes:
  - 1. The cost of the product or labor to the Contractor or Subcontractor, less any applicable trade discounts.
  - 2. Delivery to the site.
  - 3. Labor required under the allowance, only when labor is specified to be included in the allowance. If labor is not specified to be included in the allowance, it shall be included in the Contractor's bid and in the resulting Contract Sum.
  - 4. Applicable taxes.
  - 5. Profit and overhead.

- B. In addition to the amount of each allowance, include in the Contract Sum the Contractor's costs for:
  - 1. Handling at the site; including unloading, uncrating and storage.
  - 2. Protection from the elements and from damage.
  - 3. Labor for installation and finishing, except where labor is specified to be a part of the allowance.
  - 4. Other expenses required to complete the installation.
  - 5. Contractor's and Subcontractor's overhead and profit.
- C. Refer to Scope Information Sheets under Section 011100 - SUMMARY OF WORK for the amount of each lump sum allowance and for work specified in the specification sections listed below.

### 3. ADJUSTMENT OF COSTS

- A. Should the net cost be more or less than the specified amount of the allowance, the Contract Sum will be adjusted accordingly by Change Order.
  - 1. For products and labor specified under a unit cost allowance, the unit cost shall apply to the quantities actually used with a nominal allowance for waste, as determined by receipted invoices, or by field measurement.
- B. At Contract closeout, reflect all approved changes in Contract amounts in the final statement of accounting.

**END OF SECTION**

**SECTION 01 21 16**  
**ALLOWANCE AUTHORIZATION FORM**

**ALLOWANCE AUTHORIZATION**

**Project:**

**Architect:**

**Project No.**

**Contractor:**

**AAA No.:**

**Initiation Date:**

**The Allowance is allocated as follows:**

Total original Contract Allowance was:	\$
Amount of Contract Allowance Access previously authorized:	\$
Adjusted Contract Allowance prior to this authorization is:	\$
The amount of available Allowance will Decrease by this Access Authorization:	\$
The remaining Contract Allowance, after this Access Authorization will be:	\$

**Recommended by:**  
**Architect**

By (Signature): \_\_\_\_\_  
Date: \_\_\_\_\_

**Accepted by:**  
**Contractor**

By (Signature): \_\_\_\_\_  
Date: \_\_\_\_\_

**Approved by:**  
**Owner**

By (Signature): \_\_\_\_\_  
Date: \_\_\_\_\_

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**NOT FOR BID**

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SECTION 012200 - UNIT PRICES

1. GENERAL PROVISIONS

- A. The general provision of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.
- B. Refer to provisions in AIA Document A232 – 2019 EDITION, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, CONSTRUCTION MANAGER AS ADVISOR EDITION, for requirements in addition to those specified in Division 1.
- C. For work being constructed under separate prime contract, provisions of this Section apply to each contract being bid.

2. BASE BID

- A. The Base Bid shall consist of all work shown or specified in the Contract Documents, exclusive of any Additive Unit Prices specified herein.
- B. The Base Bid shall include all work in any Subtractive Unit Prices specified herein.

3. UNIT PRICES

- A. State in the Bid Form the amount to be added to (or subtracted from) the Base Bid per unit of measurement for each Unit Price specified. State this amount to include all overhead and profit. No surcharge in addition to the Unit Price listed will be permitted.
- B. See Section 002113, INSTRUCTIONS TO BIDDERS for related information.
- C. For description of Unit Prices requested, refer to the specification. The method of stating the Unit Prices is described in the Bid Form.
- D. Where both add and deduct unit prices are requested, there shall not be more that a 10% variation between the two.

4. APPLICATION OF UNIT PRICES

- A. Unit prices stated in the Bid Form will apply from the time the Bid is submitted until Contract completion.

5. MEASUREMENT OF QUANTITIES

- A. Quantities shall be determined by field measurement by contractor personnel and as verified by

the Construction Manager.

- B. At the Contractor's option, and at his expense, measurement may be made by a registered surveyor.

6. LIST AND DESCRIPTION OF UNIT PRICES

*Unit Price No. 1: Replace T1 Windows with T2 Windows*

*Description — For T1 windows provide a unit price to replace in kind as a T2 condition as specified on A204. Remove window, frame, and sill, and replace in kind with historic profiles and glazing methods to match existing, true divided lites (using non-insulated glass) and glass type per the historic window glazing & operation notes above. See comments in window schedule. Existing window, frame, and sill to be demolished & replaced. Salvage any trim in restorable condition for possible reuse at other locations and as an example of the profiles.*

END OF SECTION

SECTION 012300 - ALTERNATES

1. GENERAL PROVISIONS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.
- B. Refer to provisions in AIA Document A232 – 2019 Edition, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, CONSTRUCTION MANAGER AS ADVISOR EDITION, for requirements in addition to those specified in Division 1.
- C. For work being constructed under separate prime contracts, provisions of this Section apply to each contract being bid.

2. BASE BID

- A. The Base Bid shall consist of all Work shown or specified in the Contract Documents, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids (if any are required to be stated in the bid).
- B. The Base Bid shall include all work in any Subtractive Alternates specified herein.

3. ALTERNATES

- A. State in the Bid Form, where applicable, the amount to be added to or deducted from the amount of the Base Bid for each Alternate specified.
- B. See Section 002113 - INSTRUCTIONS TO BIDDERS for related information.
- C. The description of Alternates contained herein is in summary form. Detailed requirements for materials and execution shall be as specified in other sections and as shown on drawings.

Alternate No. 1 – Grand Stair Railing System

**Base Bid: Provide glass guardrail and handrail system as shown on A711**

**Alternate Pricing: Provide 42" tall painted steel guard railing with 2.5" square steel posts 4' OC with ¾" bar stock square steel pickets 4" OC, a top 1"x2" steel rail, and a bottom 1"x2" rail 3" above the floor. Include a 36" high 1.5" stainless steel handrail bracketed off the guard railing.**

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**NOT FOR BID**

**SECTION 01 25 00**  
**SUBSTITUTION PROCEDURES**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Substitutions.

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Identify product, fabrication, and installation method to be replaced. Include affected Specification Section number and title and Drawing numbers and titles. Indicate specific Drawing detail, where applicable.
1. Submit PDF electronic files of each request for consideration. No post-bid substitution requests will be permitted.
  2. Substitution Request Form: Use CSI Form 13.1A.
  3. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product, fabrication, and installation cannot be provided, if applicable.
    - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner, that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements

- indicated. Indicate deviations, if any, from the Work specified. Indicate modifications to Work in place required to accommodate substitution.
- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with specified requirements.
  - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES or other organization acceptable to authority having jurisdiction.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
  - n. Draft Change Order documenting substitution acceptance prepared on form specified in Section 01 26 00 "Contract Modification Procedures."
4. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.
  - c. Architect will consider only one request for substitution for each product. If substitution request is not accepted, provide specified product.

#### 1.4 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

## 1.5 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. Conditions for Consideration: Architect will consider Contractor's request for substitution when the following conditions are satisfied. When any condition for consideration is not satisfied, Architect will return request without action, except to record noncompliance with these requirements:
1. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  2. Requested substitution provides sustainable design characteristics that specified product provided.
  3. Substitution request is fully documented and properly submitted.
  4. Requested substitution will not adversely affect Contractor's construction schedule.
  5. Requested substitution has received necessary approvals of authorities having jurisdiction.
  6. Requested substitution is compatible with other portions of the Work.
  7. Requested substitution has been coordinated with other portions of the Work.
  8. Requested substitution provides specified warranty.
  9. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions will not be considered:
1. When indicated or implied on Shop Drawing or Product Data submittals, without separate written request.
  2. When acceptance will require Contract Documents revision.
  3. When request is not from Contractor.
- C. Substitutions for Cause: Submit requests for substitution required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
1. Submit requests immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
  2. Additional Conditions for Consideration:
    - a. Specified product, through no fault of Contractor, is not available or cannot be delivered in time to meet Project schedule. Failure of Contractor to

- order specified product in time to meet schedule is not a condition necessitating substitution.
- b. Specified product, through no fault of Contractor, cannot comply with changed Project conditions.
- D. Substitutions for Convenience: Architect will consider requests for substitution if received prior to bid in accordance with the Instruction to Bidders specification section 00 21 13. Requests received after that time may be considered or rejected at discretion of Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    - b. Requested substitution does not require extensive revisions to the Contract Documents.
    - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - d. Substitution request is fully documented and properly submitted.
    - e. Requested substitution will not adversely affect Contractor's construction schedule.
    - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - g. Requested substitution is compatible with other portions of the Work.
    - h. Requested substitution has been coordinated with other portions of the Work.
    - i. Requested substitution provides specified warranty.
    - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

**END OF SECTION**

## SECTION 01 26 00

### CONTRACT MODIFICATION PROCEDURES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Minor changes in the Work.
2. Proposal requests.
3. Administrative Change Orders.
4. Change Orders.
5. Construction Change Directives.

##### 1.2 MINOR CHANGES IN THE WORK

- ###### A.
- Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on form included in Project Manual.

##### 1.3 PROPOSAL REQUESTS

- ###### A.
- Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests are not instructions either to stop work in progress or to execute the proposed change.
2. Within 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
  - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - c. Include costs of labor and supervision directly attributable to the change.
  - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  - e. Quotation Form: Use forms acceptable to Architect.

- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  4. Include costs of labor and supervision directly attributable to the change.
  5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
  7. Proposal Request Form: Use form acceptable to Architect.

#### 1.4 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G731.

#### 1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Directive Form: AIA Document G733 or other Architect accepted form.
  2. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

516 N. KING ST, WILMINGTON DE 19801  
NOVEMBER 22, 2024

CUSTOMS HOUSE RENOVATION AND ADDITION  
#MJ0217000003-BP4

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

**END OF SECTION**

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**SECTION 01 29 00**  
**PAYMENT PROCEDURES**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Applications for Payment.

1.2 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with continuation sheets.
    - b. Submittal schedule.
    - c. Items required to be indicated as separate activities in Contractor's construction schedule.
  2. Submit the schedule of values to Construction Manager at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
  3. The construction manager will manage sub-contractors and collect documents required within this specification. The construction manager will complete their review of the payment documents, then supply documentation to the Architect and Owner for review.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the schedule of values:

- a. Project name and location.
  - b. Name of Architect.
  - c. Architect's project number.
  - d. Contractor's name and address.
  - e. Date of submittal.
2. Arrange schedule of values consistent with format of AIA Document G703 or other Architect accepted form with separate columns to indicate the following for each item listed:
- a. Related Specification Section or Division.
  - b. Description of the Work.
  - c. Name of subcontractor.
  - d. Name of manufacturer or fabricator.
  - e. Name of supplier.
  - f. Change Orders (numbers) that affect value.
  - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
    - 1) Labor.
    - 2) Materials.
    - 3) Equipment.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Site Mobilization: Provide a separate line item in the schedule of values for site mobilization including initial installation of temporary facilities and utilities.
9. Insurance and Bonds: Provide a separate line item in the schedule of values for Insurance and bonds, when required.
10. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
- a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

11. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

#### 1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
  1. Submit draft copy of Application for Payment seven days prior to due date for review by Construction Manager.
- C. Application for Payment Forms: Use AIA Document G732 and AIA Document G703 as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute each copy of application by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed, only if they are stored in a bonded warehouse or on site. Materials or equipment stored off-site not in a bonded warehouse shall not be included in the Application for Payment.
  1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
  2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  3. Provide proof that the warehouse where the materials are being stored is bonded.
  4. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.

- b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
  - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
  - d. Photographic documentation.
- F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Construction Manager by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Submit one duplicate set of PDF electronic files for each Application for Payment.
  2. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit conditional final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. As-built Drawings: At the end of project, submit the final set of as-built drawings for review and approval before final release of retainage.
- I. Initial Application for Payment: Submittals that must precede submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of values.
  3. Contractor's construction schedule (preliminary if not final).
  4. Products list (preliminary if not final).
  5. Schedule of unit prices.
  6. Submittal schedule (preliminary if not final).
  7. List of Contractor's staff assignments.
  8. List of Contractor's principal consultants.
  9. Copies of building permits.
  10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  11. Initial progress report.
  12. Report of preconstruction conference.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707, "Consent of Surety to Final Payment."
  7. Evidence that claims have been settled.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

**END OF SECTION**

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## SECTION 01 31 00

### PROJECT MANAGEMENT AND COORDINATION

#### PART 1 - GENERAL

##### 1.1 SUMMARY

A. Section Includes:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Interpretation (RFIs).
4. Project Web site.
5. Project meetings.

##### 1.2 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

##### 1.3 INFORMATIONAL SUBMITTALS

- A. Submittals: Make initial submittals within 15 days of starting construction operations and before first Application for Payment. Update list and resubmit when information changes and when new information becomes available.

1. Submit PDF electronic files of each list.
2. Submittal Schedule.

- B. Subcontract List: Submit list of individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

- a. Name, address, and telephone number of entity performing subcontract or supplying products.
- b. Number and title of related Specification Section(s) covered by subcontract.
- c. Drawing number and detail references, as appropriate, covered by subcontract.

- C. Key Personnel Names: Submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names,

addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, on Project Web site, and by each temporary telephone. Keep list current at all times.

#### 1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner if coordination of Owner's Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work.
1. Administrative activities include, but are not limited to, the following:
    - a. Preparation of Contractor's construction schedule.
    - b. Preparation of the schedule of values.
    - c. Installation and removal of temporary facilities and controls.
    - d. Delivery and processing of submittals.
    - e. Progress meetings.
    - f. Preinstallation conferences.
    - g. Project closeout activities.
    - h. Startup and adjustment of systems.

#### 1.5 COORDINATION DRAWINGS

- A. Before materials are purchased, fabricated or work is begun, prepare coordination drawings for all floors and areas, including buried systems and services, showing the size and location of Contractor's equipment and systems size, location and routing. Coordination drawings to be no less than ¼ inch scale and generated from a computer

CAD program compatible with AutoCAD Release 2013. Base architectural and MEP drawings will be available from the Architect and/or Engineer in .DWG format. Electronic backgrounds in .DWG format will be distributed to Contractor after award of contract and receipt by professional release forms. At Contractor's option, .RVT files from the architectural and structural models can be provided for the benefit of preparing a 3D Revit coordination model in lieu of 2D Revit coordination drawings.

- B. Take basic coordination drawings prepared for the HVAC scope of work and add (draft) each subsequent trade, in locations decided upon at coordination meetings. Add items to the coordination drawings only after all present at the coordination meetings agree to their location. Sequencing of drawing additions to be as follows:  
HVAC>Plumbing>Electrical>Fire Protection.
- C. Documents will be used as a guide, with the final approved coordination drawings governing installation sequence. Adjustments will be made as required at coordination meetings. All drawings will be prepared in accordance with all applicable rules, regulations, and governing authorities.
- D. Once reviewed and approved by each trade subcontractor, coordinate the final reproducible Systems Coordination Drawings, illustrating the work of all trades. The reproducible drawings will be via shop drawings submittal procedures with sufficient time to review and resolve coordination items so as not to affect the critical path of construction operations. The Architect will review the coordination model and/or drawings for conformance with the design intent.
- E. Coordination of Installed Work:
  - 1. In case of interferences with work of other trades or scheduling problems during any portions of actual construction, decide which work will be relocated or adjusted. These minor adjustments will be made at no additional cost to the Owner. The Architect and Engineer may direct minor architectural location changes during installation of the Work. All adjustments will be made at no additional cost to the Owner.
  - 2. Contractor is responsible for coordinating the work of subcontractors and subcontractors' work in conjunction with Owner's own forces. This may involve minor adjustments or modifications in the work to accommodate the work of other trades.
  - 3. Commencement of any work in any section indicates that previous work has been inspected and meets Contractor's full satisfaction.
  - 4. It is Contractor's responsibility to ensure that all work is completed prior to commencement of the following work.
  - 5. Contractor is required to schedule and coordinate his activities with the subcontractors and the Owner's separate prime contractors to ensure proper fit of the various elements of the work in common.
  - 6. Schedule: Contractor is responsible for establishing the schedule of coordination drawings so as not to affect the critical path of construction operations.
- F. General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination

is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Include the following information, as applicable:
  - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
  - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
  - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
  - d. Indicate space requirements for normal operations, routine maintenance, and for anticipated replacement of components during the life of the installation.
  - e. Show location and size of access doors and clearances required for access to concealed dampers, valves, and other controls.
  - f. Indicate required installation sequences.
  - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

G. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing and bracing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for other Work.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

- a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
  - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
  - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
- a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger and cable trays.
  - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm device locations.
  - c. Motion detector, occupancy sensor, daylight sensor, and other electrical system control device locations.
  - d. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
  - e. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
- a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
- H. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
  2. BIM File Incorporation (Optional): Develop and incorporate coordination drawing files into Building Information Model established for Project.
    - a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
  3. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
    - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.

- b. Digital Data Software Program: Drawings are available in AutoCAD Version 2010.

## 1.6 REQUESTS FOR INTERPRETATION (RFIs)

- A. General: Immediately on discovery of the need for interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
  - 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
  - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
  - 1. Project name.
  - 2. Project number.
  - 3. Date.
  - 4. Name of Contractor.
  - 5. Name of Architect.
  - 6. RFI number, numbered sequentially.
  - 7. RFI subject.
  - 8. Specification Section number and title and related paragraphs, as appropriate.
  - 9. Drawing number and detail references, as appropriate.
  - 10. Field dimensions and conditions, as appropriate.
  - 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  - 12. Contractor's signature.
  - 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
  - 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
  - 1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.

- b. Requests for approval of substitutions.
  - c. Requests for approval of Contractor's means and methods.
  - d. Requests for information already indicated in the Contract Documents.
  - e. Requests for adjustments in the Contract Time or the Contract Sum.
  - f. Requests for interpretation of Architect's actions on submittals.
  - g. Incomplete RFIs or inaccurately prepared RFIs.
2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within **10** days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly. Software log with not less than the following:
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect.
  4. RFI number including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
1. Indicate resulting Minor Change in the Work, Construction Change Directive, and Proposal Request in RFI log.
- 1.7 PROJECT WEB SITE
- A. Use Owner's or Architect's Project Web site for purposes of hosting and managing project communication and documentation until Final Completion. Project Web site will include the following functions:
1. Project directory.
  2. Project correspondence.
  3. Meeting minutes.
  4. Contract modifications forms and logs.
  5. RFI forms and logs.
  6. Task and issue management.
  7. Photo documentation.

8. Schedule and calendar management.
  9. Submittals forms and logs.
  10. Payment application forms.
  11. Drawing and specification document hosting, viewing, and updating.
  12. Online document collaboration.
  13. Reminder and tracking functions.
  14. Archiving functions.
- B. On completion of Project, provide one complete archive copy of Project Web site files to Owner and to Architect in a digital storage format acceptable to Architect.
- C. Project Web Site Software Package:
1. Procore Technologies Inc.

## 1.8 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
  2. Coordinate meeting times with Architect's regularly scheduled site visits.
  3. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  4. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than **15** days after execution of the Agreement.
1. Conduct the conference to review responsibilities and personnel assignments.
  2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, and Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Critical work sequencing and long-lead items.
    - d. Designation of key personnel and their duties.
    - e. Lines of communications.

- f. Procedures for processing field decisions and Change Orders.
  - g. Procedures for RFIs.
  - h. Procedures for testing and inspecting.
  - i. Procedures for processing Applications for Payment.
  - j. Distribution of the Contract Documents.
  - k. Submittal procedures.
  - l. Sustainable design requirements.
  - m. Preparation of record documents.
  - n. Use of the premises.
  - o. Work restrictions.
  - p. Working hours.
  - q. Owner's occupancy requirements.
  - r. Responsibility for temporary facilities and controls.
  - s. Procedures for moisture and mold control.
  - t. Procedures for disruptions and shutdowns.
  - u. Construction waste management and recycling.
  - v. Parking availability.
  - w. Office, work, and storage areas.
  - x. Equipment deliveries and priorities.
  - y. First aid.
  - z. Security.
  - aa. Progress cleaning.
  - bb. Commissioning activities.
4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Sustainability Coordination Conference: Architect will schedule and conduct a sustainability coordination conference before starting construction, at a time convenient to Owner, Architect, and Contractor.
1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent and sustainability coordinator; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect meeting requirements for sustainability certification, including the following:
    - a. Sustainability Project Checklist.
    - b. General requirements for sustainability-related procurement and documentation.
    - c. Project closeout requirements and sustainability certification procedures.
    - d. Role of sustainability coordinator.
    - e. Construction waste management.
    - f. Construction operations and sustainability requirements and restrictions.
  3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

- D. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: 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. Advise Architect, and Owner's Commissioning Authority of scheduled meeting dates.
  2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Sustainable design requirements.
    - i. Review of mockups.
    - j. Possible conflicts.
    - k. Compatibility requirements.
    - l. Time schedules.
    - m. Weather limitations.
    - n. Manufacturer's written instructions.
    - o. Warranty requirements.
    - p. Compatibility of materials.
    - q. Acceptability of substrates.
    - r. Temporary facilities and controls.
    - s. Space and access limitations.
    - t. Regulations of authorities having jurisdiction.
    - u. Testing and inspecting requirements.
    - v. Installation procedures.
    - w. Coordination with other work.
    - x. Required performance results.
    - y. Protection of adjacent work.
    - z. Protection of construction and personnel.
    - aa. Startup and adjusting procedures.
    - bb. Commissioning activities.
  3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  5. 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.

- E. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, and Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of record documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Submittal of written warranties.
    - d. Requirements for completing sustainable design documentation.
    - e. Requirements for preparing operations and maintenance data.
    - f. Requirements for delivery of material samples, attic stock, and spare parts.
    - g. Requirements for demonstration and training.
    - h. Preparation of Contractor's punch list.
    - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - j. Submittal procedures.
    - k. Coordination of Owner's work.
    - l. Owner's partial occupancy requirements.
    - m. Responsibility for removing temporary facilities and controls.
  4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- F. Progress Meetings: Conduct progress meetings at two-week intervals.
1. Coordinate dates of meetings with preparation of payment requests.
  2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority and Architect, each contractor, 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 meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. 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.

- 1) Review schedule for next period.
- b. Review present and future needs of each entity present, including the following:
- 1) Interface requirements.
  - 2) Sequence of operations.
  - 3) Resolution of BIM component conflicts (BIM will be optional).
  - 4) Status of submittals.
  - 5) Status of sustainable design documentation.
  - 6) Deliveries.
  - 7) Off-site fabrication.
  - 8) Access.
  - 9) Site utilization.
  - 10) Temporary facilities and controls.
  - 11) Progress cleaning.
  - 12) Quality and work standards.
  - 13) Status of correction of deficient items.
  - 14) Field observations.
  - 15) Status of RFIs.
  - 16) Status of proposal requests.
  - 17) Pending changes.
  - 18) Status of Change Orders.
  - 19) Pending claims and disputes.
  - 20) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- G. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority and Architect, each contractor, 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 meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

- a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. 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
  - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
  - c. Review present and future needs of each contractor present, including the following:
    - 1) Interface requirements.
    - 2) Sequence of operations.
    - 3) Resolution of BIM component conflicts (BIM is optional).
    - 4) Status of submittals.
    - 5) Deliveries.
    - 6) Off-site fabrication.
    - 7) Access.
    - 8) Site utilization.
    - 9) Temporary facilities and controls.
    - 10) Work hours.
    - 11) Hazards and risks.
    - 12) Progress cleaning.
    - 13) Quality and work standards.
    - 14) Change Orders.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

**END OF SECTION**

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## SECTION 013113

### PROJECT COORDINATION MEETING

#### 1. PROJECT COORDINATION MEETING

- A. An on-site project coordination meeting will be held on a biweekly basis throughout the project construction period.

#### 2. ATTENDANCE

- A. Attendance at the project coordination meeting is mandatory of each Contractor or major supplier on the project.
- B. The representative of the Contractor shall be the Project Manager and field superintendent unless a substitute representative has been approved by the Construction Manager.
- C. Contractor will begin attending the Project Coordination Meetings at least 4 weeks prior to mobilization on site and will continue until the Contractor has fulfilled the obligations of his Contract.

#### 3. AGENDA

- A. The Construction Manager will set the agenda for the biweekly Project Coordination Meeting.
- B. At a minimum, the Contractor shall be prepared to discuss the following:
  - 1. Actual vs. as planned progress for the prior two-week period.
  - 2. Planned construction activities for the next four weeks.
  - 3. Contract document clarifications.
  - 4. Coordination items with other contractors.
  - 5. Quality Control.
  - 6. Recently issued change orders.
  - 7. Potential change orders.
  - 8. Submittals and shop drawings.
  - 9. Other items requiring Construction Manager's attention.

END OF SECTION

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## SECTION 013119

### PRE-INSTALLATION MEETINGS

#### 1. PRE-INSTALLATION MEETINGS

- A. An on-site pre-installation meeting will be held at least two weeks prior to commencement of installation of work.

#### 2. ATTENDANCE

- A. Attendance at the pre-installation meeting is mandatory of each Contractor and/or major supplier as required for each specific meeting listed below.

- B. The following individuals shall attend these meetings:

- Contractors' Project Manager
- Contractors' Field Superintendent
- Contractors' Safety Representative (as needed)
- Key Subcontractors, Suppliers, and Vendors
- EDiS Project Manager
- EDiS Field Manager
- EDiS Safety Director (as needed)
- EDiS MEP Specialist (as needed)
- Owner's Representative (as needed)
- Architect/Engineer (as needed)
- Governmental Agency Representatives (as needed)
- Testing/Inspection Agency Representatives (as needed)
- Utility Company Representatives (as needed)

#### 3. SUBMITTALS

- A. Each contractor is responsible to have all submittals and mock-ups, as related to the pre-installation meeting scope of work, submitted and approved prior to commencement of the pre-installation meeting.

#### 4. LIST OF REQUIRED MEETINGS

- Selective Demolition
- Doors/Frames/Hardware
- Interior Glass and Glazing
- Finish Carpentry & Millwork
- Acoustical Ceilings/Acoustical Wall Panels
- Paint and VWC
- Flooring (VCT, Carpet)
- Operable Partitions
- Partition Walls

- Metal Studs
- Drywall
  
- Insulation
- Doors/Frames/Hardware
- Fire Protection
  - Fire Sprinkler Systems
  - Fire Alarm Systems
- MEP Coordination
  - Mechanical Piping Roughin
  - Plumbing Roughin
  - Insulation
  - Electrical Roughin
  - Electrical – Bonding, grounding, lightning protection
  - Automatic Temperature Controls
  - Commissioning
- Voice/Data Low Voltage Wiring
- Security System
- Audio-Visual Equipment
- Owner Furnished Equipment
- Final Cleaning

5. AGENDA

- A. At a minimum, the Contractor shall be prepared to discuss the items as listed on the agenda template shown on the following page:

**PROJECT: CUSTOMS HOUSE RENOVATION AND ADDITION**





516 N. KING ST, WILMINGTON DE 19801  
NOVEMBER 22, 2024

CUSTOMS HOUSE RENOVATION AND ADDITION  
#MJ0217000003-BP4

**COORDINATION WITH OTHER TRADES**

**ACTION ITEMS AND RESPONSIBILITY**

**END OF SECTION**

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## SECTION 013125

### WEB-BASED PROJECT MANAGEMENT SYSTEM

#### 1. GENERAL PROVISIONS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.
- B. Refer to provisions in AIA Document A232 – 2019 EDITION, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, for requirements in addition to those specified in Division 1.
- C. Refer to Scope Information Sheets for all contracts bound in the Project Manual under Section 011100 - SUMMARY OF WORK. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- D. All Contractors shall use Internet/Web-based project management software to transmit documents, track, and otherwise manage this project.
- E. Use of this project management software will not change any contractual responsibilities of the construction team members.

#### 2. DEFINITIONS

- A. System: A real time web-based software that shares data, translates data, organizes data, facilitates communication, archives actions, and offers scheduling prompts to identified Users.
- B. Users: Authorized participants of this project furnished with a unique password and authorized to access the system to view/input/export data. Owner, Construction Manager, Architect, and the Contractors are all Users. Other Users may be added as necessary.
- C. Contacts: Entities identified to automatically receive specific transmissions or entities selected to receive specific information sent by the system through to an e-mail address.
- D. Signees: Those individuals identified, by the Contractors, authorized to sign change orders and payment applications via electronic signature. This electronic signature is as contractually binding as an original signature on paper.

#### 3. USE OF SYSTEM

- A. The use of the system is mandatory for the documentation of the transmittal of all non-oral information, even if the actual transmission of the information is by another means.
- B. The use of the system will be mandatory by the Contractors to send, retrieve, and respond to data.

- C. In addition to this web-based project management system, the Contractors will be required to use electronic mail (email) for day-to-day communication and correspondence. Email will be the primary means of transmitting written communication (i.e. meeting minutes, draft pay applications, etc.).

#### 4. QUALITY ASSURANCE

- A. A three-hour training session in the use of the software for this project will be offered by the Construction Manager at a location convenient to the project site. Attendance by one member of each Contractor's organization is mandatory. Additional attendees may enroll based on availability of training space. All attendees must have a working knowledge of computers. Training can not begin until three working days after the receipt of the submittals indicated below.
- B. Technical assistance will be provided by on-line help, email, or telephone for all Users through-out the life of the project.

#### 5. SUBMITTALS

- A. Submit to the Construction Manager, within 5 days following the receipt of the letter of intent to award, in an electronic template, the following:
  - 1. Electronic logo of organization (as needed)
  - 2. Names, mailing address and electronic address of its Users and Contacts.
  - 3. Designation the role/responsibility for each User

#### 6. SOFTWARE AND HARDWARE REQUIREMENTS

- A. Each User shall provide and maintain a computer with high-speed internet access and an email address. The computer shall have a high-speed internet browser (Internet Explorer 8.0 or higher, Firefox version 3.6.12 or higher, Google Chrome or Safari version 5.0 or higher) and a high speed cable Internet access, high speed DSL or T1 line.
- B. License(s) to Use System - Each Contractor will be provided unlimited licenses to use the system for this project. Each license will allow secure unlimited usage from the notice to proceed until the original contract completion date.

#### 7. SYSTEM DESCRIPTION

- A. The web-based project management system is a "secure, real-time, interactive, centralized database" specifically established and maintained for the management of this construction project. The product is designed to facilitate communication and improve the time management of its users by facilitating the sharing of information. Information will be available 24/7, from any computer meeting the specifications listed above. The information is fully protected. The electronic platform allows information to be transmitted across the internet reducing printing and postage costs and the time associated with such activities.
- B. The system contains a directory of the project participants.

- C. The system includes templates, with the CM's letterhead, for each document created inside the system. The template allows the use of "pull down" menus to complete significant portions of each document.
- D. The system allows the templates (and attached documents created outside the system) to be distributed to Users and Contacts.
- E. The System contains "translation software" to permit the viewing (and marking) of documents created outside the system. The system can view documents created by different software programs and can deliver images of its translation to any computer meeting the criteria listed above.
- F. The system can be personalized by the Construction Manager to automatically send e-mail notices upon issuance of certain documents if such a practice facilitates the User's business needs.
- G. The system is the product of **Building Blok, LLC** ([www.buildingblok.com](http://www.buildingblok.com)) and will be continuously updated.
- H. The Construction Manager will administer the Building Blok User accounts for this project.

## 8. DOCUMENTS CREATED INSIDE THE SYSTEM

- A. The following documents shall be created on templates inside the system.
  - 1. Transmittals for submittals processed in the system. The transmittals are automatically created by the system when the submittal is uploaded.
  - 2. Submittal Register showing all of the submittals required of the contract, assigned to each Contractor.
  - 3. Submittal Log: The CM will maintain submittal log after it is initialized.
  - 4. RFI (Requests for Information)
  - 5. Change Orders
  - 6. RFP (Requests for Proposal)
  - 7. ASI (Architect's Supplemental Instructions)
  - 8. Tasks & Memos as determined by the CM
  - 9. Payment Applications
  - 10. Closeout Tracking Log
- B. The following documents may, at each Users option, be created on the system.
  - 1. Morning & Afternoon Activity Reports generated by the system
  - 2. E-mails: Contacts that do not have access to the system may be sent information from the system, by the system.
  - 3. Reports of information on the system
  - 4. Project Notices: "Broadcast" messages can be sent to other Users system entry screen.

9. DOCUMENTS CREATED OUTSIDE THE SYSTEM AND DISTRIBUTED BY THE SYSTEM

- A. The following documents are expected to be created outside the system and distributed through the system. The actual documents may be scanned or electronically attached to the transmittal.
1. Technical Submittals: Shop drawings, product data, testing reports, certifications, installation instructions, operation & maintenance manuals, will be submitted and distributed through the system. The Architect will return all submissions through the system electronically. The Construction Manager will distribute submittals (after Architect's action) electronically. Contractors may download and distribute submittals to their subcontractors and suppliers or elect to print paper copies for distribution, or both.
  2. Photographs: Digital photographs and scanned images can be loaded onto the system and shared.
  3. Schedule of Values/ Payment Applications: (The "pencil" review of these documents can occur inside the system).
  4. Change Orders: (The "pencil" review of these documents can occur inside the system.)
  5. Schedules: The schedule document(s) will be available for review on the system.
  6. Data created in other software may be uploaded to the system electronically.

10. DOCUMENTS CREATED OUTSIDE THE SYSTEM AND DISTRIBUTED OUTSIDE THE SYSTEM

- A. The following documents are expected to be created outside the system and distributed outside the system. The actual documents may be scanned or electronically attached to the transmittal.
1. Schedules: The Construction Manager will develop the Master Schedule through Microsoft Project 2003. The schedule will be distributed either through hard copies at meetings or through email.
  2. Product samples, color samples, physical samples are still required to be provided per the technical specifications, however, the transmittal documenting the distribution shall be done inside the system and submitted electronically and printed to accompany the actual submission.
  3. Meeting minutes will be created using Microsoft Word 2003 and distributed through hard copies at meetings or through email.
  4. AIA closeout documents, which require an "original" signature, will be created and distributed outside the system.

END OF SECTION

## SECTION 01 32 00

### CONSTRUCTION PROGRESS DOCUMENTATION

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Startup construction schedule.
  - 2. Contractor's construction schedule.
  - 3. Construction schedule updating reports.
  - 4. Construction reports.
  - 5. Material location reports.
  - 6. Site condition reports.
  - 7. Special reports.
- B. Related Requirements:
  - 1. Section 01 33 00 "Submittal Procedures" for submitting schedules and reports.
  - 2. Section 01 40 00 "Quality Requirements" for submitting a schedule of tests and inspections.

##### 1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Baseline: The complete schedule that has been set prior to the beginning of the project. The project baseline is to be saved and restricted from being changed after the project has begun. The schedule baseline is to be saved in such a manner that it can be displayed for comparison to the current live schedule.

- C. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.
- D. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- E. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- F. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time belongs to Owner.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file, where indicated.
  - 2. PDF electronic file.
- B. Startup construction schedule.
  - 1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
  - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
  - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
  - 3. Total Float Report: List of all activities sorted in ascending order of total float.
  - 4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- F. Construction Schedule Updating Reports: Submit with Applications for Payment.
- G. Construction Reports: Submit at weekly intervals.
- H. Material Location Reports: Submit at weekly intervals.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Special Reports: Submit at time of unusual event.
- K. Qualification Data: For scheduling consultant.

#### 1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling 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 the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
  - 1. Review software limitations and content and format for reports.
  - 2. Verify availability of qualified personnel needed to develop and update schedule.
  - 3. Review delivery dates for Owner-furnished products.
  - 4. Review schedule for work of Owner's separate contracts.
  - 5. Review submittal requirements and procedures.
  - 6. Review time required for review of submittals and resubmittals.
  - 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
  - 8. Review time required for Project closeout and Owner startup procedures.

9. Review and finalize list of construction activities to be included in schedule.
10. Review procedures for updating schedule.

## 1.6 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values submittal schedule, progress reports, payment requests, and other required schedules and reports.
  1. Secure time commitments for performing critical elements of the Work from entities involved.
  2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

## PART 2 - PRODUCTS

### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice of Award to date of final completion.
  1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
  1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
  2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
  5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
  6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
  2. Work under More Than One Contract: Include a separate activity for each contract.
  3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary of Work." Delivery dates indicated stipulate the earliest possible delivery date.
  5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 100 0 "Summary of Work." Delivery dates indicated stipulate the earliest possible delivery date.
  6. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use of premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e. Fabrication.
    - f. Sample testing.
    - g. Deliveries.
    - h. Installation.
    - i. Tests and inspections.
    - j. Adjusting.
    - k. Curing.
    - l. Building flush-out.
    - m. Startup and placement into final use and operation.
  8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Structural completion.
    - b. Temporary enclosure and space conditioning.

- c. Permanent space enclosure.
    - d. Completion of mechanical installation.
    - e. Completion of electrical installation.
    - f. Substantial Completion.
  - D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
  - E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
    1. See Section 01 29 00 "Payment Procedures" for cost reporting and payment procedures.
  - F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
    1. Unresolved issues.
    2. Unanswered Requests for Information.
    3. Rejected or unreturned submittals.
    4. Notations on returned submittals.
    5. Pending modifications affecting the Work and Contract Time.
  - G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
  - H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
    1. Use Microsoft Project or Primavera by Oracle, for Windows operating system.
- 2.2 STARTUP CONSTRUCTION SCHEDULE
- A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for the Notice of Award.
  - B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

## 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice of Award. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
  - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

## 2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice of Award. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's construction schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.
  - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice of Award.
    - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
  - 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
  - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
  - 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
    - a. Preparation and processing of submittals.
    - b. Mobilization and demobilization.
    - c. Purchase of materials.
    - d. Delivery.
    - e. Fabrication.
    - f. Utility interruptions.
    - g. Installation.
    - h. Work by Owner that may affect or be affected by Contractor's activities.
    - i. Testing.
    - j. Punch list and final completion.
    - k. Activities occurring following final completion.
  2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
  3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
  4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
    - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
  5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
    - a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
    - b. Total cost assigned to activities shall equal the total Contract Sum.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
  2. Description of activity.
  3. Main events of activity.
  4. Immediate preceding and succeeding activities.
  5. Early and late start dates.
  6. Early and late finish dates.
  7. Activity duration in workdays.
  8. Total float or slack time.
  9. Average size of workforce.
  10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
  2. Changes in early and late start dates.
  3. Changes in early and late finish dates.
  4. Changes in activity durations in workdays.
  5. Changes in the critical path.
  6. Changes in total float or slack time.
  7. Changes in the Contract Time.
- H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
  2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
  3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
  4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
    - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
    - b. Submit value summary printouts one week before each regularly scheduled progress meeting.

## 2.5 REPORTS

- A. Construction Reports: Prepare construction reports recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

## 2.6 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel,

evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
  2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

**END OF SECTION**

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## SECTION 013216

### CONSTRUCTION SCHEDULE

#### 1. PRE-BID CONSTRUCTION SCHEDULE

- A. Time is a critical element of this Project. By entering a bid, the Contractor agrees to adhere to the intermediate Milestone Dates and Dates of Substantial and Final Completion established herein. The Contractor also understands that all work must be performed in an orderly and closely coordinated sequence in order to achieve the specified Milestones and Completion Dates, and the Contractor hereby agrees to perform his work in conformance with the Pre-Bid Construction Schedule established herein, or with the then current and approved Project Construction Schedule as amended from time to time by the Construction Manager.
- B. The Pre-Bid Construction Schedule is a milestone schedule with durations that identify portions of the project that must be completed. This schedule includes allowances for time lost due to adverse and abnormal weather conditions, other than floods, hurricanes, tornadoes, lightening and other like acts of God. The Contractor understands and agrees that it shall not be entitled to any extensions of the Contract Time or adjustment to the Contract Sum, except as allowed in the General Conditions of the Contract for Construction. The Contractor further acknowledges that the Work may be required to be performed during the winter season, that conditions during this season may be adverse and abnormal, but that such conditions will not be the basis for an extension of the Contract Time or adjustment to the Contract Sum. By submitting a bid, each Contractor is certifying that they can complete their work within the durations, or less time, outlined in the milestone schedule and its bid includes any and all costs associated with the schedule. This includes one Contractor completing their work in conjunction with another Contractor's work (i.e. electrical conduits installed in CMU walls). Each Contractor agrees to provide sufficient labor, crew size, equipment and/or work overtime, weekends, or shift-work as necessary to meet the activity durations on this schedule and subsequently the latest coordinated Project Construction Schedule.

#### 2. SCHEDULING OF THE WORK AFTER AWARD OF CONTRACT

- A. After award of Contract, or issuance of a Notice to Proceed, the Contractor will meet with the Construction Manager to review the Pre-Bid Construction Schedule, and the overall project plan for construction. Following the above review, the Contractor will meet with each subcontractor and supplier to view the detailed plans for performing his Work. Following these meetings and within fourteen (14) days after award of the Contract or issuance of a Notice to Proceed, the Contractor shall prepare and submit for the Construction Manager's approval a Work Schedule providing for the expeditious, timely and practical execution of the Work. The Contractor's Work Schedule shall include activity descriptions and durations for shop drawings, fabrication, delivery, and installation. The Contractor's Work Schedule shall be organized by Area, Building, Phase, and/or Floor as required by the Construction Manager. If the Construction Manager so requests, the Contractor shall provide adequate explanation regarding crew sizes, production rates and similar data used to arrive at the durations and sequences. If the Contractor fails to provide a work schedule for their activities then they will be held to the Project Construction Schedule developed and updated by the Construction Manager.

- B. The Construction Manager shall review the Contractor's Work Schedule, coordinate it with the separate work by other contractors, the Owner, and the Construction Manager, and after coordination, shall incorporate it into the approved Project Construction Schedule.
- C. After all Contractors submit their Work Schedules and the schedules have been incorporated into the overall Project Construction Schedule a Schedule Charrette will be held by the Construction Manager. Each Contractor is required to participate in the Schedule Charrette in order to produce a coordinated Project Construction Schedule. The Construction Manager will have the final authority concerning the sequence of work, priorities or work, and activity durations. The approved coordinated Project Construction Schedule shall be issued to the Contractors and each Contractor shall perform their Work in conformity therewith.
- C. The Contractor shall submit proposed schedule revisions and obtain the written approval of the Construction Manager therefore before deviating from the Project Construction Schedule.
- D. The Construction Manager will incorporate approved schedule revisions into the Project Construction Schedule and shall otherwise update and revise the Project Construction Schedule as the Construction Manager, at his sole discretion, deems necessary. Each Contractor acknowledges that Construction Manager may modify, change, or alter the sequence, duration, start dates, completion dates to maintain the progress of the work. Contractor agrees to perform the work in accordance with the revised schedules and that modification of the schedule or sequence of the work by the Construction Manager shall not be the basis of any claim by the Contractor for damages or costs.
- E. Weather Delays: The project substantial completion date, shall only be adjusted due to extreme weather conditions that are above and beyond the following "Adverse Weather Days" already accounted for in the Pre-Bid Construction Schedule. These adverse weather days are based on a seven day week and come from the DelDOT Standards:
  - a. January (12), February (10), March (5), April (5), May (4), June (2), July (4), August (3), September (4), October (3), November (2), and December (6).
  - b. Time extension due to weather must be related to critical path activities.
  - c. Delays due to weather must be reported by the Contractor on the day they occur on the Contractor's daily report.
  - d. Any time lost during the work week must be made up the same week by overtime and/or working weekends. The Owner will not be responsible for additional costs for overtime.

### 3. ADHERENCE TO THE SCHEDULE

- A. The Contractor shall start each part of its Work on the date designated for start in the approved Project Construction Schedule unless advised by the Construction Manager. The Contractor shall carry the Work forward expeditiously with adequate forces, equipment, and materials, and shall complete each part of his work on or before the date designated in the approved Project Construction Schedule.

- B. If the Construction Manager determines that the Contractor is behind schedule, the Construction Manager shall have the right to require that the Contractor take steps, at the Contractor's expense, to accelerate its Work. Such steps shall include increases in manpower, equipment, and materials and/or overtime as the Construction Manager may deem necessary. If any work is not started or completed within five (5) calendar days of the schedule date in the latest Project Construction Schedule, the Construction Manager shall have the right to direct the Contractor to expedite their work by whatever means the Construction Manager deems necessary to regain the schedule, without additional compensation to the Contractor. If any work falls behind schedule more than ten (10) days, the Construction Manager shall have the right to perform the work or have the work performed by whatever means the Construction Manager deems necessary. The costs incurred by the Construction Manager in order to "maintain the Project Construction Schedule" shall be reimbursed by the Contractor or Contractors causing the delay. If the Contractor fails to comply with the Construction Manager's instructions relating to improved rate of progress, the Contractor may be held in default under the appropriate provisions of the General Conditions of the Contract.
- C. Each Contractor shall, if directed by the Construction Manager, provide the Construction Manager a two-week look ahead of anticipated manpower showing the number of men, classification, and anticipated work.
- D. Each Contractor must schedule their manpower to work on all available work at a given time. Contractors must not assume that they have an entire work area available at one time or exclusive to their work. Working simultaneously in and around other trades is required. Therefore, if an area of the building is ready for the Contractor's work to begin or continue the Contractor must have manpower onsite working.
- E. If a Contractor misses any portion of a workday due to weather, manpower, lack of materials, failure to plan, or scheduling conflicts, they must make-up this lost time on overtime or Saturday. If two or more days are lost in the same work week, the Contractor must work overtime, the immediate Saturday and the Saturdays following the week to make up the lost days. Failure to provide sufficient manpower during the normal week days may result in charges for supervision by EDiS Company, at the discretion of EDiS Company.
- F. All punchlist work and project closeout documentation shall be completed within twenty-one (21) calendar days of the Substantial Completion date. Any open punchlist items after this date will be completed by EDiS Company and back charged to the responsible Contractor.

END OF SECTION

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**NOT FOR BID**

# CUSTOMS HOUSE - RENOVATION AND ADDITION MASTER SCHEDULE



ID	Task Name	Duration	Start	Finish	Gantt Chart																																									
					1	6	11	16	21	26	31	5	10	15	20	25	2	7	12	17	22	27	1	6	11	16	21	26	1	6	11	16	21	26	31	5	10	15	20	25	30	5	10	15	20	25
1		1160 days?	Tue 3/1/22	Mon 8/10/26																																										
2	CITY OF WILMINGTON (CoW) - REGULATORY & AGENCY REVIEWS	478 days	Tue 3/1/22	Thu 12/28/23	CITY OF WILMINGTON (CoW) - REGULATORY & AGENCY REVIEWS																																									
3	CM Selection Process	87 days	Wed 5/4/22	Thu 9/1/22																																										
7	CITY OF WILMINGTON - REVIEW PROCESS	478 days	Tue 3/1/22	Thu 12/28/23	CITY OF WILMINGTON - REVIEW PROCESS																																									
73	CUSTOM HOUSE - PROGRAMMING PHASE	156 days	Tue 3/1/22	Tue 10/4/22																																										
78	CUSTOM HOUSE - SCHEMATIC DESIGN PHASE 30%	157 days	Tue 10/4/22	Wed 5/10/23	CUSTOM HOUSE - SCHEMATIC DESIGN PHASE 30%																																									
88	CUSTOM HOUSE - DESIGN DEVELOPMENT PHASE 60%	130 days	Tue 4/4/23	Mon 10/2/23	CUSTOM HOUSE - DESIGN DEVELOPMENT PHASE 60%																																									
99	CUSTOM HOUSE - CONSTRUCTION DOCUMENTS PHASE	315 days	Tue 4/4/23	Mon 6/17/24	CUSTOM HOUSE - CONSTRUCTION DOCUMENTS PHASE																																									
100	CUSTOM HOUSE - CONSTRUCTION DOCUMENT PHASE 100% (BID PACKAGE '1' - SELECTIVE DEMOLITION)	97 days	Tue 4/4/23	Wed 8/16/23	CUSTOM HOUSE - CONSTRUCTION DOCUMENT PHASE 100% (BID PACKAGE '1' - SELECTIVE DEMOLITION)																																									
108	CUSTOM HOUSE - CONSTRUCTION DOCUMENT PHASE 100% (BID PACKAGE '2' - FOUNDATIONS, STEEL)	172 days	Tue 5/16/23	Wed 1/10/24	CUSTOM HOUSE - CONSTRUCTION DOCUMENT PHASE 100% (BID PACKAGE '2' - FOUNDATIONS, STEEL)																																									
117	CUSTOM HOUSE - CONSTRUCTION DOCUMENT PHASE 100% (BID PACKAGE '2.1' - SITEWORK, GROUND IMPROVEMENT)	172 days	Tue 5/16/23	Wed 1/10/24	CUSTOM HOUSE - CONSTRUCTION DOCUMENT PHASE 100% (BID PACKAGE '2.1' - SITEWORK, GROUND IMPROVEMENT)																																									
126	CUSTOM HOUSE - CONSTRUCTION DOCUMENT PHASE 100% (BID PACKAGE '3' ENVELOPE, PRE-PURCHASE MEP EQUIPMENT)	184 days	Mon 7/24/23	Thu 4/4/24	CUSTOM HOUSE - CONSTRUCTION DOCUMENT PHASE 100% (BID PACKAGE '3' ENVELOPE, PRE-PURCHASE MEP EQUIPMENT)																																									
127	DESIGN ACTIVITIES	184 days	Mon 7/24/23	Thu 4/4/24	DESIGN ACTIVITIES																																									
128	Complete Construction Documents	69 days	Mon 7/24/23	Thu 10/26/23	Complete Construction Documents																																									
129	DFM 60% Construction Doc Submittal	0 days	Thu 10/26/23	Thu 10/26/23	DFM 60% Construction Doc Submittal																																									
130	DFM 60% CD Review and Comments	20 days	Fri 10/27/23	Thu 11/23/23	DFM 60% CD Review and Comments																																									
131	Tevebaugh Re-submits 60% CDs to DFM	1 day	Tue 2/20/24	Tue 2/20/24	Tevebaugh Re-submits 60% CDs to DFM																																									
132	DFM Reviews 60% CD Re-submission	32 days	Wed 2/21/24	Thu 4/4/24	DFM Reviews 60% CD Re-submission																																									
133	COST AND QUALITY EVALUATIONS	14 days	Wed 2/21/24	Mon 3/11/24	COST AND QUALITY EVALUATIONS																																									
134	Completes CD Check Estimate	14 days	Wed 2/21/24	Mon 3/11/24	Completes CD Check Estimate																																									
135	Plan Check & Constructability Reviews	10 days	Wed 2/21/24	Tue 3/5/24	Plan Check & Constructability Reviews																																									
136	CUSTOM HOUSE - CONSTRUCTION DOCUMENT PHASE 100% (BID PACKAGE '4' MEP SYSTEMS & FIT OUT)	79 days	Mon 10/30/23	Thu 2/15/24	CUSTOM HOUSE - CONSTRUCTION DOCUMENT PHASE 100% (BID PACKAGE '4' MEP SYSTEMS & FIT OUT)																																									
137	DESIGN ACTIVITIES	26 days	Mon 2/26/24	Mon 4/1/24	DESIGN ACTIVITIES																																									
138	Complete 60% Construction Documents	15 days	Mon 2/26/24	Fri 3/15/24	Complete 60% Construction Documents																																									
139	DFM 60% Construction Doc Submittal	1 day	Mon 3/18/24	Mon 3/18/24	DFM 60% Construction Doc Submittal																																									
140	DFM 60% CD Review and Comments	10 days	Tue 3/19/24	Mon 4/1/24	DFM 60% CD Review and Comments																																									
141	COST AND QUALITY EVALUATIONS	15 days	Mon 3/18/24	Fri 4/5/24	COST AND QUALITY EVALUATIONS																																									
142	Completes CD Check Estimate	15 days	Mon 3/18/24	Fri 4/5/24	Completes CD Check Estimate																																									
143	Plan Check & Constructability Reviews	15 days	Mon 3/18/24	Fri 4/5/24	Plan Check & Constructability Reviews																																									
144	CUSTOM HOUSE - CONSTRUCTION DOCUMENT PHASE 100% (BID PACKAGE '5' FF&E, A/V/ IT)	66 days	Mon 3/18/24	Mon 6/17/24	CUSTOM HOUSE - CONSTRUCTION DOCUMENT PHASE 100% (BID PACKAGE '5' FF&E, A/V/ IT)																																									

**NOT FOR BID**

# CUSTOMS HOUSE - RENOVATION AND ADDITION MASTER SCHEDULE



ID	Task Name	Duration	Start	Finish	January 2023							February 2023							March 2023							April 2023							May 2023							June 2023							July 2023							August 2023						
					1	6	11	16	21	26	31	5	10	15	20	25	2	7	12	17	22	27	1	6	11	16	21	26	1	6	11	16	21	26	31	5	10	15	20	25	30	5	10	15	20	25	30	4	9	14	19									
149	<b>CUSTOM HOUSE - BIDDING &amp; AWARD ACTIVITIES</b>	<b>456 days?</b>	<b>Tue 7/25/23</b>	<b>Tue 4/22/25</b>	<b>CUSTOM HOUSE - BIDDING &amp; AWARD</b>																																																							
150	<b>BID PACK '1' - SELECTIVE DEMOLITION</b>	<b>103 days</b>	<b>Tue 7/25/23</b>	<b>Thu 12/14/23</b>																																																								
163	<b>BID PACK '2' - FOUNDATIONS, &amp; STEEL</b>	<b>215 days</b>	<b>Thu 9/21/23</b>	<b>Wed 7/17/24</b>	<b>BID P</b>																																																							
164	A/E revises CD's from AAB, OMB/DFM Review & Plan Check	31.5 days	Thu 9/21/23	Tue 2/20/24																																																								
165	EDIS Rec/Prepares Bid Pack Documents for Bidding	29 days	Mon 1/15/24	Thu 2/22/24																																																								
166	Final Bid Package submitted to DFM	1 day	Fri 2/23/24	Fri 2/23/24																																																								
167	DFM Submit to Government Support Services (GSS) for Review	1 day	Thu 4/4/24	Thu 4/4/24																																																								
168	GSS Posts to MYMARKETPLACE.COM	4 days	Thu 4/4/24	Wed 4/10/24																																																								
169	1st Bid Advertisement	2 days	Wed 4/10/24	Fri 4/12/24																																																								
170	2nd Bid Advertisement	2 days	Mon 4/15/24	Tue 4/16/24																																																								
171	<b>Pre-Bid Meeting (2:00 PM) at OMB/DFM</b>	<b>1 day</b>	<b>Wed 4/17/24</b>	<b>Wed 4/17/24</b>																																																								
172	Bidding Period	13 days	Thu 4/18/24	Mon 5/6/24																																																								
173	Bid Opening Extended Addendum 5	21 days	Tue 5/7/24	Tue 6/4/24																																																								
174	<b>Bid Opening (2:00 PM) at OMB/DFM</b>	<b>1 day</b>	<b>Wed 6/5/24</b>	<b>Wed 6/5/24</b>																																																								
175	Bid Review & Recommendation to Owner	5 days	Thu 6/6/24	Wed 6/12/24																																																								
176	OMB/DFM Reviews Recommendations & Issues Letters of Intent	5 days	Thu 6/13/24	Wed 6/19/24																																																								
177	Letters of Intent Issued and Contracts Awarded	20 days	Thu 6/20/24	Wed 7/17/24																																																								
178	<b>BID PACK '2.1' - GROUND IMPROVEMENTS</b>	<b>210 days?</b>	<b>Thu 1/11/24</b>	<b>Wed 10/30/24</b>																																																								
179	A/E revises CD's from AAB, OMB/DFM Review & Plan Check	31 days	Thu 1/11/24	Thu 2/22/24																																																								
180	Tevebaugh submits 99% CD's to DFM	1 day	Mon 3/11/24	Mon 3/11/24																																																								
181	DFM Reviews 99% CD's	7 days	Tue 3/12/24	Wed 3/20/24																																																								
182	Tevebaugh Revises CD's for Bidding	17 days	Thu 3/21/24	Fri 4/12/24																																																								
183	EDIS Rec/Prepares Bid Pack Documents for Bidding	4 days	Mon 4/15/24	Thu 4/18/24																																																								
184	Final Bid Package Submitted to DFM	1 day	Fri 4/19/24	Fri 4/19/24																																																								
185	DFM Submit to Government Support Services (GSS) for Review	2 days	Mon 4/22/24	Tue 4/23/24																																																								
186	GSS Posts to MYMARKETPLACE.COM	10 days	Wed 4/24/24	Tue 5/7/24																																																								
187	1st Bid Advertisement	3 days	Wed 5/8/24	Fri 5/10/24																																																								
188	2nd Bid Advertisement	2 days	Mon 5/13/24	Tue 5/14/24																																																								
189	<b>Pre-Bid Meeting (2:00 PM) onsite</b>	<b>1 day</b>	<b>Thu 5/23/24</b>	<b>Thu 5/23/24</b>																																																								
190	Bidding Period	24 days	Fri 5/24/24	Wed 6/26/24																																																								
191	<b>Bid Opening (2:00 PM) at OMB/DFM</b>	<b>1 day</b>	<b>Thu 6/27/24</b>	<b>Thu 6/27/24</b>																																																								
192	Bid Review & Recommendation to Owner	5 days	Fri 6/28/24	Thu 7/4/24																																																								
193	OMB/DFM Reviews Recommendations & Issues Letters of Intent	5 days	Fri 7/5/24	Thu 7/11/24																																																								
194	Letters of Intent Issued and Contracts Awarded	20 days	Fri 7/12/24	Thu 8/8/24																																																								
195	<b>BID PACK '2.1A' - SITWORK</b>	<b>48 days?</b>	<b>Mon 7/8/24</b>	<b>Wed 9/11/24</b>																																																								
196	A/E Prepares Bid Pack Documents for Bidding	6 days	Fri 6/28/24	Fri 7/5/24																																																								
197	ITB Posted	1 day	Mon 7/8/24	Mon 7/8/24																																																								

NOT FOR BID









## SECTION 013226

### SUBCONTRACTOR DAILY REPORTS

#### 1. SUBCONTRACTOR DAILY REPORTS

- A. The Subcontractor shall submit a Daily Report to the Construction Manager on the forms provided covering the following subjects:
  - 1. Work in Progress, including areas where work is being performed, nature of the operations in progress, and the manpower assigned.
  - 2. Extra Work (Time and Material) in progress.
  - 3. Materials Received.
  - 4. Trade labor breakdown including identification of all workers on site and the number of hours (or portions thereof) worked by each.
  - 5. Inspection Checklist (performed daily).
- B. The Subcontractor shall submit the Daily Report to the Construction Manager by 9:00 AM on the next workday following the workday covered in the Daily Report.

#### 2. DAILY EXTRA WORK REPORT

- A. The Subcontractor shall submit on the form provided a Daily Extra Work Report on each day he performs authorized Extra Work on a time and material basis.
- B. A separate Daily Extra Work Report shall be submitted for each separate authorized Extra Work item done on a time and material basis.
- C. The Subcontractor shall submit his Daily Extra Work Report as an attachment to his Daily Report by 9:00 AM on the next workday following the workday covered in the Daily Extra Work Report.

#### 3. SAMPLE DAILY REPORT

- A. A sample daily report follows this section for your reference.

END OF SECTION



Below is a general checklist of requirements on this project. Contractors will check off items that pertain to their contract and project tasks. Notify EDiS Field Manager of any issues. This checklist is not meant to be all inclusive. Please refer to additional OSHA regulations for compliance.

**House Keeping**

- Material Storage Area's Orderly
- Trash Containers Available and Emptied daily
- Fire Hazards
- Lighting and ventilation
- Exits and Stair clear passage
- Walkways, corridors clear passage
- Daily debris /trash removal
- \_\_\_\_\_

**Personal Protective Equipment**

- Hard Hats being worn
- Safety Glasses with side shields being worn
- Secondary Eye/Face protection
- Respirators as required
- Hand protection when needed
- Ear protection when needed
- Inspected & Maintained
- \_\_\_\_\_

**Fire Prevention**

- Fire extinguishers inspected
- Flammable / Combustibles properly store
- Approved Fuel cans used and labeled
- Oxygen / Acetylenes stored properly
- \_\_\_\_\_

**Electrical**

- GFI in use
- Three prong insulated extension cords used
- Extension cords in good condition
- Lockout / Tag-out program in use
- \_\_\_\_\_

**Excavations**

- Miss Utility been contacted
- Properly Barricaded
- Ladders in use at depths over 4'-0"
- Ladders every 25'-0" distance
- Shored, sloped, benched as required
- Dewatering as needed
- \_\_\_\_\_

**Ladders**

- Good condition
- Correct pitch
- Extends 3'-0" above landing
- Open and secured / tied off
- \_\_\_\_\_

**Scaffolds**

- Certified Scaffold Installer
- Guardrails, toe boards, and planking secured
- Appropriate signage
- Adequate cross bracing
- Secured to building over 25'-0" in height
- \_\_\_\_\_

**Cranes**

- Rated Load Capacity available in cab
- Swing Radius barricaded
- Appropriate certificates / decals / hand signals
- Daily safety inspection log completed
- \_\_\_\_\_

**Fall Protection**

- Fall protection plan on file
- Full harness / shock absorbing lanyard used
- Anchoring points secured
- Perimeter barricades
- Open sided floor protection
- 6'-0" Tie-off utilized
- \_\_\_\_\_

**Paperwork**

- MSDS Information
- Contractors Safety Program
- Hazardous Communications Training
- Hazardous Communications Program
- Contractor Qualified Representation
- \_\_\_\_\_

**Other**

- \_\_\_\_\_
- \_\_\_\_\_

Foreman / Competent Person:

Print Name \_\_\_\_\_

## SECTION 01 32 33

### PHOTOGRAPHIC DOCUMENTATION

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Preconstruction photographs.
  - 2. Periodic construction photographs.
  - 3. Final completion construction photographs.
- B. Photographic Documentation included within this section is to be the responsibility of the Construction Manager.

##### 1.2 UNIT PRICES

- A. Basis for Bids: Base number of construction photographs on average of 20 photographs per week over the duration of Project.

##### 1.3 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
  - 1. Digital Camera: Minimum sensor resolution of 8 megapixels.
  - 2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
  - 3. Identification: Provide the following information with each image description in file metadata tag:
    - a. Name of Project.
    - b. Name and contact information for photographer.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Date photograph was taken.
    - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
    - g. Unique sequential identifier keyed to accompanying key plan.

#### 1.4 QUALITY ASSURANCE

- A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

#### 1.5 USAGE RIGHTS

- A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

### PART 2 - PRODUCTS

#### 2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

### PART 3 - EXECUTION

#### 3.1 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
  - 1. Date and Time: Include date and time in file name for each image.
  - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.
- D. Preconstruction Photographs: Before commencement of work, take photographs of Project site, building perimeter, hardscape, paving, building elevations, and interior photographs of floor, ceiling, and each wall or each interior room/space, including existing items to remain during construction, from different vantage points, as directed by Architect.

1. Flag excavation areas before taking construction photographs.
  2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
  3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- E. Periodic Construction Photographs: Take 20 photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- F. Architect-Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.
- G. Time-Lapse Sequence Construction Photographs: Take 20 photographs as indicated, to show status of construction and progress since last photographs were taken.
1. Frequency: Take photographs monthly, coinciding with the cutoff date associated with each Application for Payment.
- H. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as project record documents. Architect will inform photographer of desired vantage points.
1. Do not include date stamp.
- I. Additional Photographs: Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
1. Three days' notice will be given, where feasible.
  2. In emergency situations, take additional photographs within 24 hours of request.
  3. Circumstances that could require additional photographs include, but are not limited to, the following:
    - a. Special events planned at Project site.
    - b. Immediate follow-up when on-site events result in construction damage or losses.
    - c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
    - d. Substantial Completion of a major phase or component of the Work.
    - e. Extra record photographs at time of final acceptance.
    - f. Owner's request for special publicity photographs.

**END OF SECTION**

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**SECTION 01 33 00**  
**SUBMITTAL PROCEDURES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Shop Drawings.
  2. Product Data.
  3. Samples.
  4. Other submittals.

**1.2 DEFINITIONS**

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

**1.3 ACTION SUBMITTALS**

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

- a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
- a. Scheduled date for first submittal.
  - b. Specification Section number and title.
  - c. Submittal category: Action; informational.
  - d. Name of subcontractor.
  - e. Description of the Work covered.
  - f. Scheduled date for Architect's final release or approval.
  - g. Scheduled date of fabrication.
  - h. Scheduled dates for purchasing.
  - i. Scheduled dates for installation.
  - j. Activity or event number.

#### 1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
    - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    - b. Digital Drawing Software Program: The Contract Drawings are available in AutoCAD 2013 format.
    - c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Contractor or CM shall use Architect's cover sheet for all submittal correspondences. Architect reserves the right to withhold action on any submittal where said cover sheet is omitted.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

- C. Processing Time: Allow time for submittal review, including time for resubmittals. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 15 days for review of each resubmittal.
  4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 days for initial review of each submittal.
  5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  2. Name file with submittal number or other unique identifier, including revision identifier.
    - a. File name shall use project identifier and Specification Section number followed by a dash, then a sequential number, then Section Name, and ten a submittal type (PD=Product Data, SD=Shop Drawing, or SA=Sample) (e.g., 05 50 00-01-Misc. Metals-PD, SD, or SA). Resubmittals shall include an alphabetic suffix after another dash (e.g., 05 50 00-01-Misc. Metals-PD, SD, or SA-A).
  3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
  4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to Owner, containing the following information:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect.
    - d. Name of Contractor.
    - e. Name of firm or entity that prepared submittal.
    - f. Names of subcontractor, manufacturer, and supplier.
    - g. Category and type of submittal.
    - h. Submittal purpose and description.
    - i. Specification Section number and title.

- j. Specification paragraph number or drawing designation and generic name for each of multiple items.
  - k. Drawing number and detail references, as appropriate.
  - l. Location(s) where product is to be installed, as appropriate.
  - m. Related physical samples submitted directly.
  - n. Indication of full or partial submittal.
  - o. Transmittal number.
  - p. Submittal and transmittal distribution record.
  - q. Other necessary identification.
  - r. Remarks.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
- 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
- 1. Post electronic submittals as PDF electronic files directly to Project Web site specifically established for Project.

- a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
  - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
  - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data before or concurrent with Samples.
  6. Submit Product Data in the following format:
    - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
  3. Submit Shop Drawings in the following format:
    - a. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed. Take photos of physical samples and upload with cover sheet to Submittal Exchange for comments and record purposes. Either mail or hand deliver physical samples concurrently with Submittal Exchange submission.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
    - e. Specification paragraph number and generic name of each item.
  3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
  4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
  - a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
  
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit four sets of Samples. Architect will retain one Sample sets, one sample set will be sent to the Owner; remainder will be returned.
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
    - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
  
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
  5. Submit product schedule in the following format:
    - a. PDF electronic file.
  
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."
  
- G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00 "Payment Procedures."
  
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00 "Quality Requirements."

- I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 "Closeout Procedures."
- J. Maintenance Data: Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."
- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.

- T. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- U. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- V. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- W. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## 2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, 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.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note

corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.

- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

### 3.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

**END OF SECTION**

**SECTION 01 35 23**

**CONSTRUCTION MANAGER GENERAL INFORMATION**

01 35 23.A CRANE LIFT PLAN CHECKLIST

- A. This Document with its referenced attachments is part of the general construction information provided by the Construction Manager.

01 35 23.B DEMOLITION PRE-START SURVEY

- A. This Document with its referenced attachments is part of the general construction information provided by the Construction Manager.

01 35 23.C STAR SHEET

- A. This Document with its referenced attachments is part of the general construction information provided by the Construction Manager.

01 35 23.D COMPETENT/QUALIFIED PERSON DESIGNATIONS FORM

- A. This Document with its referenced attachments is part of the general construction information provided by the Construction Manager.

01 35 23.E SAFETY PROGRAM

- A. This Document with its referenced attachments is part of the general construction information provided by the Construction Manager.

01 35 23.F SITE LOGISTICS DRAWING

- B. This Document with its referenced attachments is part of the general construction information provided by the Construction Manager.

01 35 23.G SITE EXCAVATION PLAN

- A. This Document with its referenced attachments is part of the general construction information provided by the Construction Manager.

01 35 23.H SITE FILL PLAN

- A. This Document with its referenced attachments is part of the general construction information provided by the Construction Manager.

01 35 23.I SHEETING AND SHORING PLAN

- A. This Document with its referenced attachments is part of the general construction information provided by the Construction Manager.

**END OF SECTION**

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SECTION 013523 - SAFETY PROGRAM

1. GENERAL

- A. The Contractor shall be responsible for initiating, maintaining, and supervising all safety activities and programs in connection with their Work.
- B. Contractor shall be responsible for the safety of their personnel as well as their subcontractors.
- C. Hard hats and safety glasses must be worn by all personnel on the jobsite, except in contractor's administrative office/trailer. All equipment must comply with OSHA standards. All job site personnel shall wear long pants, shirts (no tank tops), high visibility garments worn on the outer layer of clothing, and work boots.

2. SAFETY PROGRAM

- A. Prior to commencing the work, the Contractor shall submit to the Construction Manager (1) electronic copy and (1) bound copy of its safety program and one (1) copy of SDS information in a 2" ringed notebook. One paper copy of the safety program and SDS will be retained by the Construction Manager in the field office.
- B. The safety program shall outline those hazards peculiar to the Contractor's Work, and the steps to be taken to eliminate or reduce the risk of injury or loss due to those hazards. The program shall be project and site specific. Every Contractor shall implement and enforce its safety program, in accordance with all OSHA, Federal, State, and local laws.
- C. Crystalline Silica Exposure Control Plan - Affected Contractors must provide a Written Exposure Control Plan for Respirable Crystalline Silica, meeting Subpart Z of the OSHA Construction Industry Regulations, that ensures each employee covered by this section of the Regulations can demonstrate knowledge and understanding meeting the requirements of the regulation, identify the competent person designated by the employer in accordance with the section, and otherwise comply with the requirements of this section of the Regulations.
- D. Every Contractor shall designate a qualified Safety Supervisor and Alternate to implement the safety program. If during the progress of the work the Safety Supervisor is not performing their duties in a manner satisfactory to the Construction Manager the Contractor will designate a new qualified Safety Supervisor.
- E. Every Contractor shall furnish the names and qualifications of the Primary and Alternate competent persons and qualified persons who may be required for their scope of work by the

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Contractor's safety procedures, and by federal, state and/or local regulations. Examples include competent persons and/or qualified persons for steel erection, excavation, scaffold erection, confined space entry, crane and rigging operations, annual crane inspections, fall protection including horizontal lifeline systems, etc.

- F. The employer shall verify compliance by preparing a written certification record. The written certification record shall contain the name or other identity of the employee trained, the date(s) of the training and the signature of the person who conducted the training or the signature of the employer. If the employer relies on training conducted by another employer or completed prior to the effective date of this section, the certification record shall include the date the employer determined the prior training was adequate rather than the date of actual training.
- G. Copies of any and all documents, including information stored electronically, such as safety and health program handbooks and training certification records shall be provided when necessary.
  - 1. The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury. Please forward certification (document) of training for each employee on an EDiS project. The latest training certificate shall be maintained.
- H. Contractor Daily Reports with Safety Inspection Checklist will be submitted daily to the Superintendent, verifying inspection of work area, machinery, equipment, and tools.
- I. Prior to starting work on-site, the Contractor shall arrange with the on-site Superintendent to have their employees complete the EDiS Company Zero Accidents Safety Orientation program.
- J. Every Contractor shall hold, at a minimum, weekly safety toolbox talks with all its employees every Monday at 12:30 PM. Every Contractor shall designate a responsible, qualified, and capable person to conduct these meetings. Contractor's safety supervisor or superintendent must submit to the Construction Manager weekly toolbox talks attendance sheets and the topics discussed.

### 3. SUBSTANCE ABUSE POLICY STATEMENT

- A. The Construction Manager is committed to providing a safe work site environment for its employees and Contractors' employees. The Construction Manager does not condone or permit employees and Contractors' employees to use or be under the influence of drugs or alcohol while they are on any of the Construction Manager work sites. The Policy is as follows:
  - 1. It is a violation of the Construction Manager's policy for employees and Contractors' employees to use, possess, sell, trade, or otherwise engage in the use of illegal drugs and alcohol.
  - 2. It is a violation for employees and Contractors' employees to report to work while influenced by illegal drugs or alcohol.

3. It is a violation for employees and Contractors' employees to use prescription drugs illegally (i.e., to use prescription drugs that have not been legally obtained) and to use prescription drugs in a manner other than the prescribed intentions.
  4. Employees and Contractors' employees who are taking medication, which is prescribed by their physician, are expected to discuss potential side effects with their prescribing physician, as it relates to the work requirements.
- B. Violations of this policy will require disciplinary action. If any employees or Contractors' employees are observed or suspected of being influenced by drugs or alcohol, they will be instructed to stop work and may be required to leave the work site.
4. EXECUTION
- A. Every Contractor shall comply with all applicable federal, state and local laws, regulations and orders relating to occupational safety and health, and related procedures, and shall, to the extent permitted by law, indemnify and hold Construction Manager, Owner and Architect, and their respective directors, officers, or agents and employees, harmless from any and all liability, public or private, penalties, contractual or otherwise, losses, damages, costs, attorney's fees, expenses, causes of action, claims or judgments resulting from a claim filed by anyone in connection with the aforementioned acts, or any rule, regulation or order promulgated thereunder, arising out of the Contractor's Work, this Agreement or any subcontract executed in prosecution of the Work. Every Contractor further agrees in the event of a claim of violation of any such laws, regulations, orders, or procedures arising out of or in any way connected with the performance of this agreement, Construction Manager may immediately take whatever action is deemed necessary by Owner and/or Construction Manager to remedy the claim or violation. Any and all costs or expenses paid or incurred by Owner and/or Construction Manager in taking such action shall be borne by the Contractor and may be deducted from any payments due Contractor.
  - B. The Contractor agrees to (1) take all necessary steps to promote safety and health on the job site; (2) cooperate with Owner and/or Construction Manager and other Contractors in preventing and eliminating safety and health hazards; (3) train, instruct and provide adequate supervision to ensure that its employees are aware of, and comply with, applicable Federal and State safety and health laws, standards, regulations and rules, safe healthful work practices and all applicable safety rules, regulations and work practices and procedures (4) not create any hazards or expose any of its employees, employees of the Owner and/or Construction Manager or employees of Contractors to any hazards; and (5) where the Contractor is aware of the existence of a hazard not within its control, notify the Construction Manager of the hazard as well as warn exposed persons to avoid the hazard.

**NOT FOR BID**

- C. The Contractor / Sub-contractor shall prepare a written Job Hazard Analysis (JHA) common to the construction industry for any work of a high risk nature. This JHA will be prepared and signed by each work crew each day prior to starting work on a specific area of work and any time a crew is re-assigned to a new work task. The JHA form is generally in table form and simply describes tasks to be performed, potential hazards and mitigating measures. The form is used to identify, analyze, understand and mitigate potential hazards associated with repetitive or potentially hazardous work operations. Each employee associated with the work to be performed shall be instructed by their companies designated Competent Person of the safety measures listed on the form and shall sign the document prior to the commencement of work. (examples of "high risk": pre-cast concrete, scaffold activities, steel erection, work at heights, work at depths, road work, etc.) If the contractor prepares a similar assessment form it must be reviewed to meet the criteria of a Job Hazard Analysis (JHA) as described by the U.S. Department of Labor (OSHA 3071 2002 Revised).
- D. The Contractor's Superintendent or Safety Supervisor shall immediately, verbally report, and promptly thereafter confirm in writing to the Construction Manager any unsafe conditions or practices that are observed, or violations of job safety which are not within the Contractor's control.
- E. Contractors shall immediately, verbally report, and promptly thereafter confirm in writing, to the Construction Manager any unsafe practices or conditions that are observed which are not under the Contractor's control.
- F. The Contractor's Superintendent or Safety Supervisor shall ensure that adequate first aid supplies are available, and that personnel are qualified to administer first aid/CPR, as required by State and/or Federal regulations.
- G. Every Contractor shall promptly notify Construction Manager of any personal injury requiring medical treatment of any of the Contractor's employees at the Project site; or of significant damage to property arising in connection with Contractor's performance, as promptly as possible after the occurrence of such injury or damage. Within twenty-four hours of such occurrence, Contractor shall furnish to Construction Manager a complete written report of such injury or damage.
- H. Contractor certifies that the forgoing terms shall be made applicable to all Contractors' subcontractors, suppliers, materialmen, or anyone furnishing labor and/or materials to the site.
- I. Every Contractor shall continue to educate their job Safety Supervisor or Superintendent of their responsibilities, which shall include:
1. Instructing workers and subcontractors under its supervision in safe work practices and work methods at the time they are given work assignments.
  2. Ensuring that its workers and subcontractors have and use the proper protective equipment

and suitable tools for the job.

3. Continuously checking to see that no unsafe practices or conditions are allowed to exist on any part of his job.
  4. Acquainting its workers and subcontractors with all applicable safety requirements and ensuring that they are enforced.
  5. Setting a good example for their workers.
  6. Making a complete investigation of incidents to determine facts necessary to take corrective action.
  7. Promptly completing an "Incident Investigation Form" with his Supervisor's assistance and distributing as required.
  8. Holding weekly "tool box" safety meetings with their employees to:
    - a. Discuss observed unsafe work practices or conditions including a review of current foreman meeting and progress meeting reports.
    - b. Review each incident with their employees and discuss correction of incident root causes.
    - c. Encourage safety suggestions from his men.
  9. Seeing that prompt medical treatment is administered to an injured employee.
  10. Correcting or reporting immediately to project superintendent any observed unsafe conditions, practices or violations of job safety or security.
  11. Making all reports required by these Contract Documents to the Construction Manager in a full and timely fashion.
5. SAFETY MEETINGS
- A. The Contractor's Project Manager or Superintendent shall attend weekly or biweekly supervisory job meetings. The first topic of these meetings will be job site safety. The weekly safety reports will be reviewed, and violations must be corrected immediately. Contractors will be encouraged to participate in the on-going jobsite safety.

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6. TOOL BOX SAFETY MEETINGS

- A. The Contractor shall schedule weekly “tool box” safety sessions to be held by their project safety supervisor or competent person / superintendent for all their employees.
- B. A member of the Contractor’s management staff shall periodically attend “tool box” safety sessions to evaluate their effectiveness and offer any appropriate suggestions for improvement.

7. REPORTS

- A. Contractors shall report all accidents or injuries on a timely basis in accordance with all applicable regulations.
- B. Contractors shall promptly complete an incident investigation report of all incidents.
- C. A record of all “tool box” safety sessions shall be made and submitted to the Construction Manager.

8. SAFETY REPRESENTATIVE

- A. The Construction Manager (CM) may employ the services of a Safety Representative on the project.
- B. The CM Safety Representative will visit the job site on a weekly basis, or as necessary, to determine if the work is being performed in a safe manner and in accordance with OSHA, State and Local safety regulations. The CM Safety Representative is not responsible for observing and documenting all possible safety violations. The Contractors’ Safety Representatives, Safety Supervisors, or Superintendents shall attend job site safety inspections with the CM Safety Representative.
- C. The CM Safety Representative will prepare a written report at the end of each inspection listing the safety violations observed during the inspection. This report will be distributed to all Contractors. Contractors will immediately correct all safety violations and provide written documentation to the CM verifying that all hazards have been corrected.

9. RIGHT TO STOP THE WORK DUE TO SAFETY VIOLATIONS

- A. The Construction Manager, in its sole discretion, may order the Contractor to stop the work due to safety violations under the following circumstances:
  - 1. If the Construction Manager observes the Contractor is violating safety regulations and the Contractor takes no immediate action to correct the violation.
  - 2. If the Contractor has been notified by the Construction Manager in writing that he is in violation of safety regulations and fails to take action to correct the violation within 24 hours of the notice.

- B. If the Construction Manager directs the Contractor to stop the work due to safety violation, it will be done in accordance with the General Conditions of the Contract. Contractor shall not be permitted an adjustment of the Contract Time or Sum for the days lost to any suspension of work.
- C. If the Construction Manager or Safety Representative observes Contractor's employee violating this safety program or OSHA Standards in a habitual manner, or creating a serious life safety violation, the Construction Manager or Safety Representative may instruct the Contractor's superintendent or foreman to remove the violator from the work site for failure to comply with the safety program and the contract.

10. EMERGENCY PROCEDURES

- A. The Construction Manager shall establish a central meeting location for the assembly of all Contractors' employees in the event of a job site emergency.
- B. Contractors shall assemble all their personnel and account for all employees. Contractors must immediately report to the Project Superintendent with the status of their employees.

11. FALL PROTECTION PROCEDURES

- A. Contractors are responsible, in accordance with federal, state, local laws and regulations including OSHA, to provide and enforce their own site specific fall protection program and equipment. The following fall protection procedures shall be enforced by all Contractors as a minimum standard.
  - 1. All workers on walking/working surfaces with unprotected sides or edges six feet (6') or higher above the next lower level must be protected from falls by the use of guardrail systems, net systems, fall arrest systems or control access zone programs. It is intended that when fall protection is required, it is required 100% of the time. All contractors are reminded that relevant industry regulations require that contractors comply with the following standards.
    - a. Workers constructing or working near leading edges must be protected.
    - b. Workers on the face of formwork or reinforcing steel must be protected at a height of 6 feet (6') or greater.
    - c. Employees working from scaffolds shall be guarded / protected from falling 6 feet (6') above next lower level.
    - d. Brick layers performing overhand bricklaying and related work six feet (6') or higher above lower levels must be protected from falls.

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- e. Roofers must comply with OSHA regulations for roof work.
  - f. The Contractor's controlled access zone plan shall be included in their site-specific safety program and shall be submitted prior to the start of work. Contractors are responsible for assuring programs are OSHA compliant.
  - g. Guidelines for Residential Construction or any interpretations will not be accepted in lieu of 1926 Standards.
  - h. Contractors must provide certification per OSHA CFR29 § 1926.503(b) of employee training and retraining on fall protection upon request.
- B. Contractor shall provide their own fall protection. Fall protection may be provided by guardrail systems, net systems, or personal fall arrest systems. All fall protection systems must comply with OSHA regulations.
- C. Stepladders, exposed to shafts or edges of the building, greater than six feet (6') above the next lower level, must be tied off or otherwise secured. Employee must wear fall protection, i.e., harness/lanyard.
- D. The Safety Cable System shall not be altered or removed without a written request submitted to the Project Manager with a copy to the Superintendent. It shall be the responsibility of each Contractor that is removing or altering the Safety Cable System to maintain the fall protection safety provided by the safety cable and not leave the area unprotected. Each Contractor shall be responsible to re-install the Safety Cable System immediately after work is completed. Each Contractor shall be responsible to re-install the Safety Cable System in accordance with OSHA regulations.
- E. Fall protection will be enforced for Structural Steel Erectors.
- 1. Contractors engaged in structural steel erection are specifically advised that structural steel erectors shall comply with all protection requirements for all work at a height of six feet (6') or greater above the next lower level, 100 percent of the time, by any of the following means.
    - a. Standard guardrail system.
    - b. Personal Fall Arrest System (PFAS) – full body harness with shock absorbing lanyard. PFAS must meet the requirements of CFR 1926 subpart M.
    - c. Access to work area shall be provided by ladders or other safe methods. There shall be sufficient number of ladders, or other safe methods, available to reduce the amount of "beam walking." When it is absolutely necessary to traverse a beam, 100% fall protection must be utilized.

- d. Steel erection Contractors must, at all times, be able to certify in writing that each of their employees have been properly trained in both OSHA fall protection standards and the Contractor's site specific project fall protection procedures.
- e. Prior to the erection of the steel, the Contractor shall meet with the Project Manager and Safety Representatives to review and document site specific procedures.

12. AIRBORNE CONTAMINENTS PROCEDURES

- A. Contractors must provide and use equipment furnished with Exhaust Purifiers / Scrubbers when any equipment produces airborne containments and will be used in an enclosed building.
- B. The Contractor shall verify air quality by the use of air monitoring equipment and document such verified air quality on the daily report. The monitoring equipment shall, at a minimum, be designed with an auditory alarm and shall provide continuous monitoring of these four gases: Oxygen, Hydrogen Sulfide, Carbon Monoxide and Combustible gases.
- C. The Contractor must provide administrative or engineering controls to protect its workers from exposure to occupational health, environmental or other hazards to be implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed by local, state, and federal regulations. Any equipment and technical measures used for this purpose must first be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with 1926.103.

13. CELL PHONE AND RADIO USE POLICY

- A. Use of cell phones on EDiS Company projects should be limited to non-construction type activity areas and away from active construction areas (i.e., project office). This includes both cell phone use and the review of data, information, texts, and the internet. Except in an emergency circumstance, phones should only be used in the designated areas. Anyone observed using a cell phone outside of these designated areas without regard to maintaining a safe focus on their surroundings can be subject to discipline, up to and including removal from the project. Use of ear buds, ear phones, and portable radios are absolutely prohibited on EDiS Company project sites. Anyone using ear buds, ear phones, or any other device that would prevent the wearer from receiving auditory cues about the surrounding environment will be subject to discipline, up to and including removal from the project.

14. EXCAVATION PROCEDURES

- A. Before ANY excavation work is to commence, the Contractor/Excavator shall contact the utility companies or utility owners and advise them of the proposed work and ask them to mark the location of the underground utility installations. This notification shall be done within established or customary local response times. If the work is on private property and the utility company will not mark out the utilities, the Contractor/Excavator will hire a private locating service to mark the utilities. Once the utilities are located and marked, the Contractor/Excavator will excavate by hand or use a vacuum truck to expose the utilities and record the exact location and elevation of the utilities.
- B. The Contractor/Excavator must submit the Excavation Permit to EDiS Company verifying their assurance of communication with the utility companies or utility owners. The Contractor/Excavator must follow State, Local, and Federal Guidelines prior to proceeding with excavations. The Contractor/Excavator will have these marks restored as long as there is work to perform.
- C. Once the Contractor has installed new utilities, they will provide to EDiS Company an as-built drawing, within 7 days, showing the exact location and elevation of the utilities. The installing Contractor will be responsible for locating and marking these utilities for other contractors that may have work in the same area.
- D. Definition: "Excavator" shall mean any person, including those acting either as an employer or employee, intending to perform or performing excavation or demolition work.
- E. Definition: "Excavate" or "Excavation" shall mean any operation in which earth, rock or other material in the ground is moved, removed, or otherwise displaced or disturbed by means of any tools, equipment or explosives and includes, without limitation, grading, trenching, digging, dredging, ditching, drilling, auguring, tunneling, boring, backfilling, post pounding, driving objects into the ground, installation of form pins, hammering, scraping, cable or pipe plowing or driving.

15. TRAFFIC CONTROL PROCEDURES: Manual on Uniform Traffic Control Devices (MUTCD)

- A. Traffic control plan(s) for the work may be required by the Authorities Having Jurisdiction (AHJ). Traffic control plans, if required, shall be prepared per AHJ standards, at the Contractor's expense, for review and approval by the AHJ. (Note: anything on a public right of way controlled by the state will require an engineer's stamp.) The implementation of the traffic control plan and any associated maintenance shall be performed at the Contractor's expense in accordance with the requirements of the AHJ. All warning signs and safety devices used by the Contractor to perform the work shall conform to the requirements contained in the State where the work is being performed, and the Department of Transportation's current edition of "Manual on Uniform Traffic Control Devices". The Contractor shall also be responsible for all traffic control required by the AHJ over the Project on the intersecting streets.
- B. Contractors must submit a traffic control plan to the AHJ over the project for approval within fourteen (14) calendar days of Contract award. The approved traffic plan must be submitted prior

to the commencement of work in a public street. The Contractor's representative on the site responsible for traffic control shall produce evidence that he/she has completed training acceptable to the Department of Transportation for safety through construction zones. All of the streets in which the work will occur shall remain open to traffic and one lane of traffic maintained at all times unless otherwise directed by the AHJ. Businesses and residences adjacent to the work shall be notified forty- eight (48) hours in advance of closing of streets, roadways, driveways, etc. The Contractor shall make every effort to minimize the amount of public parking temporarily eliminated due to construction in areas fronting businesses. No stockpiles of pipe or other material will be allowed in traveled right-of- ways unless otherwise approved. These requirements shall not authorize any extension of time for performance of this Contract.

#### 16. SCAFFOLDING PROCEDURES

- A. A written project specific scaffold inspection checklist must be completed by the Contractor's competent person responsible for inspecting the scaffolding before each work shift, and after any occurrence which could affect a scaffold's structural integrity. A copy of the documented scaffold inspection checklist must be maintained by each company performing work on a scaffold and a second copy provided for record to the EDiS project office.
- B. Contractors are required to ensure that all employees working on or around scaffolding are properly trained. Contractors shall provide documented verification of scaffold training upon request.
- C. Scaffold erectors and dismantlers are required to wear fall protection during the erecting, modifying and dismantling scaffolds. In cases where fall protection is infeasible or creates a greater hazard, the competent person shall document their decision at each specific location of scaffold assembly. At minimum, the scaffold erectors and dismantlers shall wear a fall protection harness during the erection, modification and dismantling of scaffolds.
- D. Contractors shall utilize a scaffold tag system. The scaffold tag system shall be color coded and visible. The competent person shall sign and date the scaffold tag.
  - 1. Green tags are reserved for complete systems.
  - 2. Red tags are reserved for erection/dismantling activities and for scaffolds with deficiencies in the system.
  - 3. Yellow tags are reserved for systems that require the use of both PFAS and guardrail systems for incomplete scaffold systems or platforms.

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CUSTOMS HOUSE RENOVATION AND ADDITION  
#MJ0217000003-BP4

516 N. KING ST, WILMINGTON, DE 19801  
NOVEMBER 22, 2024

END OF SECTION

**SECTION 01 35 23.H**

**SITE LOGISTICS**

DRAWING ATTACHED

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## SECTION 01 40 00

### QUALITY REQUIREMENTS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Quality assurance requirements.
2. Quality control requirements.

###### B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

##### 1.2 DEFINITIONS

###### A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

###### B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

###### C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

- D. Preconstruction Testing: Tests and inspections performed specifically for 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 specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., 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. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of **five** previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

### 1.3 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 conflicting requirements that are different, but apparently equal, to Architect 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 Architect for a decision before proceeding.

#### 1.4 ACTION 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.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- 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. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.
  - 7. Time schedule or time span for tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.

#### 1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
  - 1. Project quality-control manager may also serve as Project superintendent.

- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
  - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
  - 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

## 1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making tests and inspections.
  - 6. Description of the Work and test and inspection method.
  - 7. Identification of product and Specification Section.
  - 8. Complete test or inspection data.
  - 9. Test and inspection results and an interpretation of test results.
  - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 12. Name and signature of laboratory inspector.
  - 13. Recommendations on retesting and reinspecting.

- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of technical representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
  2. Statement that equipment complies with requirements.
  3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  4. Statement whether conditions, products, and installation will affect warranty.
  5. Other required items indicated in individual Specification Sections.
- D. 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.

## 1.8 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, as well as sufficient production capacity to produce required units.
- 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 are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections 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. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; 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. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  - 1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.

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

## 1.9 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
  3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspecting requested by 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 as specified in Section 01 33 00 "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and 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. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.
- 1.10 SPECIAL TESTS AND INSPECTIONS
- A. Special Tests and Inspections: Engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections attached to this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: 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 Architect.
  - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."
- 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 42 00

### REFERENCES

#### PART 1 - GENERAL

##### 1.1 DEFINITIONS

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

##### 1.2 INDUSTRY STANDARDS

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

- C. Copies of Standards: When copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

### 1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

1. AABC - Associated Air Balance Council; [www.aabc.com](http://www.aabc.com).
2. AAMA - American Architectural Manufacturers Association; [www.aamanet.org](http://www.aamanet.org).
3. AAPFCO - Association of American Plant Food Control Officials; [www.aapfco.org](http://www.aapfco.org).
4. AASHTO - American Association of State Highway and Transportation Officials; [www.transportation.org](http://www.transportation.org).
5. AATCC - American Association of Textile Chemists and Colorists; [www.aatcc.org](http://www.aatcc.org).
6. ABMA - American Bearing Manufacturers Association; [www.americanbearings.org](http://www.americanbearings.org).
7. ABMA - American Boiler Manufacturers Association; [www.abma.com](http://www.abma.com).
8. ACI - American Concrete Institute; (Formerly: ACI International); [www.abma.com](http://www.abma.com).
9. ACPA - American Concrete Pipe Association; [www.concrete-pipe.org](http://www.concrete-pipe.org).
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); [www.aeic.org](http://www.aeic.org).
11. AF&PA - American Forest & Paper Association; [www.afandpa.org](http://www.afandpa.org).
12. AGA - American Gas Association; [www.aga.org](http://www.aga.org).
13. AHAM - Association of Home Appliance Manufacturers; [www.aham.org](http://www.aham.org).
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); [www.ahrinet.org](http://www.ahrinet.org).
15. AI - Asphalt Institute; [www.asphaltinstitute.org](http://www.asphaltinstitute.org).
16. AIA - American Institute of Architects (The); [www.aia.org](http://www.aia.org).
17. AISC - American Institute of Steel Construction; [www.aisc.org](http://www.aisc.org).
18. AISI - American Iron and Steel Institute; [www.steel.org](http://www.steel.org).
19. AITC - American Institute of Timber Construction; [www.aitc-qlulam.org](http://www.aitc-qlulam.org).
20. AMCA - Air Movement and Control Association International, Inc.; [www.amca.org](http://www.amca.org).
21. ANSI - American National Standards Institute; [www.ansi.org](http://www.ansi.org).
22. AOSA - Association of Official Seed Analysts, Inc.; [www.aosaseed.com](http://www.aosaseed.com).
23. APA - APA - The Engineered Wood Association; [www.apawood.org](http://www.apawood.org).
24. APA - Architectural Precast Association; [www.archprecast.org](http://www.archprecast.org).
25. API - American Petroleum Institute; [www.api.org](http://www.api.org).
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; [www.asphaltroofing.org](http://www.asphaltroofing.org).

29. ASCE - American Society of Civil Engineers; [www.asce.org](http://www.asce.org).
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; [www.ashrae.org](http://www.ashrae.org).
32. ASME - ASME International; (American Society of Mechanical Engineers); [www.asme.org](http://www.asme.org).
33. ASSE - American Society of Safety Engineers (The); [www.asse.org](http://www.asse.org).
34. ASSE - American Society of Sanitary Engineering; [www.asse-plumbing.org](http://www.asse-plumbing.org).
35. ASTM - ASTM International; [www.astm.org](http://www.astm.org).
36. ATIS - Alliance for Telecommunications Industry Solutions; [www.atis.org](http://www.atis.org).
37. AWEA - American Wind Energy Association; [www.awea.org](http://www.awea.org).
38. AWI - Architectural Woodwork Institute; [www.awinet.org](http://www.awinet.org).
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; [www.awmac.com](http://www.awmac.com).
40. AWPAA - American Wood Protection Association; [www.awpa.com](http://www.awpa.com).
41. AWS - American Welding Society; [www.aws.org](http://www.aws.org).
42. AWWA - American Water Works Association; [www.awwa.org](http://www.awwa.org).
43. BHMA - Builders Hardware Manufacturers Association; [www.buildershardware.com](http://www.buildershardware.com).
44. BIA - Brick Industry Association (The); [www.gobrick.com](http://www.gobrick.com).
45. BICSI - BICSI, Inc.; [www.bicsi.org](http://www.bicsi.org).
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); [www.bifma.org](http://www.bifma.org).
47. BISSC - Baking Industry Sanitation Standards Committee; [www.bissc.org](http://www.bissc.org).
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); [www.bissc.org](http://www.bissc.org).
49. CDA - Copper Development Association; [www.copper.org](http://www.copper.org).
50. CEA - Canadian Electricity Association; [www.electricity.ca](http://www.electricity.ca).
51. CEA - Consumer Electronics Association; [www.ce.org](http://www.ce.org).
52. CFFA - Chemical Fabrics and Film Association, Inc.; [www.chemicalfabricsandfilm.com](http://www.chemicalfabricsandfilm.com).
53. CFSEI - Cold-Formed Steel Engineers Institute; [www.cfsei.org](http://www.cfsei.org).
54. CGA - Compressed Gas Association; [www.cganet.com](http://www.cganet.com).
55. CIMA - Cellulose Insulation Manufacturers Association; [www.cellulose.org](http://www.cellulose.org).
56. CISCA - Ceilings & Interior Systems Construction Association; [www.cisca.org](http://www.cisca.org).
57. CISPI - Cast Iron Soil Pipe Institute; [www.cispi.org](http://www.cispi.org).
58. CLFMI - Chain Link Fence Manufacturers Institute; [www.chainlinkinfo.org](http://www.chainlinkinfo.org).
59. CPA - Composite Panel Association; [www.pbmdf.com](http://www.pbmdf.com).
60. CRI - Carpet and Rug Institute (The); [www.carpet-rug.org](http://www.carpet-rug.org).
61. CRRC - Cool Roof Rating Council; [www.coolroofs.org](http://www.coolroofs.org).
62. CRSI - Concrete Reinforcing Steel Institute; [www.crsi.org](http://www.crsi.org).
63. CSA - Canadian Standards Association; [www.csa.ca](http://www.csa.ca).
64. CSA - CSA International; (Formerly: IAS - International Approval Services); [www.csa-international.org](http://www.csa-international.org).
65. CSI - Construction Specifications Institute (The); [www.csinet.org](http://www.csinet.org).
66. CSSB - Cedar Shake & Shingle Bureau; [www.cedarbureau.org](http://www.cedarbureau.org).
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); [www.cti.org](http://www.cti.org).

68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association;  
[www.dasma.com](http://www.dasma.com).
70. DHI - Door and Hardware Institute; [www.dhi.org](http://www.dhi.org).
71. ECA - Electronic Components Association; (See ECIA).
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
73. ECIA - Electronic Components Industry Association; [www.eciaonline.org](http://www.eciaonline.org).
74. EIA - Electronic Industries Alliance; (See TIA).
75. EIMA - EIFS Industry Members Association; [www.eima.com](http://www.eima.com).
76. EJMA - Expansion Joint Manufacturers Association, Inc.; [www.ejma.org](http://www.ejma.org).
77. ESD - ESD Association; (Electrostatic Discharge Association); [www.esda.org](http://www.esda.org).
78. ESTA - Entertainment Services and Technology Association; (See PLASA).
79. EVO - Efficiency Valuation Organization; [www.evo-world.org](http://www.evo-world.org).
80. FCI - Fluid Controls Institute; [www.fluidcontrolsinstitute.org](http://www.fluidcontrolsinstitute.org).
81. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); [www.fiba.com](http://www.fiba.com).
82. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); [www.fivb.org](http://www.fivb.org).
83. FM Approvals - FM Approvals LLC; [www.fmglobal.com](http://www.fmglobal.com).
84. FM Global - FM Global; (Formerly: FMG - FM Global); [www.fmglobal.com](http://www.fmglobal.com).
85. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; [www.floridarroof.com](http://www.floridarroof.com).
86. FSA - Fluid Sealing Association; [www.fluidsealing.com](http://www.fluidsealing.com).
87. FSC - Forest Stewardship Council U.S.; [www.fscus.org](http://www.fscus.org).
88. GA - Gypsum Association; [www.gypsum.org](http://www.gypsum.org).
89. GANA - Glass Association of North America; [www.glasswebsite.com](http://www.glasswebsite.com).
90. GS - Green Seal; [www.greenseal.org](http://www.greenseal.org).
91. HI - Hydraulic Institute; [www.pumps.org](http://www.pumps.org).
92. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
93. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
94. HPVA - Hardwood Plywood & Veneer Association; [www.hpva.org](http://www.hpva.org).
95. HPW - H. P. White Laboratory, Inc.; [www.hpwhite.com](http://www.hpwhite.com).
96. IAPSC - International Association of Professional Security Consultants;  
[www.iapsc.org](http://www.iapsc.org).
97. IAS - International Accreditation Service; [www.iasonline.org](http://www.iasonline.org).
98. IAS - International Approval Services; (See CSA).
99. ICBO - International Conference of Building Officials; (See ICC).
100. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
101. ICEA - Insulated Cable Engineers Association, Inc.; [www.icea.net](http://www.icea.net).
102. ICPA - International Cast Polymer Alliance; [www.icpa-hq.org](http://www.icpa-hq.org).
103. ICRI - International Concrete Repair Institute, Inc.; [www.icri.org](http://www.icri.org).
104. IEC - International Electrotechnical Commission; [www.iec.ch](http://www.iec.ch).
105. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); [www.ieee.org](http://www.ieee.org).
106. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); [www.ies.org](http://www.ies.org).
107. IESNA - Illuminating Engineering Society of North America; (See IES).
108. IEST - Institute of Environmental Sciences and Technology; [www.iest.org](http://www.iest.org).

109. IGMA - Insulating Glass Manufacturers Alliance; [www.igmaonline.org](http://www.igmaonline.org).
110. IGSHPA - International Ground Source Heat Pump Association; [www.igshpa.okstate.edu](http://www.igshpa.okstate.edu).
111. ILI - Indiana Limestone Institute of America, Inc.; [www.ili.ai.com](http://www.ili.ai.com).
112. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); [www.intertek.com](http://www.intertek.com).
113. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); [www.isa.org](http://www.isa.org).
114. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
115. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); [www.isfanow.org](http://www.isfanow.org).
116. ISO - International Organization for Standardization; [www.iso.org](http://www.iso.org).
117. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
118. ITU - International Telecommunication Union; [www.itu.int/home](http://www.itu.int/home).
119. KCMA - Kitchen Cabinet Manufacturers Association; [www.kcma.org](http://www.kcma.org).
120. LMA - Laminating Materials Association; (See CPA).
121. LPI - Lightning Protection Institute; [www.lightning.org](http://www.lightning.org).
122. MBMA - Metal Building Manufacturers Association; [www.mbma.com](http://www.mbma.com).
123. MCA - Metal Construction Association; [www.metalconstruction.org](http://www.metalconstruction.org).
124. MFMA - Maple Flooring Manufacturers Association, Inc.; [www.maplefloor.org](http://www.maplefloor.org).
125. MFMA - Metal Framing Manufacturers Association, Inc.; [www.metalframingmfg.org](http://www.metalframingmfg.org).
126. MHIA - Material Handling Industry of America; [www.mhia.org](http://www.mhia.org).
127. MIA - Marble Institute of America; [www.marble-institute.com](http://www.marble-institute.com).
128. MMPA - Moulding & Millwork Producers Association; [www.wmmpa.com](http://www.wmmpa.com).
129. MPI - Master Painters Institute; [www.paintinfo.com](http://www.paintinfo.com).
130. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; [www.mss-hq.org](http://www.mss-hq.org).
131. NAAMM - National Association of Architectural Metal Manufacturers; [www.naamm.org](http://www.naamm.org).
132. NACE - NACE International; (National Association of Corrosion Engineers International); [www.nace.org](http://www.nace.org).
133. NADCA - National Air Duct Cleaners Association; [www.nadca.com](http://www.nadca.com).
134. NAIMA - North American Insulation Manufacturers Association; [www.naima.org](http://www.naima.org).
135. NBGQA - National Building Granite Quarries Association, Inc.; [www.nbgqa.com](http://www.nbgqa.com).
136. NBI - New Buildings Institute; [www.newbuildings.org](http://www.newbuildings.org).
137. NCAA - National Collegiate Athletic Association (The); [www.ncaa.org](http://www.ncaa.org).
138. NCMA - National Concrete Masonry Association; [www.ncma.org](http://www.ncma.org).
139. NEBB - National Environmental Balancing Bureau; [www.nebb.org](http://www.nebb.org).
140. NECA - National Electrical Contractors Association; [www.necanet.org](http://www.necanet.org).
141. NeLMA - Northeastern Lumber Manufacturers Association; [www.nelma.org](http://www.nelma.org).
142. NEMA - National Electrical Manufacturers Association; [www.nema.org](http://www.nema.org).
143. NETA - InterNational Electrical Testing Association; [www.netaworld.org](http://www.netaworld.org).
144. NFHS - National Federation of State High School Associations; [www.nfhs.org](http://www.nfhs.org).
145. NFPA - National Fire Protection Association; [www.nfpa.org](http://www.nfpa.org).
146. NFPA - NFPA International; (See NFPA).
147. NFRC - National Fenestration Rating Council; [www.nfrc.org](http://www.nfrc.org).
148. NHLA - National Hardwood Lumber Association; [www.nhla.com](http://www.nhla.com).
149. NLGA - National Lumber Grades Authority; [www.nlga.org](http://www.nlga.org).

150. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
151. NOMMA - National Ornamental & Miscellaneous Metals Association;  
[www.nomma.org](http://www.nomma.org).
152. NRCA - National Roofing Contractors Association; [www.nrca.net](http://www.nrca.net).
153. NRMCA - National Ready Mixed Concrete Association; [www.nrmca.org](http://www.nrmca.org).
154. NSF - NSF International; [www.nsf.org](http://www.nsf.org).
155. NSPE - National Society of Professional Engineers; [www.nspe.org](http://www.nspe.org).
156. NSSGA - National Stone, Sand & Gravel Association; [www.nssga.org](http://www.nssga.org).
157. NTMA - National Terrazzo & Mosaic Association, Inc. (The); [www.ntma.com](http://www.ntma.com).
158. NWFA - National Wood Flooring Association; [www.nwfa.org](http://www.nwfa.org).
159. PCI - Precast/Prestressed Concrete Institute; [www.pci.org](http://www.pci.org).
160. PDI - Plumbing & Drainage Institute; [www.pdionline.org](http://www.pdionline.org).
161. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); [www.plasa.org](http://www.plasa.org).
162. RCSC - Research Council on Structural Connections; [www.boltcouncil.org](http://www.boltcouncil.org).
163. RFCI - Resilient Floor Covering Institute; [www.rfci.com](http://www.rfci.com).
164. RIS - Redwood Inspection Service; [www.redwoodinspection.com](http://www.redwoodinspection.com).
165. SAE - SAE International; [www.sae.org](http://www.sae.org).
166. SCTE - Society of Cable Telecommunications Engineers; [www.scte.org](http://www.scte.org).
167. SDI - Steel Deck Institute; [www.sdi.org](http://www.sdi.org).
168. SDI - Steel Door Institute; [www.steeldoor.org](http://www.steeldoor.org).
169. SEFA - Scientific Equipment and Furniture Association (The);  
[www.sefalabs.com](http://www.sefalabs.com).
170. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers;  
(See ASCE).
171. SIA - Security Industry Association; [www.siaonline.org](http://www.siaonline.org).
172. SJI - Steel Joist Institute; [www.steeljoist.org](http://www.steeljoist.org).
173. SMA - Screen Manufacturers Association; [www.smainfo.org](http://www.smainfo.org).
174. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association;  
[www.smacna.org](http://www.smacna.org).
175. SMPTE - Society of Motion Picture and Television Engineers; [www.smpte.org](http://www.smpte.org).
176. SPFA - Spray Polyurethane Foam Alliance; [www.sprayfoam.org](http://www.sprayfoam.org).
177. SPIB - Southern Pine Inspection Bureau; [www.spib.org](http://www.spib.org).
178. SPRI - Single Ply Roofing Industry; [www.spri.org](http://www.spri.org).
179. SRCC - Solar Rating & Certification Corporation; [www.solar-rating.org](http://www.solar-rating.org).
180. SSINA - Specialty Steel Industry of North America; [www.ssina.com](http://www.ssina.com).
181. SSPC - SSPC: The Society for Protective Coatings; [www.sspc.org](http://www.sspc.org).
182. STI - Steel Tank Institute; [www.steeltank.com](http://www.steeltank.com).
183. SWI - Steel Window Institute; [www.steelwindows.com](http://www.steelwindows.com).
184. SWPA - Submersible Wastewater Pump Association; [www.swpa.org](http://www.swpa.org).
185. TCA - Tilt-Up Concrete Association; [www.tilt-up.org](http://www.tilt-up.org).
186. TCNA - Tile Council of North America, Inc.; [www.tileusa.com](http://www.tileusa.com).
187. TEMA - Tubular Exchanger Manufacturers Association, Inc.; [www.tema.org](http://www.tema.org).
188. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance);  
[www.tiaonline.org](http://www.tiaonline.org).
189. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
190. TMS - The Masonry Society; [www.masonrysociety.org](http://www.masonrysociety.org).

191. TPI - Truss Plate Institute; [www.tpinst.org](http://www.tpinst.org).
192. TPI - Turfgrass Producers International; [www.turfgrassod.org](http://www.turfgrassod.org).
193. TRI - Tile Roofing Institute; [www.tilerroofing.org](http://www.tilerroofing.org).
194. UL - Underwriters Laboratories Inc.; [www.ul.com](http://www.ul.com).
195. UNI - Uni-Bell PVC Pipe Association; [www.uni-bell.org](http://www.uni-bell.org).
196. USAV - USA Volleyball; [www.usavolleyball.org](http://www.usavolleyball.org).
197. USGBC - U.S. Green Building Council; [www.usgbc.org](http://www.usgbc.org).
198. USITT - United States Institute for Theatre Technology, Inc.; [www.usitt.org](http://www.usitt.org).
199. WASTEC - Waste Equipment Technology Association; [www.wastec.org](http://www.wastec.org).
200. WCLIB - West Coast Lumber Inspection Bureau; [www.wclib.org](http://www.wclib.org).
201. WCMA - Window Covering Manufacturers Association; [www.wcmanet.org](http://www.wcmanet.org).
202. WDMA - Window & Door Manufacturers Association; [www.wdma.com](http://www.wdma.com).
203. WI - Woodwork Institute; [www.wicnet.org](http://www.wicnet.org).
204. WSRCA - Western States Roofing Contractors Association; [www.wsrca.com](http://www.wsrca.com).
205. WWPA - Western Wood Products Association; [www.wwpa.org](http://www.wwpa.org).

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; [www.din.de](http://www.din.de).
2. IAPMO - International Association of Plumbing and Mechanical Officials; [www.iapmo.org](http://www.iapmo.org).
3. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
4. ICC-ES - ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE or USACE – U.S. Army Corps of Engineers; [www.usace.army.mil](http://www.usace.army.mil).
2. CPSC - Consumer Product Safety Commission; [www.cpsc.gov](http://www.cpsc.gov).
3. DOC - Department of Commerce; National Institute of Standards and Technology; [www.nist.gov](http://www.nist.gov).
4. DOD - Department of Defense; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
5. DOE - Department of Energy; [www.energy.gov](http://www.energy.gov).
6. EPA - Environmental Protection Agency; [www.epa.gov](http://www.epa.gov).
7. FAA - Federal Aviation Administration; [www.faa.gov](http://www.faa.gov).
8. FG - Federal Government Publications; [www.gpo.gov](http://www.gpo.gov).
9. GSA - General Services Administration; [www.gsa.gov](http://www.gsa.gov).
10. HUD - Department of Housing and Urban Development; [www.hud.gov](http://www.hud.gov).
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; [www.eetd.lbl.gov](http://www.eetd.lbl.gov).
12. OSHA - Occupational Safety & Health Administration; [www.osha.gov](http://www.osha.gov).
13. SD - Department of State; [www.state.gov](http://www.state.gov).
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; [www.trb.org](http://www.trb.org).

15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; [www.ars.usda.gov](http://www.ars.usda.gov).
16. USDA - Department of Agriculture; Rural Utilities Service; [www.usda.gov](http://www.usda.gov).
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; [www.ojp.usdoj.gov](http://www.ojp.usdoj.gov).
18. USP - U.S. Pharmacopeial Convention; [www.usp.org](http://www.usp.org).
19. USPS - United States Postal Service; [www.usps.com](http://www.usps.com).

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; [www.gpo.gov/fdsys](http://www.gpo.gov/fdsys).
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
  - a. Available from Defense Standardization Program; [www.dsp.dla.mil](http://www.dsp.dla.mil).
  - b. Available from General Services Administration; [www.gsa.gov](http://www.gsa.gov).
  - c. Available from National Institute of Building Sciences/Whole Building Design Guide; [www.wbdg.org/ccb](http://www.wbdg.org/ccb).
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; [www.access-board.gov](http://www.access-board.gov).
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; [www.bearhfti.ca.gov](http://www.bearhfti.ca.gov).
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; [www.calregs.com](http://www.calregs.com).
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; [www.cal-iaq.org](http://www.cal-iaq.org).
5. CPUC; California Public Utilities Commission; [www.cpuc.ca.gov](http://www.cpuc.ca.gov).
6. SCAQMD; South Coast Air Quality Management District; [www.aqmd.gov](http://www.aqmd.gov).
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; [www.txforestservation.tamu.edu](http://www.txforestservation.tamu.edu).

516 N. KING ST, WILMINGTON DE 19801  
NOVEMBER 22, 2024

CUSTOMS HOUSE RENOVATION AND ADDITION  
#MJ0217000003-BP4

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

**END OF SECTION**

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## SECTION 01 43 25

### EXTERIOR ENCLOSURE ON-SITE PERFORMANCE MOCKUP

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes: Construction and testing of an on-site Performance Mockup (PMU).
- B. Related Requirements:
  - 1. Section 01 83 16 – “Exterior Enclosure General Requirements”
  - 2. Refer to individual sections throughout the Project Manual and particularly in Divisions 03 through 13 for work required for each individual material, system or element in addition to the requirements contained herein.

##### 1.2 REFERENCES

- A. Definitions: See Section 01 83 16 Exterior Enclosure General Requirements.

##### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Comply with the requirements of Division 1 and the following additional items related directly to the exterior enclosure.
- B. Coordination: Comply with requirements specified in Section 01 83 16.
  - 1. Exterior Enclosure Coordination Drawings: Coordinate mockup shop drawings that may be used for Coordination Drawings.
- C. Scheduling: Schedule work to allow for proper coordination of the various parts of the exterior enclosure to come together on the project in a manner to provide for compliance with requirements of the contract documents. Sequence Work of exterior enclosure to ensure proper completion of water, air and vapor barriers prior to being covered by subsequent Work and to allow installation of Work as required to conform to design intent and specified criteria.
  - 1. Schedule Work to allow for:
    - a. Submissions, and resubmissions of pre-qualification data and required data for mock-up.
    - b. Construction of mock-up.
    - c. Testing of mock-up.

- d. Modifications and retesting of mock-up.
  - e. Approval of mock-up.
  - f. Submittals, resubmittals and approval of required data for remaining enclosure Work or revisions to previously approved submissions if required to coordinate with final approved conditions in mock-up.
  - g. Installation of work included in the scope of the mockup.
    - 1) Installation of back up wall, sheathing, and air and weather barriers beyond the scope of the mockup may proceed prior to mock up approval.
2. Contractors may be required to make multiple passes over the same area to complete the work. No claims for extra cost will be recognized based on supposed "out-of-sequence" work or having to work on the same area multiple times on multiple days.

#### 1.4 ACTION SUBMITTALS

- A. General: Comply with requirements specified for Action Submittals in Division 01 Section 01 33 00 "Submittal Procedures." Submittal requirements specified in this article are in addition to those specified in the individual Specification sections in which each component of the overall exterior enclosure is specified.
- B. Performance Mock-up Shop Drawings: Provide plans, elevations, sections, full-size details, and attachments to other work.
1. Comply with requirements for shop drawings of work specified in technical sections.
  2. Include information on testing chamber and supporting steel.
  3. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
  4. Include full-size isometric details of each vertical-to-horizontal intersection of components of exterior enclosure, showing the following:
    - a. Joinery, including concealed welds.
    - b. Anchorage.
    - c. Expansion provisions.
    - d. Glazing.
    - e. Flashing and drainage.
- C. Performance Mockup Testing Plan: Testing agencies testing plan indicating each test required and instructions about how the referenced testing standard will be applied to the particular requirements of this project. Identify the following:
1. Test methods, pressures, durations, etc. TBD or similar disclaimers are not allowed. For test standards that include optional methods (e.g ASTM E 1105), identify which method will be included.

2. Description of the areas to be tested. If areas are already identified then provide plan and elevation drawings showing test locations. If areas are to be selected at time of testing by Architect, then provide detailed description of test areas.
3. Identify that necessary power and water supplies have been verified with CM to be available or temporary supplies will be provided.
4. Identify that necessary lifts, scaffolding and other similar equipment necessary for testing will be available at site for testing and who is responsible to provide the same.
5. Identify size of test chambers and how they will be constructed. Define what materials will be provided and who is responsible to have materials available on site. Identify union rules or other work restrictions that may affect the construction of the chambers and how the rules and restrictions will be accommodated on the date of chamber construction and testing.
6. Identify step-by-step masking of portions of the test area to properly conduct tests or to allow for portions of the test area with different test pressures (e.g. fixed versus operable air infiltration or lower water test pressure for door within curtain wall).
7. Identify temporary measures necessary to isolate test areas from adjacent construction to allow for testing including blocking of mullions, temporary surfaces to seal chamber to, etc. Failure to identify temporary measures in submittal will not justify not performing tests in field.
8. Identify any objections of the testing agency to the intended test procedure for review and resolution by the Architect and Architect's consultants. Objections raised on day of testing will not be considered.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Testing Agency Qualifications.
- B. Mock-up Test Reports: Prepared by a qualified preconstruction testing agency, for each mockup test.
  1. Test reports shall include a description of the testing procedure including: every pre-test and test performed (whether passed or failed) step-by-step through the testing program, identification of reason for failure, any repair or remediation procedures performed after failed tests, any information collected from examination of mock-up or tested area after testing and during disassembly, and other data as requested by Design Professional. If the tested mock-up passed tests on initial attempt, indicate so in writing.
  2. Test reports which only summarize the final successful test will be rejected.
- C. Preconstruction Mockup Photographs: Comply with requirements specified in Division 01 Section 01 32 00 "Construction Progress Documentation" and the following.
  1. Take a minimum of 30 high definition photographs each day mock-up is being erected, tested, repaired or other similar work is underway.
  2. Submit 3 CD files.

- D. Record Performance Mockup Shop Drawings: Resubmit Shop Drawings with clearly identified changes made during erection of mockup and during testing necessary to successfully complete testing and comply with indicated requirements.

## 1.6 QUALITY ASSURANCE

- A. Preconstruction ON-SITE Performance Mock-up (PMU): Construct a mock-up as follows:

1. Extent: As indicated on Drawings. Mockup to comprise opaque wall and glazed assemblies indicated for the actual work constructed using exact materials, methods, and details used for the actual work. This includes but is not limited to:
  - a. Window
  - b. Curtain wall.
  - c. Masonry Veneers
  - d. Aluminum Plate Cladding Panel System.
  - e. Backup wall with cold-formed metal framing (CFMF), sheathing, air barrier, insulation, girts and sub-support framing, with vertical and horizontal flashing.
    - 1) Interior Sealant line to be omitted during for testing.
  - f. Glazing, gaskets, sealants, and related appurtenances.
  - g. Roofing base flashing or tie-in to below grade waterproofing.
2. Intent:
  - a. Mock-up shall be tested for conformance with specified criteria.
  - b. Mock-up shall establish acceptable levels of craftsmanship, quality, and appearance.
3. Location: Free standing at location on site or at Contractors yard as acceptable by Architect.
4. Provide a reinforced concrete slab and CFMF to support mockup. CFMF shall be designed under specification 05 40 00.
5. Superintendents for construction of mock-up shall be the same individuals that will be superintendent for actual work.
6. Submittals: Obtain approvals of mock-up submittals prior to construction of mock-up.
7. Obtain Architect's acceptance of mock-up. Revise, repair, replace or rebuild mock-up as required to meet design intent and specified performance.
8. Construction Photographs: Document construction of mock-up with 30 photographs per eight (8) hour workday.
9. Approved mockup shall be retained until removal is approved by Architect but not until after Substantial Completion. Once approved, materials included in the mockup may be re-used in the actual work if not damaged. Once approved remove and properly dispose of the mockup.

## 1.7 MOCKUP TESTING

- A. Testing Agency Qualifications: The testing firm shall have minimum 5 years' experience conducting the tests indicated and shall be AAMA certified or otherwise demonstrate competency as acceptable to Architect.
- B. Preconstruction Testing Service: Provide exterior enclosure that complies with test-performance requirements indicated, as evidenced by reports based on Project-specific preconstruction testing by a qualified testing agency. General requirements for preconstruction testing and for testing agency qualifications are specified in Division 01 Section 01 83 16 "Exterior Enclosure General Requirements."
  - 1. Engage a qualified testing agency to perform preconstruction testing on mockups.
  - 2. Alter or adjust the test methods as necessary to conduct testing of the free standing mockup constructed in the field.
- C. Preconstruction Testing Methods: Perform tests specified in "Preconstruction Testing Protocol" Article according to the following methods:
  - 1. Test criteria are listed below. If test criteria is not given, comply with minimum values contained in referenced test standard. Test shall encompass entire surface area of mock-up, but is not limited to surfaces described in test title. Modify test methods as indicated for criteria, number of sensors, or as otherwise indicated.
  - 2. Where air and water infiltration tests are repeated, final evaluation of compliance with indicated criteria shall be based on successfully passing the last test at the indicated criteria.
  - 3. Tests:
    - a. Air Leakage Diagnostic Testing: Test for Air leaks per ASTM E1186: Standard Practice for Air Leakage Site Detection in Building Envelope and Air Barrier, Smoke Tracer in Conjunction with a Depressurized (or Pressurized) Chamber Practice.
    - b. Fenestration Air Infiltration: ASTM E 783 "Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors."
      - 1) Loading: 6.24 psf
      - 2) Use plastic sheeting over individual portions of test area to isolate each type of fenestration to be tested.
      - 3) Pass/Fail: Air infiltration shall not exceed:
        - a) Fixed areas: 0.06 cfm per square foot.
    - c. Water Penetration: Areas shall be tested according to ASTM E 1105, "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."

- 1) Test shall include joints between fenestration and opaque wall and portion of opaque wall assemblies.
  - 2) Test per Procedure A except use Procedure B for windows certified under AAMA/WDMA/CSA 101/I.S.2/A440
  - 3) Test Pressure: minimum uniform static-air-pressure differential of 10 psf.
  - 4) Pass/Fail: Tested area shall not evidence uncontrolled water penetration as defined in Section 01 83 16.
- d. Water Infiltration Under Dynamic Pressure: AAMA 501.1, "Test Method for Water Penetration of Windows, Curtain Walls, and Doors Using Dynamic Pressure."
- 1) Loading: 10 psf.
  - 2) Pass/Fail: Tested area shall not evidence uncontrolled water penetration as defined in Section 01 83 16.

D. Preconstruction Testing Protocol:

1. Perform the following test on laboratory preconstruction mock-up in the following order. Test shall encompass entire surface area of mock-up, but is not limited to surfaces described in test title.
2. Contractor shall not "pretest" mock-up without prior permission from Design Professional. "Testing" shall only be performed in presence of Design Professional and inspector. Testing laboratory shall be responsible for conducting and reporting tests, shall state in report whether or not test specimen conforms to all requirements of Contract Documents, and shall specifically note any deviations. Testing laboratory shall submit its report directly to Design Professional within one (1) month of testing completion.
3. Repeat the previous individual test after correcting deficiencies that caused a failure of an individual test.
4. Testing protocol:
  - a. Preload at 50 percent of inward static design pressure.
  - b. Air Leakage Diagnostic Testing: Repair leaks and retest before performing air and water infiltration test.
  - c. Fenestration Air infiltration.
  - d. Water infiltration under static pressure.
  - e. Water infiltration under dynamic pressure.

1.8 RETESTING

- A. All retesting required because of failure to pass initial test shall be at expense of Contractor and shall employ Inspection and Testing Agency who performed original tests.
- B. Mock-up testing shall be repeated until compliance is demonstrated.

### 1.9 DELIVERY STORAGE, AND HANDLING

- A. Comply with requirements specified in Division -01 Section 01 60 00 "Product Requirements."
- B. Protect mockup from damage and soiling until approved by Architect to be removed.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Mockup shall meet all performance criteria included in technical specification sections for scope of materials and systems in the mockup.
- B. The mockup shall be able to perform as indicated for field testing as indicated in Section 01 45 25.

### 2.2 MATERIALS, NOT USED

### 2.3 FABRICATION

- A. Fabrication of work for mockup shall be as specified in individual technical sections and as intended for fabrication of work incorporated into the finished project.

### 2.4 SOURCE QUALITY CONTROL

- A. Perform quality-control procedures for mockup as indicated for in place work.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, 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.

### 3.2 INSTALLATION

- A. Installation of work is typically specified in individual technical sections.

- B. Where work of various sections comes together, install for indicated performance of all assemblies and the joint.

### 3.3 ERECTION TOLERANCES

- A. General: Comply with more stringent tolerances than those listed below, if required to:
  - 1. Match approved Samples and Mock-ups.
  - 2. Comply with performance criteria.
  - 3. Comply with manufacturer's written instructions.
  - 4. Align with other supported or adjacent Work with more stringent tolerances.
  - 5. Allow for proper operation of doors, louvers or other moving parts.

**END OF SECTION**

## SECTION 01 45 23

### TESTING AND INSPECTING SERVICES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Selection and payment.
2. Laboratory responsibilities.
3. Laboratory reports.
4. Limits on testing laboratory authority.
5. Contractor responsibilities.

###### B. Third Party Inspections Program (TPIP) requirements are as follows:

###### 1. Bid Pack 0:

###### a. Civil

- 1) Laboratory Testing
- 2) Review of Subgrade Conditions
- 3) Review of Fill Placement
- 4) Review of Pavement Construction

###### b. Structural

- 1) Concrete sampling for strength tests, slump, air content, and temperature – continuous
- 2) Review of Concrete
- 3) Review of Reinforced Steel

###### 2. Bid Pack 1:

###### a. Structural

- 1) Reinforcing Steel, Including Prestressing Tendons – periodic inspection
- 2) Welding of Reinforcing Steel – periodic inspection
- 3) Cast-in bolts & embeds – periodic inspection
- 4) Post-installed anchors or dowels – periodic inspection
- 5) Use of required mix design
- 6) Concrete sampling for strength tests, slump, air content, and temperature – continuous
- 7) Concrete & shotcrete placement – continuous
- 8) Curing temperature and techniques – periodic inspection

- 9) Pre-stressed concrete – continuous
  - 10) Strength verification – periodic inspection
  - 11) Formwork – periodic inspection
  - 12) Verify subgrade is adequate to achieve design bearing capacity – periodic
  - 13) Verify excavations extend to proper depth and material – periodic
  - 14) Verify that subgrade has been appropriately prepared prior to placing compacted fill – periodic
  - 15) Perform classification and testing of compacted fill materials – periodic
  - 16) Verify proper materials, densities, and lift thicknesses during placement and compaction – continuous
  - 17) Designed seismic systems – if applicable
  - 18) Prototype tests for seismically isolated structures – if applicable
  - 19) Fabrication and installation of seismically isolated structures – if applicable
3. Bid Pack 2 (based on current 2/3 split):
- a. Structural
    - 1) Cast-in bolts & embeds – periodic inspection
    - 2) Post-installed anchors or dowels – periodic inspection
    - 3) Erection of precast concrete – periodic inspection (possibly unless all cast stone used instead)
  - b. Architectural
    - 1) Roof Deck Inspection
    - 2) Roofing Inspection
    - 3) Penetration Firestops – Periodic
    - 4) Fire-resistant joint systems – periodic
    - 5) Erection and fastening of exterior cladding or interior and exterior veneers – periodic
4. Bid Pack 3 (based on current 2/3 split):
- a. Structural
  - b. Architectural
    - 1) Penetration Firestops – Periodic
    - 2) Fire-resistant joint systems – periodic
    - 3) Erection and fastening of interior and exterior non-bearing walls – periodic
    - 4) Access floors – periodic
  - c. Mechanical

- 1) Weld Testing: Provide ultrasonic or radiographic testing of pipe welds, including 100% of all concealed welds (underground and within shaft enclosures) and 10% of all remaining welds in accessible spaces.

## 1.2 SELECTION AND PAYMENT

- A. CM will employ and pay for services of an independent testing laboratory to perform specified inspecting and testing as scheduled in contract documents.
- B. The local Authorities Having Jurisdiction may provide other special inspection services to inspect and verify work installed is in accordance with codes and ordinances.
- C. Costs for additional tests or inspections required because of a Contractor change in product, materials, or source will be borne by the Contractor.
- D. Costs for testing required solely for the convenience of the Contractor in its scheduling and performance of the Work will be borne by the Contractor.
- E. Costs for verification of testing of work done without timely notice, improper supervision, or contrary to construction practice, will be borne by the Contractor.

## 1.3 QUALITY ASSURANCE

- A. Laboratory: Authorized to operate in State in which Project is located.
- B. Laboratory Staff: Maintain a full time registered engineer on staff to review services.
- C. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Institute of Standards and Technology or accepted values of natural physical constants.

## 1.4 SUBMITTALS

- A. Submit one PDF electronic file or two paper copies of each required submittal to Architect and Contractor, with a copy to the Owner and local jurisdiction having authority.
- B. Submit with transmittal letter as specified for Submittals in Section 01 33 00 "Submittal Procedures." Submit and distribute reports, logs, and certificates as specified in Section 01 33 00 "Submittal Procedures."

## 1.5 CONTRACTOR SUBMITTALS

- A. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time registered Engineer.

- B. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Institute of Standards and Technology during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

#### 1.6 LABORATORY RESPONSIBILITIES

- A. The independent firm will perform tests, inspections and other services specified in individual specification sections and as indicated on Drawings.
  - 1. Perform additional inspections and tests required by Owner or Architect.
- B. Testing, inspections and source quality control may occur on or off the project site. Perform off-site testing as required by the Architect or the Owner.
- C. Test samples of mixes submitted by Contractor.
- D. Provide qualified personnel at site. Cooperate with Owner and Contractor in performance of services.
- E. Perform specified inspection, sampling, and testing of Products in accordance with specified standards.
- F. Ascertain compliance of materials and mixes with requirements of Contract Documents.
- G. Promptly notify Owner, Architect and Contractor of observed irregularities or non-conformance of Work or Products. Immediately upon determination of test failure, the inspector will telephone results to the Contractor, Owner, and Architect. On the same day, the inspector will distribute written test results.
- H. Attend preconstruction conferences and progress meetings as requested.

#### 1.7 LABORATORY REPORTS

- A. After each inspection and test, promptly submit copies of laboratory report.
- B. In each report, include:
  - 1. Date issued.
  - 2. Project title and number.
  - 3. Name of inspector.
  - 4. Date and time of sampling or inspection.
  - 5. Identification of product and Specifications Section.
  - 6. Location in the Project.
  - 7. Type of inspection or test.
  - 8. Date of test.
  - 9. Results of tests.

10. Conformance with Contract Documents.
11. Weather and climatic conditions at time sample was obtained or work observed.
12. Description of test methods.

C. When requested by Owner or Architect, provide interpretation of test results.

#### 1.8 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 Contractor.
- D. Laboratory has no authority to stop the Work.

#### 1.9 CONTRACTOR RESPONSIBILITIES

- A. Deliver to laboratory at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
- B. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
- C. 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, storage and curing of test samples.
- D. Notify laboratory 48 hours before expected time for operations requiring inspection and testing services. Coordinate schedule with laboratory to ensure testing and inspection personnel are available at the site when required by Work in progress. Coordinate testing and inspection activities to avoid delay and to eliminate need to uncover work for testing or inspection. Give sufficient advance notice of cancellation to impacted parties to allow rescheduling of work. Any charges due to insufficient advance notice will be borne by the Contractor.
- E. Arrange with laboratory and pay for additional samples and tests required by Contractor beyond specified requirements.
- F. When initial tests indicate Work is defective, pay for additional inspections and tests required to confirm corrected Work conforms to Contract Documents.
- G. Remove and replace any work found defective or not complying with contract document requirements at no additional cost to Owner. Where testing requires cores or cut-outs to verify compliance, repair prior to acceptance.

- H. Code Compliance Inspection and Tests: Inspections and tests not specified in the contract documents and required by codes and ordinances or by plan approval authorities, will be the responsibility of the Contractor.
- I. Where indicated or as required by Owner or Architect, engage manufacturer's field services, inspectors, or representatives to inspect or observe components, installation, and connections. Report results in writing.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

**END OF SECTION**

## SECTION 01 45 25

### EXTERIOR ENCLOSURE TESTING SERVICES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes: Independent field-testing services required to verify construction of exterior enclosure is in compliance with design intent and specified criteria as follows:
  - 1. Field testing of installed work.
- B. Related Requirements:
  - 1. Section 01 43 25 Exterior Enclosure Onsite Performance Mockup for preconstruction testing of the mockup.
  - 2. Section 01 83 16 "Exterior Enclosure General Requirements" for other requirements for the enclosure.
  - 3. Refer to individual sections throughout the Project Manual and particularly in Divisions 03 through 13 for work required for each individual material, system or element in addition to the requirements contained herein.

##### 1.2 REFERENCES

- A. Definitions: Refer to Division 1 Section 01 83 16 "Exterior Enclosure General Requirements".

##### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Comply with requirements specified in Division 01 Section 01 31 00 "Project Management and Coordination."
  - 1. Coordination: Coordinate with Work specified in Section 01 83 16 "Exterior Enclosure General Requirements" and individual Specification Sections that is required to complete exterior enclosure.
- B. Pre-installation Meetings: Participate in Meetings specified in Division 1 Section 01 83 16 "Exterior Enclosure General Requirements" and in individual sections throughout the Project Manual and particularly in Divisions 03 through 13.
- C. Sequencing / Scheduling: Coordinate as indicated in Section 01 83 16 Exterior Enclosure General Requirements".

#### 1.4 INFORMATIONAL SUBMITTALS

- A. General: Comply with requirements specified for Informational Submittals in Division 01 Section 01 33 00 "Submittal Procedures." Submittal requirements specified in this article are in addition to those specified in the individual Specification sections in which each component of the overall exterior enclosure is specified.
- B. Testing Agency Qualifications
- C. Field Test Report Plan: Testing agencies testing plan indicating each test required and instructions about how the referenced testing standard will be applied to the particular requirements of this project. Identify the following:
1. Test methods, pressures, durations, etc. TBD or similar disclaimers are not allowed. For test standards that include optional methods (e.g ASTM E 1105), identify which method will be included.
  2. Frequency of testing.
  3. Description of the areas to be tested. If areas are already identified then provide plan, elevation and wall section drawings showing test locations. If areas are to be selected at time of testing by Architect, then provide detailed description of test areas.
  4. Identify that necessary power and water supplies have been verified with CM to be available or temporary supplies will be provided.
  5. Identify that necessary lifts, scaffolding and other similar equipment necessary for testing will be available at site for testing and who is responsible to provide the same.
  6. Identify size of test chambers and how they will be constructed. Define what materials will be provided and who is responsible to have materials available on site. Identify union rules or other work restrictions that may affect the construction of the chambers and how the rules and restrictions will be accommodated on the date of chamber construction and testing.
  7. Identify step-by-step masking of portions of the test area to properly conduct tests or to allow for portions of the test area with different test pressures (e.g. fixed versus operable air infiltration or lower water test pressure for door within curtain wall).
  8. Identify temporary measures necessary to isolate test areas from adjacent construction to allow for testing including blocking of mullions, temporary surfaces to seal chamber to, etc. Failure to identify temporary measures in submittal will not justify not performing tests in field.
  9. Identify any objections of the testing agency to the intended test procedure for review and resolution by the Architect. Objections raised on day of testing will not be considered.
- D. Field Test Reports: Prepared by a qualified preconstruction testing agency, for each field test.
1. Test reports shall include a description of the testing procedure including: every pre-test and test performed (whether passed or failed) step-by-step through the

testing program, identification of reason for failure, any repair or remediation procedures performed after failed tests, any information collected from examination of mock-up or tested area after testing and during disassembly, and other data as requested by Design Professional. If the tested mock-up passed tests on initial attempt, indicate so in writing.

2. Test reports which only summarize the final successful test will be rejected.

### 1.5 QUALITY ASSURANCE

- A. Air and Water Infiltration Testing Agency Qualifications: The testing firm shall have minimum 5 years' experience conducting the tests indicated and shall be AAMA certified or otherwise demonstrate competency as acceptable to Commissioner.
- B. Field testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
- C. Approval of field tests does not constitute approval of deviations from the Contract Documents unless Architect specifically approves such deviations in writing.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

### 3.1 FIELD TESTING LABORATORIES

- A. Approved Testing Laboratories include:
  1. Molimo, LLC 717 309 4964
  2. National Certified Testing Laboratories, Inc 717 846 1200
  3. Any laboratory AAMA approved for the indicated tests.

### 3.2 FIELD TESTING SUPPORT

- A. Provide support to testing agency as follows for each test:
  1. Erect 2 by 4 wood stud frame test chamber walls per the testing agencies instructions.
  2. Provide staging, access, ladders, power, water supply, and supporting services for testing. Access to both interior and exterior surfaces will be required.
  3. Cooperate with testing agency.

### 3.3 FIELD QUALITY CONTROL TESTING

- A. Testing Agency: Engage a qualified testing agency to perform specified tests.

- B. Water and Air Chamber Tests: Testing of representative areas of exterior enclosure shall take place as installation proceeds to determine compliance of installed assemblies with specified requirements.
1. Test Areas: Test three areas, each approximately 16 feet by one story tall, selected at random by Architect.
    - a. Test area may include any of the building enclosure components and assemblies without limit including:
      - 1) Masonry Veneer Walls
      - 2) Aluminum Plate Clad Walls
      - 3) Punched Windows.
      - 4) Curtain Wall
      - 5) Intersection of walls with roofing assemblies.
    - b. Perform tests in three test area as directed by Architect at approximately 50 percent completion.
  1. Air Leaks Diagnostic Testing: Test for Air leaks per ASTM E1186: Standard Practice for Air Leakage Site Detection in Building Envelope and Air Barrier, Smoke Tracer in Conjunction with a Depressurized (or Pressurized) Chamber Practice.
    - a. Repair leaks and retest before performing air and water infiltration test.
  2. Water Penetration: Areas shall be tested according to ASTM E 1105, "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."
    - a. Test shall include joints between fenestration and opaque wall and portion of opaque wall assemblies.
    - b. Test per Procedure A except use Procedure B for windows certified under AAMA/WDMA/CSA 101/I.S.2/A440
    - c. Test Pressure: minimum uniform static-air-pressure differential of 6.7 psf.
    - d. Pass/Fail: Tested area shall not evidence uncontrolled water penetration as defined in Section 01 83 16.
- C. Dynamic Water Infiltration Testing: Testing of representative areas of exterior enclosure shall take place as installation proceeds to determine compliance of installed assemblies with specified requirements.
1. Method: Dynamic Water Penetration, AAMA 1501.1 "Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure."
    - a. Test shall include joints between fenestration and opaque wall and portion of opaque wall assemblies.

- b. Test Pressure: minimum uniform static-air-pressure differential of 6.7 psf.
      - c. Pass/Fail: Tested area shall not evidence uncontrolled water penetration as defined in Section 01 83 16.
    2. Provide 1 day of dynamic water infiltration testing, at approximately 75% completion of the enclosure work. Test as many areas as possible during the day.
    3. Test Areas: selected at random by Architect.
  - D. Hose Testing: Allow for 1 day of hose testing on-site at locations selected by Architect per AAMA 501.2. Testing to occur at approximately 75% of enclosure completion.
  - E. Sealant Tests: Perform destructive and non-destructive testing of installed exterior sealant joints in compliance with ASTM C 1521.
    1. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
      - a. Extent of Testing: Test completed and cured sealant joints as follows:
        - 1) Test two of each combination of substrates present in mockup.
        - 2) Perform 5 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
        - 3) Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
      - b. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
      - c. Conduct periodically throughout the installation of the work and submit field reports.
    2. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.
- F. Exterior enclosure will be considered defective if components and overall assembly do not pass tests and inspections.
- G. Repairs and Retesting:
  1. If any test or retest fail on the first attempt, after repairs, retest 1 additional new locations of similar size until all tests pass on first attempt.
  2. Continue testing and retesting at additional test areas until tests are passed on first attempt.

- H. Exterior enclosure will be considered defective if components and overall assembly do not pass tests and inspections.
- I. Prepare test reports.

**END OF SECTION**

**NOT FOR BID**

## SECTION 01 50 00

### TEMPORARY FACILITIES AND CONTROLS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

A. Section Includes:

1. Temporary utilities.
2. Support facilities.
3. Security and protection facilities.

##### 1.2 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Service provided and paid for by Construction Manager
- C. Water Service: Service provided and paid for by Construction Manager.
- D. Electric Power Service: Service provided and paid for by Construction Manager.
1. Internet Service: Contractor shall pay for all internet service use charges for internet access

##### 1.3 INFORMATIONAL SUBMITTALS

- A. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

##### 1.4 QUALITY ASSURANCE

- A. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- B.

## PART 2 - PRODUCTS

### 2.1 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading. Exact location of construction trailers to be determined with assistance from Construction Management.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped as required to accommodate materials and equipment for construction operations.
  - 1. Store combustible materials apart from building.

### 2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
  - 1. Locate facilities to limit site disturbance.
  - 2. Locate facilities within the limits defined in the drawings.
  - 3. The Contractor is responsible for obtaining permitting from the town of Georgetown (or State if required) for any lane or street closures and any sidewalk closures.

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
  - 2. Upcoming required shut-downs are to be presented to Building Superintendent and State Project Manager in bi-weekly construction meetings and coordinated with Building Superintendent.

- B. Sewers and Drainage: Existing sewers and drainage to building is to remain. Coordinate any temporary service interruptions with owner.
- C. Water Service: Existing water service to building is to remain. Coordinate any temporary service interruptions with owner.
- D. Sanitary Facilities:
- E. Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- F. 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.
- G. 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.
- H. Electric Power Service: Existing electric power service to building is to remain. Coordinate any temporary service interruptions with owner and sub-contractors.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- J. General: Comply with the following:
- K. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- L. Parking:
  - 1. Contractor's Superintendent may park within the secure lot.
  - 2. All other construction personnel must park where street or unsecured lot parking is available.

- M. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  2. Remove snow and ice as required to minimize accumulations.
  3. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
  - 4.
  5. No other corporate or project signage to be displayed except if approved by Owner.
  6. Maintain and touchup signs so they are legible at all times. Avoid obstructions and maintain sightlines to public ways to greatest extent possible. Relocate signage as progression of work may require.
  7. Remove signage at time of Substantial Completion. Repair surrounding areas.
- N. Waste Disposal Facilities:
1. Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."
  2. A trash chute may be installed within the limits defined on the drawings.
- O. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

### 3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Section 01 10 00 "Summary."
- C. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 31 10 00 "Site Clearing."
1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross existing planting areas.
  2. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
  3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction.

- E. Tree and Plant Protection: Protect as needed during construction.
- F. Security Enclosure and Lockup: Install temporary enclosure around exterior construction staging area. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- G. Barricades, Warning Signs, Fencing and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
- I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241 and OSHA requirements; manage fire-prevention program.
  - 1. Smoking is prohibited on the facility property, extending out to the edge of the sidewalk. Additionally, smoking is prohibited within the construction staging area, including where it extends onto the sidewalk.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
  - 4. Provide temporary fire extinguishers. Fire extinguishers to comply with section 2.2 A and located per NFPA requirements.
  - 5. Notify Building Superintendent and State Project Manager prior to any hot work.
- J. Site Security Cameras: NA

### 3.4 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

- D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- E. 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 Contractor. Owner reserves right to take possession of Project identification signs.
  - 2. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
  - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

**END OF SECTION**

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SECTION 015113 - TEMPORARY ELECTRICITY

1. GENERAL

A. RELATED WORK SPECIFIED ELSEWHERE

1. Electrical Basic Materials and Methods, Division 16 or 26.

B. DESCRIPTION OF SYSTEM

1. Power Source

- a. Contract 4-21 Electrical, Lighting, and Fire Alarm Systems is to supply their own power source for work of this Contract. No temporary or permanent power to be supplied by the Construction Manager or Owner.
- b. Contract 4-21 Electrical, Lighting, and Fire Alarm Systems will make all arrangements for bringing the power supply to the site and for installation of appropriate temporary transformers to provide for the power supply.
- d. The source will be adequate to service temporary electrical needs of the proposed construction.

2. Electrical Service

- a. Contract 4-21 Electrical, Lighting, and Fire Alarm Systems will be responsible to pay for all costs associated with providing electrical service from the power source to their respective site office, temporary storage facilities or temporary construction buildings as appropriate.
- b. Contract 4-21 Electrical, Lighting, and Fire Alarm Systems shall install and maintain temporary electric service for items below, throughout the construction period, such that power can be secured at any desired point with no more than a 60 foot extension:
  - (1) Power Centers for miscellaneous tools and equipment used in the construction work shall be provided with a minimum of four 20-amp, 120 volt grounding type outlets. Each outlet shall be provided with ground fault detecting circuit breaker protection.
  - (2) Adequate lighting for safe working conditions shall be provided and maintained on a 24 hour per day basis throughout the building, tunnels, and stairways per OSHA requirements. Each lamp must be rated at least 100 watts. Voltage of each socket must be at least 110 volts.
  - (3) Power for testing and checking equipment must be supplied.

3. Capacity

- a. All electrical power supply and service lines installed shall be of adequate capacity for construction use by all trades during the construction period at the locations necessary.
- b. The Electrical Contractor shall notify the Power Company if unusually heavy loads, such as welding units, are anticipated.

4. Power Costs

- a. The Construction Manager will pay all costs of temporary electrical power used during construction.
- b. The Owner will pay all costs of power used in the permanent wiring.

C. REQUIREMENTS AND REGULATORY AGENCIES

1. The Electrical Contractor will obtain permits as required by local governmental authorities.
2. The temporary electrical service shall comply with National Electrical Code, 1990 Edition and applicable local codes and utility regulations.

D. USE OF PERMANENT SYSTEM

1. The Electrical Contractor shall regulate any part of the permanent electrical system which is used for construction purposes to prevent interference with safety and orderly progress of the Work.
2. Contractors shall leave permanent electrical services in a condition as good as new and clean.

2. PRODUCTS

A. MATERIALS

1. General

- a. The materials may be new or used, but must be adequate in capacity for the purposes intended and must not create unsafe conditions or violate the requirements of applicable codes.

2. Conductors

- a. Use wire, cable, or busses of appropriate type, sized in accordance with the National Electrical Code for the applied loads.
- b. Use only UL labeled wire and devices.

B. EQUIPMENT

1. Provide appropriate enclosure for the environment in which used in compliance with NEMA standards.

3. EXECUTION

A. GENERAL

1. Install all work with a neat and orderly appearance.
2. Make structurally sound throughout.
3. Maintain to give continuous service and to provide safe working conditions.
4. Modify temporary power and light installation as job progress requires.

B. INSTALLATION

1. Locate so that interference with storage areas, traffic areas and work under other Contracts is avoided.

C. REMOVAL

1. Remove all temporary equipment and materials completely upon completion of construction.
2. Repair all damage caused by the installation and restore to satisfactory condition.

END OF SECTION

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SECTION 015123 - TEMPORARY HEATING, COOLING AND VENTILATING

1. GENERAL

A. RELATED REQUIREMENTS SPECIFIED ELSEWHERE

1. Temporary Electric: Section 015113
2. Temporary Facilities: Section 015200
3. Heating Requirements for Cold Weather Installation and Protection of Materials: Respective specification section for each item of work.

B. DEFINITIONS

1. Temporary Enclosures: Sufficient preliminary enclosures of an area of structure, or of an entire building, to prevent entrance or infiltration of rainwater, wind, or other elements and which will prevent undue heat loss from within enclosed area.
2. Permanent Enclosure: Stage of construction at which all moisture and weather protection elements of construction have been installed in accordance with Contract Documents, either for a portion of structure, or for an entire building.

C. DESCRIPTION OF SYSTEM

1. Prior to the building or portion of building being permanently enclosed, each Contractor shall provide temporary heat and ventilation and weather protection necessary for their work, as described below. After permanent enclosure, Contract 4-19 HVAC and Controls shall provide and maintain temporary heat and ventilation in enclosed areas, coordinated by the Construction Manager, required to:
  - a. Facilitate progress of Work.
  - b. Protect Work and products against dampness and cold.
  - c. Prevent moisture condensation on surfaces.
  - d. Provide suitable ambient temperatures and humidity levels for installation and curing of materials.
  - e. Provide adequate ventilation to meet health regulations for safe working environment.

2. Temperatures Required

- a. Generally, 24 hours a day: Minimum of 40 degrees F.
  - b. 24 hours a day during placing, setting, and curing of cementitious materials: As required by specification section for each product.
  - c. 24 hours a day, seven days prior to, and during, placing of interior finishes: woodwork, resilient floors, painting and finishing: As required by specification section for each product.
  - d. 24 hours a day after application of finishes, and until Substantial Completion: Minimum of 50 degrees F.
3. Ventilation Required:
- a. Contractors shall prevent hazardous accumulations of dusts, fumes, mists, vapors, or gases in areas occupied during construction. Reference OSHA regulations CFR 1926.55 (Gases, vapors, fumes, dusts, and mists), and CFR 1926.57 (Ventilation).
    - (1) Provide local exhaust ventilation to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas.
    - (2) Dispose of exhaust materials in manner that will not result in harmful dispersal of hazardous substances into atmosphere of occupied areas.
    - (3) Continuously ventilate storage spaces containing hazardous or volatile materials.
    - (4) Contractor/subcontractor must provide and use equipment which is furnished with Exhaust Purifiers/Scrubbers or is electrically power driven when any such equipment produces airborne containments and will be used in an enclosed building.
    - (5) The Contractor/subcontractor shall verify air quality by the use of air monitoring equipment and document the verified air quality on the daily report. The monitoring equipment shall, at a minimum, be designed with an auditory alarm and shall provide continuous monitoring of those four gasses, Oxygen, Hydrogen Sulfide, Carbon Monoxide and Combustible gasses.
4. Contractors shall provide adequate ventilation for:
- a. Curing installed materials.
  - b. Dispersal of humidity.
  - c. Temporary sanitary facilities.
5. Duration of Operations:

a. For Personnel:

- (1) At all times personnel occupy an area subject to hazardous accumulations of harmful elements.
- (2) Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful elements.

b. For curing installed materials: As required by specification section for respective materials.

c. For humidity dispersal: Continuously ventilate to provide suitable ambient conditions for work.

d. Contract 4-19 HVAC and Controls shall maintain supervision and operation of temporary heating and ventilating equipment in order to:

- (1) Enforce conformance with applicable codes and standards.
- (2) Enforce safe practices.
- (3) Prevent abuse of services.

D. COSTS OF INSTALLATION AND OPERATION

1. The Contractor shall be responsible for all installation and operating costs for any heat and ventilation as required in this section until the permanent HVAC system is in operation.
2. After the permanent HVAC system is operational, the Owner will pay the costs of fuel for temporary heat and ventilation. The Contractor will pay the costs for maintaining the system until final acceptance by the Owner.
3. Contract 4-19 HVAC and Controls shall be responsible for all installation and operating costs for any heat required to supplement that which is to be supplied by the Construction Manager in paragraph 1.C.1, above.

E. REQUIREMENTS OF REGULATORY AGENCIES

1. The Construction Manager will obtain and pay for permits as required by governing authorities for those activities required by this Section.
2. Contractor shall comply with Federal, State, and local codes, and utility company regulations.

## 2. PRODUCTS

### A. MATERIALS

#### 1. General

- a. Materials may be new or used but must be adequate for purposes intended and must not create unsafe conditions nor violate requirements of applicable codes.

### B. EQUIPMENT

#### 1. Standard products, meeting code requirements.

#### 2. Provide required facilities, including piping, wiring and controls.

#### 3. Portable Heaters:

- a. Indirect hot air units, located outside with duct entering into the building. Provide a sufficient number of units to meet the temperature and ventilation requirements specified above.
- b. Provide Safety Controls against explosion, overheating, and carbon monoxide build up.
- c. Provide adequate combustion air.
- d. Provide Temperature Controls installed in the building at a location(s) designated by the Construction Manager.
- e. Provide temporary barricades around the equipment to protect against damage from other construction equipment.
- f. Provide supplementary fans / distribution equipment capable of distributing heated air evenly throughout the space(s).

#### 4. Oil-Fired heaters will not be allowed.

## 3. EXECUTION

### A. GENERAL

#### 1. Comply with applicable sections of Division 26 - Mechanical.

#### 2. Install work in neat and orderly manner.

#### 3. Make structurally, mechanically, and electrically sound throughout.

4. Maintain to give safe, continuous service at required times and to provide safe working conditions.
5. Modify and extend system as work progress requires.

B. INSTALLATION

1. Locate units to provide equitable distribution of heat and air movements.
2. Locate to avoid interference with, or hazards to:
  - a. Work or movement of personnel.
  - b. Traffic areas.
  - c. Materials handling.
  - d. Storage areas.
  - e. Work of other Contractors.
  - f. Finishes.

C. OPERATION OF PERMANENT EQUIPMENT

1. The Construction Manager will coordinate with Contract 4-19 HVAC and Controls
2. The Contractor will place permanent HVAC system in operation only upon written authorization by the Construction Manager.
3. Before operating the permanent HVAC equipment, the Contractor shall confirm to the Construction Manager that:
  - a. Inspection has been made by proper authorities.
  - b. Systems, equipment piping, strainers, filters and associated operating items are sufficiently complete, cleaned, and ready for operation.
  - c. Controls and safety devices are complete and tested, or adequate temporary controls are provided.
  - d. Before operating the permanent HVAC equipment, the Contractor shall install temporary

filters:

- (1) For air handling units.
- (2) For permanent ducts.

D. REMOVAL

1. The Contractor shall completely remove temporary materials and equipment when no longer required, or on completion of construction.
2. The Contractor shall clean and repair damage caused by temporary installation and restore equipment to specified or original condition.
3. The Contractor shall remove temporary filters and install new filters, or clean permanent filters, in the permanent HVAC system prior to final acceptance by the Owner.

END OF SECTION

**SECTION 01 60 00**  
**PRODUCT REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Product delivery, storage, and handling.
2. Product warranties.
3. Product selection procedures.
4. Comparable products.

**1.2 DEFINITIONS**

**A. Products:** Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. **Named Products:** Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. **New Products:** Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. **Comparable Product:** Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

**B. Basis-of-Design Product Specification:** A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

**1.3 ACTION SUBMITTALS**

**A. Comparable Product Requests:** Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
  - a. Form of Approval: As specified in Section 01 33 00 "Submittal Procedures."
  - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 "Submittal Procedures." Show compliance with requirements.

#### 1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
  2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

#### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- 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.

- C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Contractor may, but is not required to, provide a secure location and enclosure at Project site for storage of materials and equipment within the area indicated on the drawings to be secured by the Contractor.

## 1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications or Drawings name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications or Drawings 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.
3. Products:
  - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered.
  - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
  - a. Restricted List: 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 be considered.
  - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications or Drawings name a product, and include a list of products or manufacturers, provide the basis of design product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
  1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: 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.

## 2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
  1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

**END OF SECTION**

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## SECTION 01 73 00

### EXECUTION

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Construction layout.
2. Installation of the Work.
3. Cutting and patching.
4. Coordination of work by Owner.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.

##### 1.2 DEFINITIONS

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

##### 1.3 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
  1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
  2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
  3. Products: List products to be used for patching and firms or entities that will perform patching work.
  4. Dates: Indicate when cutting and patching will be performed.
  5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
    - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

#### 1.4 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
  - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.
    - c. Air or smoke barriers.
    - d. Fire-suppression systems.
    - e. Mechanical systems piping and ducts.
    - f. Control systems.
    - g. Communication systems.
    - h. Fire-detection and -alarm systems.
    - i. Electrical wiring systems.
    - j. Operating systems of special construction.
    - k. Security barriers.
  - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
    - a. Water, moisture, or vapor barriers.
    - b. Membranes and flashings.
    - c. Exterior curtain-wall construction.
    - d. Sprayed fire-resistive material.
    - e. Equipment supports.
    - f. Piping, ductwork, vessels, and equipment.
    - g. Noise- and vibration-control elements and systems.
  - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

- B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
  - 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
  - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- B. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  - 1. Description of the Work.

2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for interpretation to Architect according to requirements in Section 01 31 00 "Project Management and Coordination."

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.
- B. Building Lines and Levels: Locate and lay out control lines and levels for structures, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- C. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### 3.4 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.
  4. Maintain minimum headroom clearance as indicated on Drawings in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  2. Allow for building movement, including thermal expansion and contraction.
  3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.5 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection:
  - 1. Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
  - 2. Where cutting occurs adjacent to other spaces in the building they must be secured at the end of each day.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
  - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as

invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
  6. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.
- I. Execute cutting, fitting, and patching to avoid damage to other work and provide proper surfaces to receive future work.
- J. Whenever possible and practical, coordinate cutting and patching with other trades to minimize impact to progress of Work.
- K. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before cutting and patching will be performed. Include extents, dates, building elements affected, and additional trades affected.

### 3.6 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.

- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
  - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
  - 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

### 3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
  - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in

Section 01 50 00 "Temporary Facilities and Controls." and Section 01 74 19  
"Construction Waste Management and Disposal."

- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.8 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01 91 13 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

### 3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

**END OF SECTION**

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**SECTION 01 73 29**  
**CUTTING AND PATCHING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section includes:**

1. Requirements and limitations for cutting and patching of Work.

**1.2 SUBMITTALS**

**A. Submit written request in advance of cutting or alteration which affects:**

1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate contractor.
6. Continuous operation of utilities, building services, fire suppression, fire alarm, or security system.

**B. Include in request:**

1. Identification of Project.
2. Location and description of affected Work.
3. Necessity for cutting or alteration.
4. Description of proposed Work, and Products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

**1.3 WARRANTY**

- A. Perform cutting and patching in a manner to preserve conditions suitable for executing specified warranties and maintaining previously issued warranties for the Work.**

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Primary Products: Those required for original installation.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- B. After uncovering existing Work, assess conditions affecting performance of work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

### 3.2 PREPARATION

- A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.
- B. Provide protection from elements for areas which may be exposed by uncovering work.
- C. Maintain excavations free of water.

### 3.3 CUTTING

- A. Execute work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- B. Identify hazardous substances or conditions exposed during the Work to the Architect/Engineer for decision or remedy.
- C. Execute cutting and fitting to complete the Work.
- D. Uncover work to install improperly sequenced work.
- E. Remove and replace defective or non-conforming work.
- F. Remove samples of installed work for testing when requested.
- G. Provide openings in the Work for penetration of mechanical and electrical work.

- H. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight-exposed surfaces.
- I. For sight-exposed surfaces.
  - 1. Cutting New Work: Employ original installer.
  - 2. Cutting Existing Facilities to Accommodate New Work: Employ qualified installer.
- J. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

### 3.4 PATCHING

- A. Execute patching to complement adjacent Work.
- B. Fit Products together to integrate with other Work.
- C. For sight-exposed surfaces.
  - 1. Patching New Work: Employ original installer.
  - 2. Patching Existing Facilities to Accommodate New Work: Employ qualified installer.
- D. Restore work with new Products in accordance with requirements of Contract Documents.
- E. Fit work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- F. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids in accordance with Section 078400.
- G. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

**END OF SECTION**

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## SECTION 01 74 19

### CONSTRUCTION WASTE MANAGEMENT

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. Section includes: Administrative and procedural requirements for construction waste management activities.

##### 1.2 DEFINITIONS

- A. Construction, Demolition, and Land clearing (CDL) Waste: Includes all non-hazardous solid wastes resulting from construction, remodeling, alterations, repair, demolition and land clearing. Includes material that is recycled, reused, salvaged or disposed as garbage.
- B. Salvage: Recovery of materials for on-site reuse, sale or donation to a third party.
- C. Reuse: Making use of a material without altering its form. Materials can be reused on-site or reused on other projects off-site. Examples include, but are not limited to the following: Crushing or grinding of concrete for use as sub-base material. Chipping of land clearing debris for use as mulch.
- D. Recycling: The process of sorting, cleaning, treating, and reconstituting materials for the purpose of using the material in the manufacture of a new product.
- E. Source-Separated CDL Recycling: The process of separating recyclable materials in separate containers as they are generated on the job-site. The separated materials are hauled directly to a recycling facility or transfer station.
- F. Co-mingled CDL Recycling: The process of collecting mixed recyclable materials in one container on-site. The container is taken to a material recovery facility where materials are separated for recycling.
- G. Approved Recycling Facility: Any of the following:
  - 1. A facility that can legally accept CDL waste materials for the purpose of processing the materials into an altered form for the manufacture of a new product.
  - 2. Material Recovery Facility: A general term used to describe a waste-sorting facility. Mechanical, hand-separation, or a combination of both procedures, are used to recover recyclable materials.
- H. Universal waste components (UWC) are as follows: electric motors, PCB ballasts, non PCB ballasts, capacitors, contactors, circuit breakers, elemental and liquid mercury containing articles, transformers, lead acid batteries, fluorescent light bulbs, and all HID light bulbs.

##### 1.3 SUBMITTALS

- A. Contractor shall develop a Waste Management Plan: Submit 3 copies of plan within 14 days of date established for the **Notice to Proceed**.
- B. Contractor shall provide Waste Management Report: Concurrent with each Application for Payment, submit **3** copies of report.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General: Divert a minimum of **75%** CDL waste, by weight, from the landfill by one, or a combination of the following activities:
1. Salvage
  2. Reuse
  3. Source-Separated CDL Recycling
  4. Co-mingled CDL Recycling
- B. CDL waste materials that can be salvaged, reused or recycled include, but are not limited to, the following:
1. Acoustical ceiling tiles
  2. Asphalt
  3. Asphalt shingles
  4. Cardboard packaging
  5. Carpet and carpet pad
  6. Concrete
  7. Drywall
  8. Fluorescent lights and ballasts
  9. Land clearing debris (vegetation, stumpage, dirt)
  10. Metals
  11. Paint (through hazardous waste outlets)
  12. Wood
  13. Plastic film (sheeting, shrink wrap, packaging)
  14. Window glass
  15. Wood
  16. Field office waste, including office paper, aluminum cans, glass, plastic, and office cardboard.

#### 1.5 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED Accredited Professional, certified by the USGBC as waste management coordinator.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Conduct construction waste management activities in accordance with hauling and disposal regulations of all authorities having jurisdiction and all other applicable laws and ordinances.
- D. Preconstruction Conference: Schedule and conduct meeting at Project site prior to construction activities.
1. Attendees: Inform the following individuals, whose presence is required, of date and time of meeting.
    - a. Owner
    - b. Architect
    - c. Contractor's superintendent
    - d. Major subcontractors
    - e. Waste Management Coordinator

- f. Other concerned parties.
  2. Agenda Items: Review methods and procedures related to waste management including, but not limited to, the following:
    - a. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
    - b. Review requirements for documenting quantities of each type of waste and its disposition.
    - c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
    - d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
    - e. Review waste management requirements for each trade.
  3. Minutes: Record discussion. Distribute meeting minutes to all participants.  
Note: If there is a Project Architect, they will perform this role.
- 1.6 WASTE MANAGEMENT PLAN – Contactor shall develop and document the following:
- A. Develop a plan to meet the requirements listed in this section at a minimum. Plan shall consist of waste identification, waste reduction plan and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight throughout the plan.
  - B. Indicate anticipated types and quantities of demolition, site-cleaning and construction waste generated by the project. List all assumptions made for the quantities estimates.
  - C. List each type of waste and whether it will be salvaged, recycled, or disposed of in an landfill. The plan should included the following information:
    1. Types and estimated quantities, by weight, of CDL waste expected to be generated during demolition and construction.
    2. Proposed methods for CDL waste salvage, reuse, recycling and disposal during demolition including, but not limited to, one or more of the following:
      - a. Contracting with a deconstruction specialist to salvage materials generated,
      - b. Selective salvage as part of demolition contractor’s work,
      - c. Reuse of materials on-site or sale or donation to a third party.
    3. Proposed methods for salvage, reuse, recycling and disposal during construction including, but not limited to, one or more of the following:
      - a. Requiring subcontractors to take their CDL waste to a recycling facility;
      - b. Contracting with a recycling hauler to haul recyclable CDL waste to an approved recycling or material recovery facility;
      - c. Processing and reusing materials on-site;
      - d. Self-hauling to a recycling or material recovery facility.
    4. Name of recycling or material recovery facility receiving the CDL wastes.
    5. 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.

- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
1. Total quantity of waste.
  2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
  3. Total cost of disposal (with no waste management).
  4. Revenue from salvaged materials.
  5. Revenue from recycled materials.
  6. Savings in hauling and tipping fees by donating materials.
  7. Savings in hauling and tipping fees that are avoided.
  8. Handling and transportation costs. Including cost of collection containers for each type of waste.
  9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT, GENERAL

- A. Provide containers for CDL waste that is to be recycled clearly labeled as such with a list of acceptable and unacceptable materials. The list of acceptable materials must be the same as the materials recycled at the receiving material recovery facility or recycling processor.
- B. The collection containers for recyclable CDL waste must contain no more than 10% non-recyclable material, by volume.
- C. Provide containers for CDL waste that is disposed in a landfill clearly labeled as such.
- D. Use detailed material estimates to reduce risk of unplanned and potentially wasteful cuts.
- E. To the greatest extent possible, include in material purchasing agreements a waste reduction provision requesting that materials and equipment be delivered in packaging made of recyclable material, that they reduce the amount of packaging, that packaging be taken back for reuse or recycling, and to take back all unused product. Insure that subcontractors require the same provisions in their purchase agreements.
- F. Conduct regular visual inspections of dumpsters and recycling bins to remove contaminants.

3.2 SOURCE SEPARATION

- A. General: Contractor shall separate recyclable materials from CDL waste to the maximum extent possible.

Separate recyclable materials by type.

1. Provide containers, clearly labeled, by type of separated materials or provide other storage method for managing recyclable materials until they are removed from Project site.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water and to minimize pest attraction. Cover to prevent windblown dust.
3. Stockpile materials away from demolition area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from weather.

3.3 CO-MINGLED RECYCLING

- A. General: Do not put CDL waste that will be disposed in a landfill into a co-mingled CDL waste recycling container.

3.4 REMOVAL OF CONSTRUCTION WASTE MATERIALS

- A. Remove CDL waste materials from project site on a regular basis. Do not allow CDL waste to accumulate on-site.
- B. Transport CDL waste materials off Owner's property and legally dispose of them.
- C. Burning of CDL waste is not permitted.

3.5 UNIVERSAL WASTE DIVERSION

- A. Remove all universal waste from fixtures, panels, and related devices for proper diversion and reclamation.
- B. Store all universal waste in containers provided by contact person within facilities operations.
- C. Store all universal waste in a secured location and request periodic removal from assigned contact person.
- D. Exemption: electric motors, circuit breakers, transformers and lighting contactors are exempt from this provision provided the contractor chooses to salvage or reuse the components.
- E. No identified universal waste will be discarded into the waste stream.

**END OF SECTION**

<b>WASTE MANAGEMENT PROGRESS REPORT</b>				
<b>MATERIAL CATEGORY</b>	<b>DISPOSED IN MUNICIPAL SOLID WASTE LANDFILL</b>	<b>DIVERTED FROM LANDFILL BY RECYCLING, SALVAGE OR REUSE</b>		
		Recycled	Salvaged	Reused
1. Acoustical Ceiling Tiles				
2. Asphalt				
3. Asphalt Shingles				
4. Cardboard Packaging				
5. Carpet and Carpet Pad				
6. Concrete				
7. Drywall				
8. Fluorescent Lights and Ballasts				
9. Land Clearing Debris (vegetation, stumpage, dirt)				
10. Metals				
11. Paint (through hazardous waste outlets)				
12. Wood				
13. Plastic Film (sheeting, shrink wrap, packaging)				
14. Window Glass				
15. Field Office Waste (office paper, aluminum cans, glass, plastic, and coffee cardboard)				
16. Other (insert description)				
17. Other (insert description)				
<b>Total (In Weight)</b>		<b>(TOTAL OF ALL ABOVE VALUES – IN WEIGHT)</b>		
		<b>Percentage of Waste Diverted</b>	<b>(TOTAL WASTE DIVIDED BY TOTAL DIVERTED)</b>	

**SECTION 01 75 00**  
**STARTING AND ADJUSTING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Starting systems.
  - 2. Demonstration and instructions.
  - 3. Training session recording.

**1.2 STARTING SYSTEMS**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect and Owner seven days prior to start-up of each item. Contractor may direct subcontractor to “start systems” in order to prevent delay of project.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- G. Execute start-up in accordance with manufacturers' instructions.

**1.3 DEMONSTRATION AND INSTRUCTIONS**

- A. Demonstration and instructions to comply with requirements in Section 01 79 00 “Demonstration and Training”.
- B. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.

- C. Demonstrate Project equipment and instructed by a qualified manufacturers' representative who is knowledgeable about the Project.
- D. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
- F. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
- G. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

#### 1.4 TRAINING SESSION RECORDING

- A. Record demonstration and instruction sessions in accordance with requirements in Section 01 79 00 "Demonstration and Training".

PART 2 - PRODUCTS - Not Used.

PART 3 - EXECUTION - Not Used.

**END OF SECTION**

**SECTION 01 77 00**  
**CLOSEOUT PROCEDURES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Substantial Completion procedures.
  2. Final completion procedures.
  3. Warranties.
  4. Final cleaning.
  5. Repair of the Work.

**1.2 ACTION SUBMITTALS**

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

**1.3 CLOSEOUT SUBMITTALS**

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Close out checklist at end of this specification.

**1.4 MAINTENANCE MATERIAL SUBMITTALS**

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

**1.5 SUBSTANTIAL COMPLETION PROCEDURES**

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

- B. Submittals Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
  5. Submit test/adjust/balance records.
  6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
  2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  3. Complete startup and testing of systems and equipment.
  4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 "Demonstration and Training."
  6. Advise Owner of changeover in heat and other utilities.
  7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  9. Complete final cleaning requirements, including touchup painting.
  10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of **10** days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
  2. Results of completed inspection will form the basis of requirements for final completion.

#### 1.6 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 01 29 00 "Payment Procedures."
  2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

#### 1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization 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. MS Excel electronic file. Architect will return annotated file.
  - b. PDF electronic file. Architect will return annotated file.
  - c. Three paper copies. Architect will return two copies.

#### 1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. 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.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
  1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
  2. 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.
  3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
  4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
  - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. There should be no construction dust or debris upon completion. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. 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.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. 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.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.

- i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
- j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
- k. Remove labels that are not permanent.
- l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
- o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
- p. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 50 00 "Temporary Facilities and Controls" and Section 01 74 19 "Construction Waste Management and Disposal."

### 3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
  - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
  - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

### Closeout Document Checklist

**Project and Project Number:**

**Date:**

1. Form G704 Substantial Completion
2. Form G706 Affidavit of Payment of Debts and Claims
3. Form 706A Release of Liens Contractor / Subcontractor
4. Individual Contractor and Subcontractor Release and Waiver of Liens
5. Form 707 Consent of Surety Company
6. Copy of the Certified Final Payment Application (to be added after review/approval of close-out docs)
7. Design Review Summary's
8. Meeting Minutes (To be added by Architect)
9. Approved Product and Equipment Submittals, Tabbed by Specification No. (Include Architects approval stamp and comments)
10. Certificate of Occupancy
11. Environmental Certificates
12. Warranties ( Letter of Guarantee and Warranty Info)
13. Warranty (Subcontractor) Contact List
14. Operation, Maintenance, & Cleaning Requirements for all products and Equipment (Tabbed by specification)
15. Hard Copy of As-Built Drawings
16. 2 sets of Archive grade discs to include:
  - a. Updated as-built drawings and updated AutoCAD files
  - b. Copy of final specifications/Project Manual
  - c. Tabbed copy of all closeout documents
17. Test & Balancing Reports
18. Field Reports/Inspection Reports
19. Pest Control Final Inspection Report & Warranty (Slabs over 400SF)
20. Affidavit of Discharge of State Tax Liability
21. Copy of completed final punch list signed off on by Owner's Rep (By Architect)
22. Punch list Closeout Letter.
23. General Correspondence (To be added by Owner)

**Notes:**

- a. Organize the package using tabs per the above numbering sequence and include a "Table of Contents"
- b. The Contractor shall prepare the closeout package in binders of sufficient size and quality to contain the documentation and enough space for items to be added by the Architect, without being overloaded.
- c. All closeout documents are to include all documents listed above, unless identified by others, prior to submitting to the Architect for review and approval. The Architect shall verify that all items are

complete, and add those items required of the Architect for the Closeout documents. After approval of all closeout documents, Architect shall add copies of the certified application for payment to the package and archive disc. Once approved by the Architect, the package will be forwarded to the Owner.

- d. The above item 6. Indicates a copy of the final application is to be added. This is intended as a copy. The original should be forwarded to the A/E for certification separately from the closeout package. The final application will not be certified until all other closeout documents are complete and approved.
- e. The closeout package is an official submittal and is to be complete with all items above before submitting it to the Architect for review prior to being forwarded to the Owner.

**END OF SECTION**

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## SECTION 01 78 23

### OPERATION AND MAINTENANCE DATA

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

##### 1.2 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

##### 1.3 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  1. Architect and Commissioning Authority will comment on whether content of operations and maintenance submittals are acceptable.
  2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
  1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    - b. Enable inserted reviewer comments on draft submittals.
  2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

- C. Initial Manual Submittal: Submit draft copy of each manual at least **30** days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least **15** days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.
  - 1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within **15** days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

## PART 2 - PRODUCTS

### 2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
  - 1. List of documents.
  - 2. List of systems.
  - 3. List of equipment.
  - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

### 2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of

equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Name and contact information for Commissioning Authority.
8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
9. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
  - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
  - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
  - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
  - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
  1. Type of emergency.
  2. Emergency instructions.
  3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  1. Fire.
  2. Flood.
  3. Gas leak.
  4. Water leak.
  5. Power failure.
  6. Water outage.

7. System, subsystem, or equipment failure.
  8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
  2. Shutdown instructions for each type of emergency.
  3. Operating instructions for conditions outside normal operating limits.
  4. Required sequences for electric or electronic systems.
  5. Special operating instructions and procedures.

## 2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  2. Performance and design criteria if Contractor has delegated design responsibility.
  3. Operating standards.
  4. Operating procedures.
  5. Operating logs.
  6. Wiring diagrams.
  7. Control diagrams.
  8. Piped system diagrams.
  9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
  2. Manufacturer's name.
  3. Equipment identification with serial number of each component.
  4. Equipment function.
  5. Operating characteristics.
  6. Limiting conditions.
  7. Performance curves.
  8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.

2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
  5. Instructions on stopping.
  6. Normal shutdown instructions.
  7. Seasonal and weekend operating instructions.
  8. Required sequences for electric or electronic systems.
  9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## 2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
  2. Manufacturer's name.
  3. Color, pattern, and texture.
  4. Material and chemical composition.
  5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
  2. Types of cleaning agents to be used and methods of cleaning.
  3. List of cleaning agents and methods of cleaning detrimental to product.
  4. Schedule for routine cleaning and maintenance.
  5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  1. Standard maintenance instructions and bulletins.
  2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  3. Identification and nomenclature of parts and components.
  4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  1. Test and inspection instructions.
  2. Troubleshooting guide.
  3. Precautions against improper maintenance.
  4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  5. Aligning, adjusting, and checking instructions.
  6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
  1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

## PART 3 - EXECUTION

### 3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
  - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
  2. Comply with requirements of newly prepared record Drawings in Section 01 78 39 "Project Record Documents."
- G. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

**END OF SECTION**

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**SECTION 01 78 39**  
**PROJECT RECORD DOCUMENTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

**1.2 CLOSEOUT SUBMITTALS**

**A. Record Drawings: Comply with the following:**

**1. Number of Copies: Submit copies of record Drawings as follows:**

**a. Initial Submittal:**

- 1) Submit PDF electronic files of scanned record prints and one of file prints.
- 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

**b. Final Submittal:**

- 1) Submit PDF electronic files of scanned record prints and three set(s) of prints.
- 2) Print each drawing, whether or not changes and additional information were recorded.

**B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.**

**C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.**

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

**D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.**

- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

## PART 2 - PRODUCTS

### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible, but no greater than a week, after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding archive photographic documentation.
    - f. Electronic copies of marked-up paper copies are to be submitted with each Payment Application in accordance with Section 01 29 00 "Payment Procedures".
  - 2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Construction Change Directive.
    - k. Changes made following Architect's written orders.
    - l. Details not on the original Contract Drawings.
    - m. Field records for variable and concealed conditions.
    - n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Format: Annotated PDF electronic file with comment function enabled.
  3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
  4. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect.
    - e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
  5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file.

## 2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  - 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as annotated PDF electronic file.
  - 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

## 2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.
  - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

## PART 3 - EXECUTION

### 3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

**END OF SECTION**

**SECTION 01 79 00**  
**DEMONSTRATION AND TRAINING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

**A. Section Includes:**

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.

**1.2 INFORMATIONAL SUBMITTALS**

**A. Instruction Program:** Submit outline of instructional program for demonstration and training, including a list of training modules and 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. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

**B. Qualification Data:** For instructor and videographer.

**C. Attendance Record:** For each training module, submit list of participants and length of instruction time.

**D. Evaluations:** For each participant and for each training module, submit results and documentation of performance-based test.

**1.3 CLOSEOUT SUBMITTALS**

**A. Demonstration and Training Video Recordings:** Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:
  - a. Name of Project.
  - b. Name and address of videographer.
  - c. Name of Architect.
  - d. Name of Construction Manager.
  - e. Name of Contractor.

- f. Date of video recording.
  2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
  3. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disk.
- B. Demonstration and Training Video Recordings to be provided for the following systems:
1. Air Handling Units
  2. Building Automation System
  3. Door Hardware
  4. Fire Alarm
  5. Lighting Controls
  6. Security System
  7. Automatic Opening Doors and Hardware
  8. Vehicle Gate Operators
  9. Emergency Generator/ATS Operation
  10. Snow melt systems
  11. Boiler Operation/Maintenance
  12. Elevators
  13. Chiller/Cooling system
  14. Wall Clocks that are tied into the system
  15. Clock on tower of exterior of the building

#### 1.4 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 Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- D. Pre-instruction 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 demonstration and training including, but not limited to, the following:
  1. Inspect and discuss locations and other facilities required for instruction.

2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

## 1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel. Instruction is to occur during normal business hours. Allow for one or two make-up sessions for personnel unable to attend original training session.
- 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

### 2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- 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 as applicable to the system, equipment, or component:
  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 messages.
  - b. Instructions on stopping.
  - c. Shutdown instructions for each type of emergency.
  - d. Operating instructions for conditions outside of 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

#### 3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

#### 3.2 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. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
  2. Owner will furnish an instructor to describe Owner's operational philosophy.
  3. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  1. Schedule training with Owner with at least seven days' advance notice.

- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral performance-based test.
- F. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

### 3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
  - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video: Provide minimum 640 x 480 video resolution converted to .mp4 format file type, on electronic media.
  - 1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
  - 2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
  - 3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
  - 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
    - a. Name of Contractor/Installer.
    - b. Business address.
    - c. Business phone number.
    - d. Point of contact.
    - e. E-mail address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
  - 1. Film training session(s) in segments not to exceed 15 minutes.
    - a. Produce segments to present a single significant piece of equipment per segment.

- b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
  - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
- 1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
- F. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

**END OF SECTION**

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## SECTION 01 83 16

### EXTERIOR ENCLOSURE GENERAL REQUIREMENTS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes: Administrative procedures, common criteria, and supporting Work required for construction of exterior enclosure in compliance with design intent and indicated criteria as follows
1. Performance and design requirements for exterior building enclosure, comprising components enumerated in Systems Description article in Part 2 of this Section.
  2. Coordination of Work required to complete the Exterior Enclosure.
- B. Related Requirements: Refer to individual sections throughout the Project Manual and particularly in Divisions 03 through 13 for work required for each individual material, system or element in addition to the requirements contained herein.
1. Section 01 43 25 Exterior Enclosure On site Performance Mockup for mockup construction and testing requirements.
  2. Section 01 45 25 Exterior Enclosure Testing Services for field testing of the enclosure.

##### 1.2 REFERENCES

- A. Definitions:
1. Unless specifically defined in the contract documents terms shall be as defined in the AIA Building Performance Knowledge Community Website "Definitions for Building Performance".  
  
[https://www.aia.org/pages/6314361-definitions-for-building-performance?utm\\_source=real-magnet&utm\\_medium=email&utm\\_campaign=kc20-dynamic-9-november](https://www.aia.org/pages/6314361-definitions-for-building-performance?utm_source=real-magnet&utm_medium=email&utm_campaign=kc20-dynamic-9-november)
  2. Pressure-equalized Rain Screen (PER) System: A design concept for limiting water penetrations by addressing all forces which can drive water through a wall.
    - a. The wall must consist of an outer layer (the rain screen) and an inner layer (the air barrier) with a weeped and vented cavity between.
    - b. Gravity pulling water down and kinetic energy (wind-driven rain) shall be resisted at joints in the rainscreen with shingled overlaps, downward sloped surfaces and upstand legs.

- c. Open joints are not allowed.
  - d. Upstand legs at the line of the air barrier or where there is no drained cavity behind the upstand leg shall have a height equivalent to minimum one half the total static head for the pressure indicated for water penetration. Note that upstand legs not in pressure-equalized systems shall be high enough to resist the total static head for the pressure indicated for water penetration.
  - e. Capillarity shall be resisted at joints with breaks or cavities of sufficient size.
  - f. Surface tension shall be resisted at joints by drips.
  - g. Pressure differentials driving water through joints or openings shall be eliminated or substantially minimized by creating pressure equalization chambers between the rainscreen and the air barrier. Chambers shall be limited in size to address external pressure differentials across the façade.
  - h. Under ideal situations, no water should penetrate past the rainscreen, however, incidental water penetration shall be anticipated in the pressure-equalization cavity and therefore the cavity shall be designed to be waterproof and to harmlessly convey any water penetration to the exterior.
  - i. Refer to AAMA CW-RS-1 Rain Screen Principle and Pressure Equalization for further information.
  - j. Wall Panel Assemblies that pass AAMA 508 testing are PER
3. Back-Ventilated Drained Cavity (BVDC) Systems: A design concept for limiting water penetrations through a redundant, multi-layered water-resistant approach.
- a. The wall must consist of an outer layer and an inner layer (the weather barrier) with a weeped cavity between.
  - b. Weeped cavity shall be at least 3/8" wide, unless otherwise indicated.
  - c. Gravity pulling water down and kinetic energy (wind-driven rain) shall be resisted at joints in the outer layer with shingled overlaps, downward sloped surfaces and upstand legs.
  - d. Open joints are not allowed.
  - e. Upstand legs shall be high enough to resist the total static head for the pressure indicated for water penetration.
  - f. Capillarity shall be resisted at joints with breaks or cavities of sufficient size.
  - g. Surface tension shall be resisted at joints by drips.
  - h. Under ideal situations, no water should penetrate past the outer layer, however, incidental water penetration shall be anticipated in the drainage cavity and therefore the cavity shall be designed to be waterproof and to harmlessly convey any water penetration to the exterior.
  - i. Wall Panel Assemblies that pass AAMA 509 testing at minimum V-7 and Maximum M-3 are accepted as a BVDC systems
4. Water penetration, uncontrolled water or leak: Appearance of water on an interior surface of any part of Work or water that has bypassed the inner weather barrier or air barrier as described in construction documents or submittals.

- a. Architect may elect to accept appearance of water on an interior surface if all criteria listed are met. Failure of any single criteria will be defined as water penetration.
  - 1) Surface is unharmed by water, such as aluminum or stainless steel.
  - 2) Volume of leak creates a puddle less than approximately 4 square inches
  - 3) Water does not run off or drip from any unharmed surface to another surface.
  - 4) Water shall not splash onto surfaces harmed by water.
  - 5) No more than two puddles as defined shall be permitted per each 100 square feet of wall surface tested.
  - 6) Leaks do not occur at similar locations which may indicate a systemic concern.
5. Oil Canning: Deformation or lack of flatness visible in the surface of metal products in the Finished Work when viewed from any angle or height under normal natural light conditions between 2 hours after sunrise and 2 hours before sunset from a distance of 10 feet away from plane of metal product at ground level except from a distance of 3 feet away for metal products visible on the interior of the building, at building entrances, , or other locations where people commonly come into close contact.
6. Surface Visual Uniformity: Color, texture, smoothness, flatness, reflectivity and all other visual criteria for uniformity shall be maintained within limits so that no variation is visible in the Finished Work when viewed from any angle or height under normal natural light conditions between 2 hours after sunrise and 2 hours before sunset from a distance of 10 feet away from plane of Finished Work at ground level except from a distance of 3 feet away viewed from closest walking surface for surfaces visible on the interior of the building, at building entrances, at balconies, at decks, at plazas, or other locations where building users or public commonly come within 10 feet as determined solely by the Architect.
  - a. Samples and Work shall be evaluated under the same criteria indicated above.
  - b. Range limits: Where a range of surface aesthetic criteria is inherent to the product, then uniformity shall be judged by comparing the range Samples under similar circumstances as indicated above.
7. Normal Natural Light: Any lighting conditions ranging from cloudy to clear, sun up to sun down.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Comply with the requirements of Division 1 and the following additional items related directly to the exterior enclosure.
- B. Coordination: Comply with requirements specified in Division 01 Section 01 31 00 "Project Management and Coordination."

1. Coordination: Coordinate Work specified in individual Specification Sections that is required to complete exterior enclosure, including but not limited to:
  - a. Sequence the installation of overlapping layers of work required within the scope of work of one Section or of multiple Sections.
  - b. Ensure that submittals for individual sections are coordinated with the submittals of sections for adjacent, underlying or overlying work of other Sections.
  - c. Ensure that selections allowed within individual Sections are compatible when combined with selections allowed in other Sections.
  - d. Certifications: When requested by Architect, submit certification from manufacturers involved for appropriateness and compatibility of their products for uses indicated. Certifications shall address, but not be limited to, the following coordination issues between the work specified in various Sections:
    - 1) Compatibility of materials and product which are in contact.
    - 2) Isolation of dissimilar metals to avoid electrolytic action.
    - 3) Compatibility of adhesives with substrates.
    - 4) Compatibility of sealants with substrates.
    - 5) Compatibility of sealants with other sealants which may come into contact.
    - 6) Isolation or compatibility of anchors with attached materials.
- C. Coordination of Enclosure Related Submittals: Coordinate preparation and processing of submittals included in the scope of the work for the exterior enclosure with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
  1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that requires sequential activity.
  2. Coordinate transmittal of different types of submittals for related elements of Work so processing shall not be delayed by need to review submittals concurrently for coordination.
  3. Ensure that all submittals required in an individual Specification Section together as a single package for simultaneous review, unless otherwise indicated.
    - a. With each submission, attach a copy of the list of required submittals from the applicable specification sections and indicate that each is included in the submittal package.
    - b. Phased submissions of shop drawings only shall be allowed if indicated in the CM's Submittal Schedule.
  4. Ensure that each preparer of Shop Drawings has access to the most current Shop Drawing for adjacent work.
  5. Ensure that each Shop Drawing includes accurate depiction of adjacent construction based on current submittals for the adjacent work.

6. When Coordination Drawings are required, complete Coordination Drawings before submittal of Shop Drawings related to affected Work.
  7. When mock-ups are required, submittals for all products used in mock-ups shall be coordinated with schedule for mock-up construction.
  8. Architect reserves right to withhold action on a submittal requiring coordination.
  9. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
  10. Evidence of Coordination: Contractor shall indicate on submittals at a minimum the following information indicating coordination. The following list shall not limit the contractor's requirement to coordinate the work, but shall serve as an indication of that coordination.
    - a. Where the preparer of submittal notes "BY OTHERS", "NOT IN CONTRACT" or other similar language describing the scope of sub-contractor work or otherwise indicates the division of work between various vendors, installers, and manufacturers; annotate each such note with the name of the party to whom the work has been assigned.
    - b. Each dimension checked or coordinated shall be ticked off, circled, highlighted, yellowed-out or otherwise marked to indicate checking if the dimension is not changed.
    - c. Where Coordination Drawings are required for the scope of work included in the submittal, indicate the Coordination Drawing number corresponding to each plan and detail in the shop drawings.
  11. Architect reserves right to return submittals without review if there are no marks on submittal indicating Contractor's review.
- D. Exterior Enclosure Coordination Drawings: Prepare and submit for approval Coordination Drawings for the entire scope of the exterior enclosure as indicated herein.
1. Source of Exterior Enclosure Coordination Drawings:
    - a. If shop drawings submitted as part of the requirements of individual Specification Sections in the opinion of the Architect are sufficient to show the coordination of all components of the exterior enclosure, then those shop drawings may be considered as Coordination Drawings. Identify the specific Section for which submittals are intended to serve as Coordination Drawings.
    - b. If submittals of individual sections do not adequately convey coordination then submittal of coordination drawings as required herein shall be required.
    - c. Mock-up Drawings may be used for Coordination Drawings to extent of situations covered, but additional Coordination Drawings shall be provided as required to document coordination as determined by Architect.
  2. Coordination Drawings shall include, but not limited to, the following:

- a. Continuity Details: Show how provisions for control of heat, air, water and vapor penetration are maintained across, for example, multiple materials, assemblies and systems specified in various Sections.
  - b. Each element of work shown on the coordination drawings shall be the actual shop drawing profiles of that work. Use of the architectural drawings to show parts of the work is not acceptable.
  - c. Show exact relationships of elements specified in various Sections in the coordination drawings.
  - d. Show method of support or anchorage of work one section to work of another section.
  - e. Show loads imposed on one (1) work of one section by the work of another Section.
  - f. Show similar level of detail as required for the individual components included in the Coordination Drawing.
- E. Exterior Enclosure Coordination Workshop: Convene a meeting to coordinate Work related to exterior enclosure.
1. Schedule meeting prior to submittals for any portion of exterior enclosure.
    - a. Architect reserves the right to reject submittals of work from individual sections that are required to be coordinated in this workshop until workshop has been completed.
  2. Location of Meeting: Project Field Office of Contractor.
  3. Duration: Allow full day.
  4. Conduct meeting per requirements of Division 1.
  5. Notify Architect minimum one (1) week in advance.
  6. Attendance: In addition to managers, directors or executives for each category below, include appropriate field superintendents, foremen, and others trade workers who will be involved in actual construction.
    - a. Architect.
    - b. CM and Contractor's Representative.
    - c. Subcontractors and installers of exterior enclosure work.
    - d. Subcontractors and installers of substrates to which exterior enclosure work is applied.
    - e. Manufacturer's Technical Representatives for exterior enclosure work as indicated in individual Specification Sections.
    - f. Independent Testing and Inspection Agency representatives
    - g. CM, Contractor and sub-contractor Quality Control supervisors.
    - h. Others as appropriate.
  7. Suggested Agenda related to exterior enclosure and mock-ups:
    - a. Review requirements of Drawings and Specifications related to exterior enclosure.
    - b. Review requirements for coordination.

- c. Review progress for indicated mock-ups.
  - d. Review requirements for Submittals.
  - e. Review of Quality Control Programs.
  - f. Field observations, problems, conflicts anticipated.
  - g. Review of off Project Site fabrication, Delivery Schedules.
  - h. Coordination of schedules, deliveries and long lead items.
  - i. Review and coordinate interface of different systems.
  - j. Review and coordinate relationship of tolerances of different systems.
  - k. Maintenance of quality standards.
  - l. Review effect on portions of Work.
  - m. Other business.
- F. Exterior Enclosure Preinstallation Coordination Meetings: Conduct conference in accordance with requirements specified in Division 01 Section 01 31 00“Project Management and Coordination” and the following:
- 1. Schedule meeting after erection of mock-up back-up wall but before any other portion of exterior enclosure is installed.
  - 2. Duration: Allow half day
  - 3. Notify Architect minimum one (1) week in advance.
  - 4. Attendance: In addition to managers, directors or executives for each category below, include appropriate field superintendents, foremen, and others trade workers who will be involved in actual construction.
    - a. Architect.
    - b. CM and Contractor's Representative.
    - c. Subcontractors and installers of exterior enclosure work.
    - d. Subcontractors and installers of substrates to which exterior enclosure work is applied.
    - e. Suppliers of materials for exterior enclosure work.
    - f. Manufacturer's Technical Representatives for exterior enclosure work as indicated in individual Specification Sections.
    - g. Independent Testing and Inspection Agency representatives
    - h. Others as appropriate.
  - 5. Suggested Agenda related to exterior enclosure and mock-ups:
    - a. Review requirements of Drawings and Specifications related to exterior enclosure.
    - b. Review requirements for coordination.
    - c. Review Submittals.
    - d. Field observations, problems, conflicts anticipated.
    - e. Coordination of schedules, deliveries and long lead items.
    - f. Review and coordinate interface of different systems.
    - g. Review criteria and procedures for acceptance of substrates and structures to which work will be applied.
    - h. Review and coordinate relationship of tolerances of different systems.
    - i. Maintenance of quality standards.
    - j. Review of Quality Control Programs

- k. Review required Testing and Inspection
  - l. Review effect on other portions of Work.
  - m. Other business.
- G. Scheduling: Schedule work to allow for proper coordination of the various parts of the exterior enclosure to come together on the project in a manner to provide for compliance with requirements of the contract documents. Sequence Work of exterior enclosure to ensure proper completion of water, air and vapor barriers prior to being covered by subsequent Work and to allow installation of Work as required to conform to design intent and specified criteria.
- 1. Schedule Work to allow for:
    - a. Submissions, and resubmissions of pre-qualification data and required data for mock-up.
    - b. Construction of mock-up.
    - c. Testing of mock-up.
    - d. Modifications and retesting of mock-up.
    - e. Approval of mock-up.
    - f. Submittals, resubmittals and approval of required data for remaining enclosure Work or revisions to previously approved submissions if required to coordinate with final approved conditions in mock-up.
    - g. Installation of work included in the scope of the mockup.
      - 1) Installation of back up wall, sheathing, and air and weather barriers beyond the scope of the mockup may proceed prior to mock up approval.
- H. Sequencing: Sequence Work of exterior enclosure to ensure proper completion of water, air and vapor barriers prior to being covered by subsequent Work and to allow installation of Work as required to conform to design intent and specified criteria.
- 1. Sequence work to allow for specified inspections by Architect, manufacturer representative or third party inspector.
  - 2. Installers may be required to make multiple passes over the same area to complete the work. No claims for extra cost will be recognized based on supposed "out-of-sequence" work or having to work on the same area multiple times in the same day or on multiple days.

#### 1.4 ACTION SUBMITTALS

- A. General: Comply with requirements specified for Action Submittals in Division 01 Section 01 33 00 "Submittal Procedures." Submittal requirements specified in this article are in addition to those specified in the individual Specification sections in which each component of the overall exterior enclosure is specified.

## 1.5 INFORMATIONAL SUBMITTALS

### A. Preconstruction Mockup Submittals:

1. Photographs/Videographs: Comply with requirements specified in Division 01 Section 01 32 00“Construction Progress Documentation” and the following.
  - a. Take a minimum of 30 high definition photographs and 1 hour of videography each day mock-up is being erected, tested, repaired or other similar work is underway.
  - b. Submit 3 CD files.
2. Record Drawings: Submit record drawings of preconstruction mockups prepared by preconstruction testing agency. Comply with requirements specified in Division 01 Section 01 78 39“Project Record Documents.”

### B. Record Performance Mockup Shop Drawings: Resubmit Shop Drawings with clearly identified changes made during erection of mockup and during testing necessary to successfully complete testing and comply with indicated requirements

### C. Coordination Drawings:

### D. Certifications

### E. Quality Control Program: Submit the following:

1. Enclosure Quality Control Program
2. Monthly reports: Assembly and submit together monthly the daily reports with photographs and deficiencies log.

## 1.6 QUALITY ASSURANCE

### A. Mockup and Preconstruction Testing: As specified in Section 01 43 25.

### B. Certifications:

1. Use and Compatibility Certification: Certify that materials are appropriate for indicated use and that substrates and adjacent materials are compatible.
2. Certify installer qualifications.
3. Certify single source responsibility.
4. Certify acceptance of products manufactured by others.
5. Certify that enclosure systems comply with specified requirements.
6. Certify that the system represented in the shop drawings and other submittals will result in, if installed as detailed, performance substantially the same as it did in the tests on which the manufacturer bases their predictions of performance for air and water resistance, thermal performance, condensation resistance, structural capacity and other salient performance criteria in compliance with the Contract Documents. Include the primary products, all accessories, interface and

anchorage to adjacent construction and all other work of this section included in the submittals.

- C. Product Options: Information on Drawings and in Specifications establishes requirements for assemblies' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- D. Construction Manager's Enclosure Quality Control Program: Establish and administer a quality control program to ensure compliance with requirements. Quality Control Program shall incorporate the Quality Control programs required in the technical specifications.
1. Assign a Quality Manager to the project. Quality Manager shall be experienced in construction and quality programs.
  2. Document each aspect of quality control plan, including statistical data regarding compliance to tolerances and indicated requirements.
  3. Determine frequency of each type of inspection and checking, unless otherwise indicated. Document measurements, counts, and other quantitative checking. Frequency shall be adequate to provide statistically significant sampling.
  4. Provide adequate tools, measuring devices and equipment at plants and on site required to verify compliance.
  5. Inspect and check at each phase of Work for compliance with requirements including, but not limited to, the following:
    - a. Checking of raw materials, products, and pre-fabricated work upon delivery to site.
    - b. Inspection of substrates before start of overlying work.
    - c. Verification that sub-contractors are working from approved submittals.
    - d. Checking that certified units are properly marked or labeled.
    - e. Checking substrates for preparation, cleaning, and priming.
    - f. Checking of each phase of installation.
    - g. Checking cleaning and temporary protection.
  6. Document and record each step of process.
    - a. Prepare daily enclosure quality control reports including but not limited to the following:
      - 1) Document trades at site and the work underway.
      - 2) Document acceptance or required repairs of substrates and structures before covering with overlying work based on required examinations/inspections.

- 3) Document verification of compliance with indicated tolerances for the work installed that day.
- 4) Document that approved submittals are available on site and are being used by installers.
- 5) Document events affecting quality.
- 6) Report independent testing completed.
- 7) Document weather conditions and temporary controls so weather does not damage the Work.

b. Maintain a Deficiencies Log:

- 1) Document deficiencies identified by Quality Control program.
- 2) Included deficiencies and action items identified by Owner and Architect.
- 3) Include verification that the deficiencies have been corrected before being covered. Coordinate with photographic documentation.

c. Photographs/Videographs: Comply with requirements specified in Division 01 Section "Photographic Documentation" and the following.

- 1) Take a minimum of 12 high definition photographs and 1/2 hour of videography each day enclosure work is underway.
- 2) Record areas of work that will be covered with overlying construction in the next day.
- 3) Submit 3 CD files.

## 1.7 DELIVERY STORAGE, AND HANDLING

- A. Comply with requirements specified in Division -01 Section "Product Requirements."
- B. Protect prefinished surfaces with wrapping or strippable coating. Do not use adhesives which bond or leave a residue.
- C. Ship and store under conditions which will not have a deleterious effect on the finished work. Comply with written instructions of product manufacturers.
- D. Protect during shipping and storing to eliminate water from standing in locations which are not designed to hold standing water in the installed position.
- E. Protect surfaces designed for interior exposure in the finished work from exposure to the weather.
- F. Protect from weather and soiling during shipping and storing with tarps, wraps, or other covering.

## 1.8 FIELD CONDITIONS

- A. Field Measurements: Where practical or necessary for the final fitting at atypical intersections, verify actual locations of structural supports and adjacent construction by field measurements before fabrication and indicate measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified in individual technical specification sections.
- B. Exterior Glazed Aluminum Curtain Wall, and Aluminum Windows, shall be designed as a Pressure-Equalized Rainscreen system as defined above and shall be constructed in compliance with the requirements indicated.
- C. Exterior wall assemblies not identified as a PER are designed as Back Ventilated Drained Cavity Systems as defined above and shall be constructed in compliance with the requirements indicated with the exception of architectural precast concrete in the parking garage only.
- D. The building enclosure shall be able to perform as indicated for mockup testing and field testing as indicated in Sections 014325 and 014525.
- E. Structural Loads:
  - 1. Cladding and Component loads per the ASCE 7 table included in the Structural drawings sheet S100.
  - 2. Contractor and Delegated Design Engineer's option to use Ultimate Strength or Allowable Stress values but either one shall be used consistently through all calculations and shall be identified in calculations.
  - 3. Deflection limits are included in individual technical specifications.
  - 4. Maintenance Loads: 300 pounds at any one square foot area more than 45 degrees off vertical applied independently of other loading criteria. Deflection shall be limited to not result in the permanent set or to reach inelastic limits of materials.
  - 5. Snow Loads: Determined per building code and as noted on structural drawings.

### 2.2 SYSTEMS DESCRIPTION

- A. Exterior building enclosure, comprising all materials and systems required to comply with the criteria indicated including but not limited to the following components: Include all accessory materials specified with the primary material or system listed.

1. Foundation, slab-on-grade and elevated waterproofing, insulation and vapor barriers.
2. Facades and Vertical Enclosure Components:
  - a. Concrete, either exposed to the exterior or providing back-up to overlying construction exposed to the exterior.
  - b. Unit masonry, either exposed to the exterior or providing back-up to overlying construction exposed to the exterior.
  - c. Cast stone.
  - d. GFRC.
  - e. Aluminum plate cladding.
  - f. Insulated metal panel cladding
  - g. Cold Formed Metal Framing supporting exterior enclosure elements.
  - h. Sheathing.
  - i. Air/Moisture Barriers.
  - j. Flashing, sheet metal, vents, weeps, flashing and trim.
  - k. Insulation.
  - l. Sealants, joint fillers, joint covers, and gaskets.
  - m. Curtain wall and Glazing.
  - n. Glazed aluminum Doors and Entrances.
  - o. Aluminum Windows
  - p. Hollow Metal Exterior doors.
  - q. Overhead Coiling Doors
  - r. Exterior louvers.
  - s. Metal roof screens.
  - t. Copings and roof edge flashing.
  - u. Exterior Expansion Joint Covers
  - v. Structural elements required to support enclosure.
  - w. Anchors, inserts, brackets, clips and braces required to attach enclosure to structural elements.
  - x. Anchors, inserts, brackets, clips and braces required to attach other work to the enclosure or through the enclosure to underlying structural elements including but not limited to handrail brackets, sign brackets, and other miscellaneous supports.
3. Low-slope roofing systems.
4. Components of the Maintenance Safety Equipment which penetrate the roof.
5. Components of the mechanical, electrical, plumbing, life safety, alarm, sprinkler or other systems which penetrate wholly or partially through the exterior enclosure.
6. Connection between the various exterior building enclosure elements as required to maintain the specified performance criteria for both.

## 2.3 MATERIALS, NOT USED

## 2.4 FABRICATION

- A. Fabrication of work is typically specified in individual technical sections. This article specifies fabrication requiring work of multiple sections.
- B. Continuity: Fabricate to ensure continuity between work of various sections to ensure compliance with performance criteria and to control infiltration of heat, air or moisture.
  - 1. Maintain internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within exterior enclosure to building exterior.
- C. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.5 FABRICATION TOLERANCES

- A. General: Comply tolerances indicated for installed work or with more stringent tolerances if required to:
  - 1. Match approved Samples and Mock-ups.
  - 2. Comply with performance criteria.
  - 3. Comply with manufacturer's written instructions.
  - 4. Align with other supported or adjacent Work with more stringent tolerances.

## 2.6 SOURCE QUALITY CONTROL

- A. Perform quality-control procedures including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and underlying structure, slab edges, and other areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the overlying Work before starting installation.
- B. Record inspection, parties present and required rework in the Construction Manager's Enclosure Quality Control Program.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Installation of work is typically specified in individual technical sections.
- B. Where work of various sections comes together, install for indicated performance of all assemblies and the joint.

### 3.3 ERECTION TOLERANCES

- A. General: Comply with more stringent tolerances than those listed below, if required to:
  - 1. Match approved Samples and Mock-ups.
  - 2. Comply with performance criteria.
  - 3. Comply with manufacturer's written instructions.
  - 4. Align with other supported or adjacent Work with more stringent tolerances.
  - 5. Allow for proper operation of doors, louvers or other moving parts.
- B. Erection Tolerances: Install so that surfaces exposed in the finished work comply with the following non-accumulating maximum tolerances:
  - 1. Plumb, level and plan location: Limit variation for plane, edge or line as follows:
    - a. For surfaces within 10 feet of ground level or for surfaces visible on the interior of the building, at building entrances, at balconies, at decks, at plazas, or other locations where people are allowed to come into close contact: 1/8 inch in 10 feet.
    - b. For exterior surfaces not included above: 1/4" inch in 10 feet.
  - 2. Alignment: For edges, lines or surfaces within 10 feet of ground level or for surfaces visible on the interior of the building, at building entrances, at balconies, at decks, at plazas, or other locations where people are allowed to come into close contact.
    - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/32 inch for interior and 1/16 inch for exterior exposure.
    - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/16 inch for interior and 1/8 inch for exterior exposure.
    - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 3/16 inch.
  - 3. Alignment: For exterior edges, lines or surfaces not included above.

- a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/8 inch.
  - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 3/16 inch for exterior exposure.
  - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
4. Location: Limit local variation from idealized line or point location to 1/8 inch plus or minus at surfaces within 10 feet of ground level, or for surfaces visible on the interior of the building, at building entrances, at balconies, at decks, at plazas, or other locations where people are allowed to come into close contact. Limit local variation from idealized line or point to 1/2" plus or minus in all other locations.
5. Joint Size and Variation: For surfaces within 10 feet of ground level or for surfaces visible on the interior of the building, at building entrances, at balconies, at decks, at plazas, or other locations where people are allowed to come into close contact.
- a. Parallel sides of joints shall not vary in width by more than 25% plus or minus of their nominal width.
  - b. Joint sides shall not be out of parallel by more than 15% of their nominal width in any story or 12 feet horizontal.
  - c. Edges of joints at intersections shall comply with requirements for "Alignment" indicated above.
6. Joint Size and Variation: For surfaces not included above.
- a. Parallel sides of joints shall not vary in width by more than 40% plus or minus of their nominal width.
  - b. Joint sides shall not be out of parallel by more than 25% of their nominal width in any story or 12 feet horizontal.
  - c. Edges of joints at intersections shall comply with requirements for "Alignment" indicated above.
7. Limit maximum width of a hairline joint as follows:
- a. For surfaces within 10 feet of ground level or for surfaces visible on the interior of the building, at building entrances, at balconies, at decks, at plazas, or other locations where people are allowed to come into close contact: 0.020 inch.
  - b. Surfaces not included above: 0.050 inch.
8. Limit maximum variation in width of a hairline joint as follows:
- a. For surfaces within 10 feet of ground level or for surfaces visible on the interior of the building, at building entrances, at balconies, at decks, at plazas, or other locations where people are allowed to come into close contact: 0.005 inch.

- b. Surfaces not included above: 0.020 inch.
- 9. Limit difference in diagonal measurements to 1/8 inch across typical curtain wall unitized panels or not to exceed .008" per 12" elsewhere.
- 10. Control flatness of metal surfaces to eliminate oil-canning as defined above. Flatness shall be measured as a ratio of deviation from a straight edge(d) between any two high points (l). Ratio d/l shall not exceed 500.
- 11. Control finished surfaces to maintain visual uniformity as defined above.
- 12. Limit patching or repair of masonry veneer or stone to not more than 1% of the surface area or linear edge dimension. If damages exceed 1% of the surface area or 1% of the linear edge dimension, then replace panel in whole.

### 3.4 FIELD QUALITY CONTROL TESTING

- A. Coordinate with Testing Agency specified in other sections to schedule tests and to provide proper access to testing area.
- B. Provide miscellaneous work required to isolate areas of Field Testing from adjacent work including but not limited to air and water tight dividers in drainage cavities.
- C. Do not cover work with interior finishes not required for the weatherproof enclosure until testing is completed. Remove and replace if covered before testing.

### 3.5 WASTE MANAGEMENT

- A. Separate and dispose of waste in accordance with the Project's Waste Management Plan under Section 01 74 19.

**END OF SECTION**

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## SECTION 01 91 13

### GENERAL COMMISSIONING REQUIREMENTS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Section 01 31 00 – Project Management and Coordination:
  - 1. To introduce commissioning and refers to this Section
- B. Section 01 77 00 - Closeout Procedures:
  - 1. Which defines substantial completion and functional completion, relative to commissioning.
- C. Section 01 79 00-Demonstration and Training:
  - 1. Which defines demonstration and training procedures, relative to commissioning.
- D. Section 21 08 00 - Commissioning of Fire Protection Systems:
  - 1. For commissioning process activities for fire protection systems, equipment and components.
- E. Section 22 08 00 - Commissioning of Plumbing Systems:
  - 1. For commissioning process activities for plumbing systems, assemblies, equipment and components.
- F. Section 23 08 00 - Commissioning of HVAC Systems:
  - 1. For commissioning activities for HVAC&R systems, assemblies, equipment and components.
- G. Section 26 08 00 - Commissioning for Electrical Systems:
  - 1. For commissioning process activities for integrated automation systems, assemblies, equipment and components.

##### 1.2 SUMMARY

- A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies or components.
  - 1. Commissioning is a systematic process to verify that all building systems perform interactively according to the design intent and the Owner's operational needs. This is achieved by beginning in the design phase and documenting design intent and continuing through construction, acceptance and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation,

equipment startup, control system calibration, testing and balancing, performance testing, and training.

2. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:

- a. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
- b. Verify and document proper performance of equipment and systems.

B. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.

C. OPR documentation is included for information only.

### 1.3 REFERENCES

A. U.S. Green Building Council's (USGBC) Publications:

1. ASHRAE Standard 202-2018 - Commissioning Process for Buildings and Systems

### 1.4 DEFINITIONS

A. Abbreviations - The following are common abbreviations used in the Specifications and in the Commissioning Plan.

1. A/E - Architect and Design Engineers
2. CxA - Commissioning Authority
3. CC - Controls Contractor
4. Cx Plan - Commissioning Plan document
5. EC - Electrical Contractor
6. FPT - Functional Performance Test
7. CM - Construction Manager
8. MC - Mechanical Contractor
9. OR - Owner's Representative
10. PC - Pre-Functional Checklist
11. PM - Project Manager (of the Owner)
12. Subs - Subcontractors to the General Contractor
13. TAB - Test and Balance Contractor

B. Acceptance Phase - Phase of construction after startup and initial checkout where functional performance tests, O&M documentation review and training occurs.

C. Approval - Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the Contract Documents.

- D. Architect/Engineer - The prime consultant (architect) and sub-consultants who comprise the design team, generally the HVAC mechanical designer/engineer and the electrical designer/engineer.
- E. BoD - Basis of Design - A document that records concepts, calculations, decisions and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- F. CxA - Commissioning Authority - An independent agent, not otherwise associated with the A/E team members or the Contractor, hired by the Owner. The CxA directs and coordinates the day-to-day commissioning activities. The CxA does not take an oversight role like the CM. The CxA is part of the Construction Manager (CM) team or shall report directly to the CM.
- G. Cx Plan - Commissioning Plan - A document that outlines the organization, schedule, allocation of resources and documentation requirements of the commissioning process.
- H. Datalogging - Monitoring flows, currents, status, pressures, etc. of equipment using standalone dataloggers separate from the control system.
- I. Deferred Functional Tests - FPTs that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the test from being performed.
- J. Deficiency - A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the design intent).
- K. Design Intent - A dynamic document that provides the explanation of the ideas, concepts and criteria that are considered to be very important to the Owner. It is initially the outcome of the programming and conceptual design phases.
- L. Design Narrative or Design Documentation - Sections of either the Design Intent or Basis of Design.
- M. Factory Testing - Testing of equipment on-site or at the factory by factory personnel with an Owner's Representative present.
- N. Functional Performance Test (FPT) - Test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g. the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside temperatures, fire alarm, power failure, etc. The systems are run through all control system's sequences of operation and components are verified to be responding as sequences state. Traditional air or water test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB's primary work is setting up the

system flows and pressures as specified, while functional testing is verifying that which has already been set up. The commissioning authority develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing contractor or vendor. FPTs are performed after pre-functional checklists and startups are complete.

- O. General Contractor (CM) - The prime contractor for this project. Generally refers to all the CM's subcontractors as well. Also referred to as the Contractor in some contexts.
- P. Indirect Indicators - Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.
- Q. Manual Test - Using handheld instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
- R. Monitoring - The recording of parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or trending capabilities of control systems.
- S. Non-Compliance - See Deficiency
- T. Non-Conformance - See Deficiency
- U. Over-written Values - Writing over a sensor value in the control system to see the response of a system (e.g. changing the outside air temperature value from 50F to 75F to verify economizer operation). See also "Simulated Signal".
- V. OPR - Owner's Project Requirements - A document that details the functional requirements of the project and the expectations of how it will be used and operated. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria and supporting information.
- W. Pre-functional Checklist (PC) - A list of items to inspect and elementary component tests to conduct to verify proper installation of equipment provided by the CxA to the subcontractor. Pre-functional checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g. belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However some pre-functional checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three phase pump motor of a chiller system). The word pre-functional refers to before functional testing. Pre-functional checklists augment and are combined with the manufacturer's startup checklist. Even without a commissioning process, contractors typically perform some if not many of the pre-functional checklist items a commissioning authority will recommend. However, few contractors document in writing the execution of these checklist items. Therefore, for most equipment, the contractors execute the checklists on their own. The commissioning authority only requires that the procedures be documented in writing, and does not witness much of the pre-functional checklist completion, except for larger or more critical pieces of equipment.
- X. Sampling - Functionally testing only a fraction of the total number of identical or near identical pieces of equipment.

- Y. Seasonal Performance Tests - FPTs that are deferred until the system(s) will experience conditions closer to their design conditions.
  - Z. Simulated Condition - Condition that is created for the purpose of testing the response of a system (e.g. applying a hair blower to a space sensor to see the response in a VAV terminal).
  - AA. Simulated Signal - Disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to a transducer and DDC system to simulate a sensor value.
  - BB. Systems, Subsystems, Equipment and Components - Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment or components.
  - CC. Startup - The initial starting or activating of dynamic equipment, including executing pre-functional checklists.
  - DD. Subs - The subcontractors to the CM who provide and install building components and systems.
  - EE. Test Procedures - The step-by-step process which must be executed to fulfill the test requirements. The test procedures are developed by the CxA.
  - FF. Test Requirements - Requirements specifying what modes and functions, etc. shall be tested. The test requirements are not the detailed test procedures. The test requirements are specified in the Contract Documents.
  - GG. Trending - Monitoring using the building control system.
  - HH. Vendor - Supplier of equipment.
  - II. Warranty period - Warranty period for the entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least one year, unless specifically noted otherwise in the Contract Documents and accepted submittals.
- 1.5 COORDINATION
- A. Commissioning Team - The members of the commissioning team consist of the Commissioning Authority (CxA), the Owner's Representative (OR), the General Contractor (CM), the Architect and Design Engineers (A/E), the Mechanical Contractor (MC), the Electrical Contractor (EC), the TAB representative, the Controls Contractor (CC), and any other installing subcontractors or suppliers of equipment. If known, the Owner's building or plant operator/engineer is also a member of the commissioning team.
  - B. Management - The CxA directs and coordinates the commissioning activities and the reports to the OR. All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents.

- C. Scheduling - The CxA will work with the CM according to established protocols to schedule the commissioning activities. The CxA will provide sufficient notice to the CM for scheduling commissioning activities. The CM will integrate all commissioning activities into the master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.
- D. The CxA will provide the initial schedule of primary commissioning events at the commissioning scoping meeting. The Commissioning Plan - Construction Phase provides a format for this schedule. As construction progresses, more detailed schedules are developed by the CxA. The Commissioning Plan also provides a format for detailed schedules.

## 1.6 COMMISSIONING PROCESS

- A. Commissioning Plan - The commissioning plan provides guidance in the execution of the commissioning process. Just after the initial commissioning scoping meeting, the CxA shall update the plan which is then considered the "final" plan though it will continue to evolve and expand as the project progresses. The Specifications shall take precedence over the Commissioning Plan.
- B. Commissioning Process - The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.
  - 1. Commissioning during construction begins with a scoping meeting conducted by the CxA where the commissioning process is reviewed with the commissioning team members.
  - 2. Additional meetings will be required throughout construction, scheduled by the CxA with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.
  - 3. Equipment documentation is submitted to the CxA during normal submittals, including detailed startup procedures.
  - 4. The CxA works with the Subs in developing startup plans and startup documentation formats, including providing the Subs with pre-functional checklists to be completed during the startup process.
  - 5. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels with pre-functional checklists being completed before functional testing.
  - 6. The Subs under their own direction, execute and document the pre-functional checklists and perform startup and initial checkout. The CxA documents that the checklists and startup were completed according to the approved plans. This may include the CxA witnessing startup of selected equipment.
  - 7. The CxA develops specific equipment and system functional performance test procedures. The Subs review the procedures.
  - 8. The procedures are executed by the Subs, under the direction of, and documented by the CxA.
  - 9. Items of non-compliance in material, installation or setup are corrected at the Sub's expense and the system retested.
  - 10. Commissioning is completed before Substantial Completion. Substantial completion will not be attained if commissioning is not complete.

11. Deferred testing is conducted, as required based on seasonal impact.

#### 1.7 COMMISSIONING TEAM

- A. Members Appointed by Contractor(s) - Individuals each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, the General Contractor (CM) and representatives of the Contractor, including Project superintendent and subcontractors, installers, suppliers and specialists deemed appropriate by the CxA.
- B. Members Appointed by Owner:
  - 1. CxA - The designated person, company or entity that plans, schedules and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
  - 2. Representatives of the facility user and operations and maintenance personnel.
  - 3. The Owner's Representative
  - 4. Architect and engineering design professionals.

#### 1.8 OWNER'S RESPONSIBILITIES

- A. Provide the OPR documentation to the CxA and Contractor for information and use.
- B. Assign operations and maintenance personnel and schedule them to participate in the commissioning team activities.
- C. Provide the BoD documentation, prepared by the Architect and approved by the Owner, to the CxA and Contractor for use in developing the commissioning plan, systems manual and operation and maintenance training plan.
- D. Follow the Commissioning Plan.
- E. Attend commissioning scoping meetings and additional meetings as necessary.

#### 1.9 OWNER'S REPRESENTATIVE RESPONSIBILITIES

- A. The Owner's Representative (OR) shall represent the Owner during the commissioning process as follows:
  - 1. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions according to the "Commissioning Plan - Construction Phase".
  - 2. Provide final approval for the completion of the commissioning work.
  - 3. Address any seasonal or deferred testing and any deficiency issues.
  - 4. Follow the Commissioning Plan.
  - 5. Attend commissioning scoping meetings and additional meetings as necessary.

#### 1.10 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning activities.
- B. Contractor and contractor's representatives shall engage in commissioning activities including, but not limited to the following:
  - 1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
  - 2. Cooperate with the CxA for resolution of issues recorded in the "Issues Log".
  - 3. Attend commissioning team meetings, commissioning scoping meetings and additional meetings as necessary.
  - 4. Integrate and coordinate commissioning process activities with construction schedule.
  - 5. Provide detailed startup procedures.
  - 6. Review and accept construction checklists provided by the CxA.
  - 7. Complete electronic construction checklists as the work is completed and provide to the CxA on a weekly basis.
  - 8. Revise and accept commissioning process test procedures provided by the CxA.
  - 9. Complete commissioning process test procedures.
  - 10. Include the cost of commissioning in the total contract price.
  - 11. Execute seasonal or deferred functional performance testing witnessed by the CxA to facilitate the Cx process.
  - 12. Provide a list of final settings, setpoints, ranges, schedules and/or trend logs required by the CxA.
  - 13. Follow the Commissioning Plan.
  - 14. Provide copies of all submittals as required in this Section and in Section 013100.
  - 15. Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built/as-tested conditions.
  - 16. Provide the training of Owner personnel.
  - 17. Participate in 10 and 20 month warranty reviews.

#### 1.11 CONTROL CONTRACTOR'S RESPONSIBILITIES

- A. With respect to HVAC commissioning, the controls contractor shall:
  - 1. Include cost for commissioning requirements in the total contract price.
  - 2. Review design for controllability with respect to equipment selected for the project:
    - a. Review and confirm in writing that a proper hardware specification exists to permit functional performance testing as required by specification and sequence of operation.
    - b. Review and confirm in writing that proper safeties and interlocks are included in design.
    - c. Ensure the proper sizing of control valves and actuators, based on design pressure drops. Ensure that control valve authority will result in capacity control as specified. Include valve sizing and authority information in submittal to mechanical engineer.

- d. Ensure the proper sizing of control dampers. Ensure damper authority to control air flows as specified. Review and confirm in writing proper damper positioning for mixing to prevent stratification. Ensure correct actuator vs. damper movement for smooth operation. Include damper sizing, control authority and actuator selection data in submittal to mechanical engineer.
  - e. Ensure the proper selection of sensor ranges, and include data with submittal to mechanical engineer.
  - f. Clarify all questions concerning sequences of operation with the mechanical engineer.
3. Attend commissioning meetings scheduled by the CA. In addition to the regular status meetings these shall also include the following:
    - a. Control Integration Meeting – held during design to discuss integration issues between equipment, systems, and disciplines to ensure that integration issues and responsibilities are clearly described in the design documents.
    - b. Controls Coordination Meeting – held after controls submittal is submitted to confirm that all systems will operate per the design documents and owner's requirements.
  4. Provide the following submittals to the CxA for review;
    - a. Hardware and software submittals
    - b. Control panel construction shop drawings.
    - c. Diagrams showing all control points, sensor locations, point names, actuators, controllers and where necessary, points of access, all superimposed on diagrams of the physical equipment.
    - d. Narrative description of all control sequences for each piece of equipment controlled.
    - e. Logic diagrams showing the logic flow of all control sequences.
    - f. A list of all control points, including analog inputs, analog outputs, digital inputs and digital outputs. Include the values of all parameters for each system point. Provide a separate list for each stand-alone control unit.
    - g. A complete control language program listing including all software routines employed in operating the control system. Also provide a program write-up, organized in the same manner as the control software. This narrative shall describe the logic flow of the software and the functions of each routine and sub-routine. It should also explain individual math or logic operations that are not clear from reading the software listing.
    - h. Hardware operation and maintenance manuals.
    - i. Application software and project applications code manuals.
    - j. Graphics and System Dashboard submittal as detailed below
  5. Inspect, check and confirm the proper installation and performance of controls/BAS hardware and software provided by others.
  6. Integrate installation and programming scheduling with construction and commissioning schedules.

7. Inspect, check and confirm the correct installation and operation of input and output field points and devices through documented and signed off point-to-point checkouts.
  8. Provide thorough training to operating personnel on hardware operations and programming, and the application program for the system, in accordance with the O&M staff training program in the commissioning plan.
  9. In conjunction with the mechanical contractor, demonstrate system performance to the CxA including all modes of system operation (e.g. occupied, unoccupied, and emergency) during the functional performance tests (FPTs). If improper functionality, incomplete work, or other deficiencies affecting system performance are discovered, the FPTs will be stopped by the CxA. Those responsible for deficient or incomplete work will be responsible for rescheduling costs.
  10. Provide control system technician to assist during system verification and functional performance testing, capable of altering programming and provide dedicated technician to complete Cx while construction is ongoing without impacting the schedule.
  11. Provide support and coordination with TAB contractor on all interfaces between controls and TAB scopes of work. Provide, at no additional cost to the TAB and commissioning agencies, all devices, such as portable operator's terminals and all software for the TAB agency to use in completing TAB procedures.
  12. Provide Graphics and System Dashboard Submittal including complete and detailed representations of all equipment and systems. They shall include:
    - a. Graphic for each typical piece of equipment.
    - b. Graphic for each system including air-handling units, chilled water, heating hot water, domestic hot water, etc.
    - c. Dashboards for energy use, critical space status, systems on emergency power, and other summaries as requested by the Commissioning Authority or Owner
  13. Assist in the development of trend definitions that will be useful for performance analysis and troubleshooting. Group trends based on system and control function (temperature, pressure, etc.) and provide link to graphical display of these trend groups from the associated BAS dashboard.
- 1.12 EQUIPMENT SUPPLIERS' RESPONSIBILITIES
- A. The equipment suppliers shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to the following:
1. Provide all requested submittal data, including detailed startup procedures and specific responsibilities of the Owner to keep warranties in force.
  2. Assist in equipment testing per agreements with Subs.
  3. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract

Documents in the base bid price to the Contractor, except for stand-alone datalogging equipment that may be used by the CxA.

4. Through the contractors, supply products to analyze specified products and verify that the designer has specified the newest, most updated equipment reasonable for this project's scope and budget.
5. Provide information requested by the CxA regarding equipment sequence of operation and testing procedures.
6. Review test procedures for equipment installed by factory representatives.
7. Follow the Commissioning Plan.
8. Attend commissioning scoping meetings and additional meetings as necessary.

### 1.13 CxA's RESPONSIBILITIES

A. The CxA is not responsible for the design, concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating or construction management. The CxA may assist in problem solving, non-conformance issues, and/or deficiencies, but ultimately that responsibility resides with the General Contractor and the A/E. The primary role of the CxA is to develop and coordinate the execution of a testing plan, observe, document performance and verify that systems are functioning in accordance with the documented design intent and in accordance with the Contract Documents. The Contractors will provide all tools or the use of tools to start, check out and functionally test equipment and systems, except for specified testing with portable dataloggers, which shall be supplied by the CxA.

1. Coordinates and directs the commissioning activities using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.
2. Coordinates the commissioning work and, with the CM, incorporate commissioning activities into the master schedule.
3. Revise, as necessary, the Commissioning Plan - Construction Phase. Collaborate with the Contractor and with subcontractors to develop the test and inspection procedures. Include design changes and scheduled commissioning activities coordinated with overall Project master schedule. Identify commissioning team member responsibilities, by name, firm and trade specialty, for performance of each commissioning task.
4. Review and comment on submittals from each contractor for compliance with OPR, BoD, Contract Documents and Commissioning Plan - Construction Phase. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the OPR and BoD.
5. Plan and conduct a commissioning scoping meeting and other commissioning meetings. Also, attend select other coordination meetings as necessary.
6. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor startup and checkout procedures.
7. Before startup, gather and review the current control sequences and interlocks and work with contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed test procedures.
8. Write and distribute pre-functional tests and checklists.
9. Perform site visits, as necessary, to observe component and system installations. Attend selected planning and job site meetings to obtain information on construction progress. Review construction meeting minutes for

- revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
10. Approve pre-functional tests and checklist completion by reviewing pre-functional checklist reports and by selected site observation and spot checking.
  11. Approve systems startup by reviewing startup reports and by selected site observation.
  12. Review TAB execution plan.
  13. Oversee sufficient functional testing of the control system and approve it to be used for TAB before TAB is executed.
  14. With necessary assistance and review from installing contractors, write the functional performance test procedures for equipment and systems. This may include energy management control system trending, standalone datalogger monitoring or manual functional testing. Submit to CM for review.
  15. Analyze any functional performance trend logs and monitoring data to verify performance.
  16. Coordinate, witness and approve manual functional performance tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved.
  17. Maintain a master deficiency and resolution log and a separate testing record. Provide the CM with written progress reports and test results with recommended actions.
  18. Compile and maintain a commissioning book.
  19. Compile and maintain a building system manual to ensure optimal operation by facility staff.
  20. Oversee and approve the training of the Owner's operating personnel.
  21. Review and approve the O&M manuals.
  22. Provide a final commissioning report.
  23. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
  24. Return to the site within 10 months of substantial completion and review with facility staff, the current building operation and the condition of outstanding issues related to the original and seasonal commissioning.
  25. Return at 10 and 20 months for warranty reviews.

#### 1.14 SYSTEMS TO BE COMMISSIONED

- A. The following systems and equipment shall be commissioned:
1. Mechanical/HVAC
  2. Plumbing Systems
  3. Electrical Systems
  4. Fire Protection Systems

### PART 2 - PRODUCTS

#### 2.1 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup, initial checkout and functional performance testing shall be provided under the Specification Division and Section for the equipment being tested. For example, the Mechanical Contractor (MC) for Division 23 shall ultimately be responsible for all standard testing equipment for the

HVAC systems, equipment and controls in Division 23, except for equipment specific to and used by the TAB contractor. Two-way radios shall be supplied by the Division Contractor.

- B. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base bid price to the Contractor, except for stand-alone datalogging equipment that may be used by the CxA.
- C. Datalogging equipment and software required to test equipment shall be provided by the CxA, but shall not become property of the Owner.
- D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance within the tolerances identified in the Specifications. All equipment shall have been calibrated within the preceding 12 months. If not otherwise noted, the following minimum requirements apply:
  - 1. Temperature sensors and digital thermometers shall have an accuracy of 0.5 degrees F and a resolution of  $\pm 0.1$  degree F.
  - 2. Pressure sensors shall have an accuracy of  $\pm 2\%$  of full range of the value being measured, not the sensor/meter full scale.
  - 3. Equipment shall be recalibrated if dropped or otherwise damaged.
  - 4. Calibration tags shall be affixed to the device or certificates readily available to the CxA.

## PART 3 - EXECUTION

### 3.1 MEETINGS

- A. Scoping Meeting - Within 90 days of commencement of construction, the CxA shall schedule, plan and conduct a commissioning scoping meeting with the entire commissioning team in attendance. Meeting minutes shall be distributed to all parties by the CxA. Information gathered from this meeting will allow the CxA to revise the Commissioning Plan to its "final" version, which shall also be distributed to all parties.
- B. Miscellaneous Meetings - Other meetings shall be planned and conducted by the CxA as construction progresses. These meetings shall cover coordination, deficiency resolution and planning issues with particular Subs. The CxA shall plan these meetings and shall minimize unnecessary time being spent by Subs. Commissioning meetings as frequently as weekly will be scheduled as required to meet requirements.
- C. Lessons Learned Meeting
  - 1. The following people shall attend the Lessons Learned Meeting:
    - a. Design Team
    - b. Facilities and Operations
    - c. CxA
  - 2. Write summary of Lessons Learned and distribute to team members.

### 3.2 REPORTING

- A. The CxA shall provide regular reports to the OR and CM, with increasing frequency as construction and commissioning progresses.
- B. The CxA shall regularly communicate with all members of the commissioning team, keeping them apprised of commissioning progress and scheduling changes through memorandums, progress reports, etc.
- C. Testing or review approvals and non-conformance and deficiency reports shall be made regularly with the review and testing as described in later Sections.
- D. A final summary report (about four to six pages, not including backup documentation) by the CxA shall be provided to the OR and CM, focusing on evaluating commissioning progress issues and identifying areas where the process could be improved. All acquired documentation, logs, minutes, reports, deficiency lists, communications, findings, unresolved issues, etc. shall be compiled in appendices and provided with the summary report. Pre-functional checklists, functional tests and monitoring reports shall not be part of the final report, but shall be stored in the Commissioning Record in the O&M manuals.

### 3.3 SUBMITTALS

- A. The CxA shall provide appropriate contractors with a specific request for the type of submittal documentation the CxA requires to facilitate the commissioning work. The requests shall be integrated into the normal submittal process and protocol of the construction team. At minimum, the request shall include the manufacturer and model number, the manufacturer's printed installation and detailed startup procedures, full sequences of operation, O&M data, performance data, any performance test procedures, control drawings and details of Owner contracted tests. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CxA. All documentation requested by the CxA shall be included by the Subs in their O&M manual contributions.
- B. The CxA shall review submittals related to the commissioned equipment for conformance to the Contract Documents as it relates to the commissioning process, and to the performance of equipment and adequacy for developing test procedures. The CxA shall notify the Owner's CM and PM of the A/E as requested of items missing or areas that are not in conformance with contract documents and which require resubmission.
- C. The CxA may request additional design narrative from the A/E and Controls Contractor, depending on the completeness of the BOD and OPR and sequences provided in the Specifications.
- D. These submittals to the CxA do not constitute compliance for O&M manual documentation. The O&M manuals are the responsibility of the Contractor.

### 3.4 STARTUP, PRE-FUNCTIONAL CHECKLISTS AND INITIAL CHECKOUT

- A. The following procedures apply to all equipment to be commissioned, according to Paragraph 1.14, "Systems To Be Commissioned". Some systems that are not comprised so much of actual dynamic machinery, (e.g. electrical system power quality), may have simplified PCs and startup.
- B. General - Pre-functional checklists are important to ensure that the equipment and systems are hooked up and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full pre-functional checkout. No sampling strategies are used. The pre-functional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.
- C. Startup and Initial Checkout Plan - The CxA shall assist the commissioning team members responsible for startup of any equipment in developing detailed startup plans for all equipment. The primary role of the CxA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures has been completed. Parties responsible for pre-functional checklists and startup are identified in the commissioning scoping meeting and in the checklist forms.
1. These checklists indicate required procedures to be executed as part of startup and initial checkout of the systems and the party responsible for their execution.
  2. These checklists and tests are provided by the CxA to the Contractor. The Contractor determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each form will have more than one trade responsible for its execution.
  3. The subcontractor responsible for the purchase of the equipment develops the full startup plan by combining (or adding to) the CxA's checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual and the normally used field checkout sheets. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan. The full startup plan could consist of something as simple as:
    - a. The CxA's pre-functional checklists.
    - b. The manufacturer's standard written startup procedures copies from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
- D. The manufacturer's normally used field checkout sheets.
1. The subcontractor submits the full startup plan to the CxA for review and approval.
  2. The CxA reviews and approves the procedures and the format for documenting them, noting any procedures that need to be added.
  3. The startup procedures and the approval form may be provided to the CM for review and approval, depending on management protocol.
- E. Execution of Pre-Functional Checklists and Startup

1. Four weeks prior to startup, the Subs and vendors shall schedule startup and checkout with the CM and CxA. The performance of the pre-functional checklists, startup and checkout are directed and executed by the Sub or vendor. When checking off pre-functional checklists, signatures may be required of other Subs for verification of completion of their work.
2. The CxA shall observe, at minimum, the procedure for each piece of primary equipment, unless there are multiple units, (in which case a sampling strategy may be used as approved by the CM). In no case will the number of units witnessed be less than four on any one building, nor less than 20% of the total number of individual or very similar units.
3. For lower-level components of equipment (e.g. VAV terminals, sensors, controllers), the CxA shall observe a sampling of the pre-functional and startup procedures. The sampling procedures are identified in the commissioning plan.
4. The Subs and vendors shall execute startup and provide the CxA with a signed and dated copy of the completed startup and pre-functional tests and checklists.
5. Only individuals that have direct knowledge and who witnessed that a line item task on the pre-functional checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

F. Deficiencies, Non-Conformance and Approval in Checklists and Startup

1. The Subs shall clearly list any outstanding items of the initial startup and pre-functional procedures that were not completely successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are to be provided to the CxA within two days of the test completion.
2. The CxA shall review the report and submit either a non-compliance report or an approval form to the Sub and the CM. The CxA shall work with the Subs and vendors to correct and retest deficiencies or uncompleted items. The CxA shall involve the CM and others as necessary. The installing Subs and vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CxA as soon as outstanding items have been corrected and resubmit an updated startup report and a statement of correction on the original non-compliance report. When satisfactorily completed, the CxA shall recommend approval of the execution of the checklists and startup of each system to the CM using a standard form.
3. Items left incomplete, which later cause deficiencies or delays during functional testing may result in back charges to the responsible party. Refer to Part 3, paragraph 3.7 herein for details.

3.5 FUNCTIONAL PERFORMANCE TESTING

- A. This sub-section applies to all commissioning functional testing for all Divisions of the Specifications.
- B. The general list of equipment to be commissioned is found in Section 019113, Part 1.12, "Systems to be Commissioned".

- C. Objectives and Scope - The objective of functional performance testing is to demonstrate that each system is operating according to the documented design intent (BOD and OPR) and Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.
1. In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part and full load) where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to all field programmed safety and alarm responses shall also be tested.
  2. Development of Test Procedures - Before test procedures are written, the CxA shall be provided all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements the CxA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each Sub or vendor responsible to execute a test shall provide limited assistance to the CxA in developing the procedures review (answering questions about equipment, operation, sequences, etc.). Prior to execution, the CxA shall provide a copy of the test procedures to the Subs who shall review the tests for feasibility, safety, equipment and warranty protection. The CxA will submit the tests to the A/E for review.
  3. The CxA shall review Owner-contracted, factory testing or required Owner acceptance tests which the CxA is not responsible to oversee, including documentation format, and shall determine what further testing or format changes may be required to comply with the Specifications. Redundancy of testing shall be minimized.
  4. The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.
  5. The test procedure forms developed by the CxA shall include (but not be limited to) the following information:
    - a. System and equipment or component name(s).
    - b. Equipment location and ID number.
    - c. Project name.
    - d. Participating parties.
    - e. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format.
    - f. Acceptance criteria of proper performance with a Yes/No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
    - g. A section for comments.
    - h. Signatures and date block for the CxA.

D. Test Methods

1. Functional performance testing and verification may be achieved by manual testing (persons manipulate the equipment and observe performance) or by monitoring the performance and analyzing the results using the control system's

trend log capabilities or by standalone dataloggers. The CxA may substitute specified methods or require an additional method be executed, other than what was specified, with the approval of the CM. This may require a change order and adjustment in charges to the Owner. The CxA will determine which method is most appropriate for tests that do not have a method specified.

- E. Simulated Conditions - Simulating conditions (not by an overwritten value) shall be allowed though timing of the testing to experience actual conditions is encouraged wherever practical.
- F. Overwritten Values - Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than what it really is, shall be allowed, but shall be used with caution and avoided where possible. Such testing methods often can only test a part of the system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable, (e.g. for the above case), by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.
- G. Simulated Signals - Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.
- H. Altering Setpoints - Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test sequence is acceptable. For example, to see the AC compressor lockout work at an outside air temperature below 55°F, when the outside air temperature is above 55°F, temporarily change the lockout setpoint to be 2°F above the current outside air temperature.
- I. Indirect Indicators - Relying on indirect indicators to responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification is completed during pre-functional testing.
- J. Setup - Each function and test shall be performed under conditions that simulate actual conditions as close as practically possible. The Sub executing the test shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Sub shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.
- K. Sampling - Multiple identical pieces of non-life safety or otherwise non-critical equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference alone does not constitute a difference. The specific recommended sampling rates are specified with each type of equipment in It is noted that no sampling by Subs is allowed in pre-functional checklist execution.

1. A common sampling strategy referenced in the Specifications as the “xx% sampling - yy% failure rule” is defined by the following example:
    - a. xx = the percent of the group of identical equipment to be included in each sample.
    - b. yy = the percent of the sample that if failing, will require another sample to be tested.
    - c. The example below describes a 20% sampling - 10% failure rule.
      - 1) Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three (3) units in each group. This 20%, or three (3), constitute the “first sample”.
      - 2) If 10% (yy) of the units in the first sample fail the functional performance tests, test another 20% of the group (the second sample).
      - 3) In 10% of the units in the second sample fail, test all remaining units in the whole group.
    - d. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CxA may stop the testing and require the responsible Sub to perform and document a checkout of the remaining units, prior to continuing with functional testing of the remaining units.
  - L. Coordination and Scheduling - The Subs shall provide sufficient notice to the CxA regarding their completion schedule for the pre-functional checklists and startup of all equipment and systems. The CxA shall schedule functional tests through the CM and affected Subs. The CxA shall direct, witness and document the functional testing of all equipment and systems. The Subs shall execute the tests.
    1. In general, functional testing is conducted after pre-functional checklists and startup has been satisfactorily completed. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems. For scheduling purposes, a ‘pencil copy’ of the balancing report for individual pieces of equipment may be accepted for review by the CxA prior to functional testing in lieu of a final report. Testing proceeds from components to sub-systems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.
  - M. Test Equipment - Refer to Section 01 91 13, Part 2 for test equipment requirements.
  - N. Problem Solving - The CxA can recommend solutions to problems found, however the burden of responsibility to solve, correct, and retest problems is with the CM, Subs and the A/E.
- 3.6 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS
- A. Documentation - The CxA shall witness and document the results of all functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms will be provided to the CM for review and approval and to the Subs for review. The CxA shall include the filled out forms in the O&M manuals.

B. Non-Conformance

1. The CxA shall record the results of the functional test on the procedure or test form. All deficiencies or non-conformance issues shall be noted and reported to the CM on a standard non-conformance form.
2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution shall be documented on the procedure form.
3. Every effort shall be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA shall not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the CM.
4. As tests progress and a deficiency is identified, the CxA shall discuss the issue with the executing contractor.
5. When there is no dispute on the deficiency and the Sub accepts responsibility to correct it:
  - a. The CxA shall document the deficiency and the Sub's response and intentions and then go on to another test or sequence. After the day's work, the CxA shall submit the non-compliance reports to the CM for signature, if required. A copy shall be provided to the Sub and the CxA. The Sub shall correct the deficiency, sign the statement of correction at the bottom of the non-compliance form, certifying that the equipment is ready to be retested and shall send it back to the CxA.
  - b. The CxA shall reschedule the test to be repeated.
6. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
  - a. The deficiency shall be documented on the non-compliance form with the Sub's response and a copy given to the CM and the Sub representative assumed to be responsible.
  - b. Resolutions shall be made at the lowest management level possible. Other parties shall be brought into the discussions as needed. Final interpretive authority shall be with the A/E. Final acceptance is with the Owner's Project Manager (PM).
  - c. The CxA shall document the resolution process.
  - d. Once the interpretation and resolution have been decided, the appropriate party shall correct the deficiency, sign the statement of correction on the non-compliance form and provide the form to the CxA. The CxA shall reschedule the test and the test shall be repeated until satisfactory performance is achieved.
7. Cost of Retesting
  - a. The cost for a Sub to retest a pre-functional or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the CM.
  - b. For a deficiency identified, not related to any pre-functional checklist or startup fault, the following shall apply: The CxA shall direct the retesting of

- the equipment once at “no charge” to the CM for his time. However, the CxA’s time for a second retest will be charged to the CM, who may choose to recover costs from the responsible Sub.
- c. The time for the CxA to direct any retesting required because a specific pre-functional checklist or startup test item, reported to have been successfully completed, but determined during functional testing to be faulty, shall be back charged to the CM, who may choose to recover costs from the party responsible for executing the faulty pre-functional test.
  - d. Refer to the sampling portion of Section 019113, Part 3.6 “Documentation, Non-Conformance and Approval of Tests” for requirements for testing and retesting identical equipment.
8. The Contractor shall respond in writing to the CxA and OR at least as often as commissioning meetings are being scheduled, concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.
  9. The CxA shall retain the original non-conformance forms until the end of the project.
  10. Any required retesting by any Sub shall not be considered a justified reason for a claim of delay or for a time extension by the CM.
- C. Approval - The CxA shall note each satisfactorily demonstrated function on the test form. Formal approval of the functional test shall be made later after review by the CxA and by the OR, if necessary.
  - D. Substantial completion will not be attained if commissioning is not complete.
- ### 3.7 OPERATION AND MAINTENANCE MANUALS
- A. The specific content and format requirements for the standard O&M manuals are detailed in Division 01. Special requirements for the controls contractor and TAB contractor are found in Division 23.
  - B. AE Contribution – The AE will include in the beginning of the O&M manuals a separate section describing the systems including the Basis of Design prepared by the AE. The will also provide simplified professionally drawn single line diagram systems on 8 ½” x 11” or 11” x 17” sheets. These shall include (ex. Chillers/hot water system(s), condenser water system, supply air systems, exhaust systems, etc). These shall show major pieces of equipment such as (ex. Pumps, chillers, heat exchangers, control valves, expansion tanks, coils, service valves, etc.).
  - C. CxA Review and Approval – Prior to substantial completion, the CxA shall review the O&M manuals, documentation and record documents for systems that were commissioned to verify compliance with the Specifications. The CxA will communicate deficiencies in the manuals to the CM/GC, Owner of AE, as requested. Upon a successful review of the corrections, the Cxa recommends approval and acceptance of these sections of the O&M manuals to the CM/GC, Owner or AE. The CxA also reviews each equipment warranty and verifies that all requirements to keep the warranty valid are clearly stated. This work does not supersede the AE’s review of the O&M manuals according to the AE’s Contract.

### 3.8 TRAINING OF OWNER PERSONNEL

- A. The CM shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed. The CM shall enlist the participation of all SUBs and vendors to develop and submit a training plan.
  1. The training plan shall include the following items:
    - a. Outline of instructional topics related to the systems, subsystems, equipment, and assemblies. These topics shall address the design, construction, operation, and maintenance of specific systems, assemblies, and equipment.
    - b. Learning objectives and training delivery methods for each instructional topic.
    - c. The planned location of the training sessions (class-room, on site, and off site) and the minimum duration of each training session, in hours, to be completed as required in the OPR, Cx Plan, or construction documents
    - d. Instructor's qualifications
    - e. Training materials requirements to be employed during the instructional process
    - f. Training report, records, and recording requirements, including sign-in sheet
- B. The CxA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.
- C. Training shall normally start with classroom sessions followed by hands-on training on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc.
- D. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
- E. Major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.
- F. The appropriate trade or manufacturer's representative shall provide the instructions on each.
- G. The controls contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
- H. The training shall include:
  1. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.

2. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
  3. Discussion of relevant health and safety issues and concerns.
  4. Discussion of warranties and guarantees.
  5. Common troubleshooting problems and solutions.
  6. Explanatory information included in the O&M manuals and the location of all plans and manually in the facility.
  7. Discussion of any peculiarities of equipment installation or operation.
  8. Classroom sessions shall include the use of overhead projections, video/audio-taped material as might be appropriate.
- I. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment. The mechanical contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system. Training shall occur after functional testing is complete, unless approved otherwise by the Project Manager.

### 3.9 DEFERRED TESTING

- A. Unforeseen Deferred Tests - If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the OR. These tests shall be conducted in the same manner as the seasonal tests as soon as possible.
- B. Seasonal Testing - During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this Contract. The CxA shall coordinate this activity. Tests shall be executed, documented and deficiencies corrected by the appropriate Sub(s), with facilities staff and the CxA witnessing. Any final adjustments to the O&M manuals and as-built documents due to the testing shall be made.

### 3.10 FINAL COMMISSIONING REPORT

- A. Final Commissions Report: Compile final commission report. Summarize all the tasks, findings, conclusions and recommendations from the Commissioning process. Include a "Lessons Learned" section.

### 3.11 WRITTEN WORK PRODUCTS

- A. The commissioning process shall generate a number of written work products described in various parts of the Specifications. The Commissioning Plan, lists all formal written work products, describes briefly their contents, who is responsible for creating them, their due dates, who receives and approves them and the location of the Specification to create them. In summary, the written work products are:

<u>Product</u>	<u>Developed By</u>
1. Final Commissioning Plan	CxA
2. Commissioning Meeting Minutes	CxA

3.	Commissioning Schedule	CxA with CM
4.	Pre-Functional Checklists	CxA
5.	Startup and Initial Checkout Plan	CM with SUBs
6.	Completed Pre-Functional Checklists	SUBs
7.	Completed Startup Forms	SUBs
8.	Systems Manual Components	CMC with Sub-contractors
	Owner's Project Requirements (OPR)	A/E
	Basis of Design (BoD)	A/E
	Record Design Documents	A/E
	Operations and Maintenance Manuals	CM with SUBs
	Equipment Warranties	CM with SUBs
	Preventative Maintenance Plan	CM with SUBs
	Contractor and Supplier Listing with Contact Information	CM with SUBs
	Table of all setpoints	ATC
	As-Built Sequence of Operations	ATC
	System single line diagrams	ATC
	Recommended Trend Logs and description of how to interpret	ATC with CxA
	Seasonal adjustments	ATC
	Startup/shutdown procedures	ATC
	Instructions for Energy Savings operating strategies	A/E
	Recommendations for Re-Commissioning and blank test forms	CxA
9.	Final TAB Report	TAB
10.	Final Point to Point Checkout	ATC
11.	Training Plan	CM with SUBs2.
12.	Issues Log	CxA
13.	Commissioning Status Log	CxA
14.	Functional Test Forms	CxA
15.	Completed Functional Tests	CxA
16.	Final Commissioning Report	CxA

END OF SECTION 01 91 13

**SECTION 03 20 00**  
**CONCRETE REINFORCING**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Reinforcing bars.
  2. Welded wire fabric.
  3. Reinforcement accessories.

1.2 COORDINATION

- A. Coordinate Work of this Section with placement of formwork, formed openings, and other Work.

1.3 SUBMITTALS

- A. Shop Drawings:
1. Indicate bar sizes, spacings, locations, splice locations, and quantities of reinforcing steel and welded wire fabric.
  2. Indicate bending and cutting schedules.
  3. Indicate supporting and spacing devices.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Submit certified copies of mill test report of reinforcement materials analysis.
- D. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.
- E. Source Quality-Control Submittals: Indicate results of shop tests and inspections.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Qualifications Statement:
1. Welders: Qualify procedures and personnel according to AWS D1.1.

#### 1.4 QUALITY ASSURANCE

- A. Perform Work according to CRSI 10-MSP.
- B. Prepare Shop Drawings according to ACI SP-66.
- C. Perform Work according to DeIDOT standards.
- D. Contractor shall maintain at all times on site a set of official stamped approved project drawings for all disciplines (civil, architectural, mechanical/electrical, plumbing, etc.).

#### 1.5 QUALIFICATIONS

- A. Welders: AWS qualified within previous 12 months for employed weld types.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Store materials according to manufacturer instructions.
- C. Protection:
  - 1. Protect materials from moisture by storing in clean, dry location remote from construction operations areas.
  - 2. Provide additional protection according to manufacturer instructions.

#### 1.7 EXISTING CONDITIONS

- A. Field Measurements:
  - 1. Verify field measurements prior to fabrication.
  - 2. Indicate field measurements on Shop Drawings.

### PART 2 - PRODUCTS

#### 2.1 REINFORCEMENT

- A. Uncoated Reinforcement:
  - 1. Provide billet-steel bar reinforcement in accordance with AASHTO M31, Grade 60.
  - 2. Provide deformed steel wire in accordance with ASTM A1064.
  - 3. Provide welded plain steel wire fabric in accordance with ASTM A1064.
  - 4. Provide plain steel wire in accordance with ASTM A1064.

5. Provide deformed steel welded wire reinforcement in accordance with ASTM A1064.
6. Provide zinc alloy wire in accordance with ASTM A1055..

B. Coated Reinforcement

1. Provide epoxy-coated bar reinforcement in accordance with ASTM A775, ASTM D3963, and AASHTO M31, Grade 60.
2. Provide poxy-coated wire and welded wire fabric in accordance with ASTM A884, Class A.
3. Provide a certificate of compliance with each shipment of epoxy-coated reinforcing steel. The certificate of compliance must be signed by the coating applicator certifying that the above requirements are met.
4. Provide a certificate of compliance with each shipment of epoxy-coated reinforcing steel. The certificate of compliance must be signed by the coating applicator certifying that the above requirements are met.

C. Stainless Steel Reinforcement.

1. Provide stainless steel bar reinforcement in accordance with ASTM A955, Grade 60. Do not mix multiple stainless steel types on the same project.

D. Pavement Hardware

1. Provide tie bars in accordance with AASHTO M31, Grade 60 or AASHTO M322, Grade 60. Do not use rail-steel for tie bars that will be bent and restraightened during construction.
2. Provide plain round dowel bars and load transfer assemblies in accordance with AASHTO M255 (ASTM A675), Grade 65. Provide coating in accordance with ASTM A775.
3. Provide Coated Dowel Bars in accordance with AASHTO M31 and ASTM A775 Type A or Type B as referenced on the contract.

E. Other Hardware

1. Provide splice couplers in accordance with AASHTO M31, Grade 60.
2. Provide epoxy coated splice couplers in accordance with AASHTO M31, Grade 60 and ASTM A775.
3. Provide tie bars, hook bolts, and w-bolts in accordance with AASHTO M31, Grade 60.
4. Provide fiber reinforcement that is alkali resistant per ASTM C1116, Type III with a minimum fiber length of 1/2-inch and a maximum length of 1 1/2-inch..

## 2.2 FABRICATION

- A. Fabricate concrete reinforcement according to CRSI 10-MSP.
- B. Form reinforcement bends with minimum diameters according to applicable code.
- C. Fabricate column reinforcement with offset bends at reinforcement splices.

- D. Form spiral column reinforcement from minimum 3/8-inch-diameter continuous plain bar or wire.
- E. Form ties and stirrups from following:
  - 1. Bars No. 10 and Smaller: No. 3 deformed bars.
  - 2. Bars No. 11 and Larger: No. 4 deformed bars.
- F. Weld reinforcement according to AWS D1.4.
- G. Galvanized or Epoxy-Coated Reinforcement: Clean surfaces, weld, and re-protect welded joint according to CRSI 10PLACE
- H. Splicing:
  - 1. If not indicated on Drawings, locate reinforcement splices at point of minimum stress.
  - 2. Obtain approval of splice locations from Architect/Engineer.

## 2.3 SHOP FINISHING

- A. Galvanized Finish for Steel Bars:
  - 1. Comply with ASTM A767.
  - 2. Hot-dip galvanized after fabrication.
  - 3. Zinc coating confirming to ASTM B6.
- B. Epoxy-Coated Finish for Steel Bars: Comply with ASTM A775.
- C. Epoxy-Coated Finish for Steel Wire: Comply with ASTM A884, Class A.

## 2.4 ACCESSORY MATERIALS

- A. Tie Wire:
  - 1. Minimum 16 gage, annealed type.
- B. Chairs, Bolsters, Bar Supports, and Spacers:
  - 1. Size and Shape: To strengthen and support reinforcement during concrete placement conditions.
  - 2. Furnish load-bearing pad on bottom to prevent vapor retarder puncture.
- C. Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather-Exposed Concrete Surfaces:
  - 1. Material: Stainless steel.
  - 2. Size and Shape: To meet Project conditions.
- D. Reinforcing Splicing Devices:

1. Type: Exothermic welding type; full tension and compression.
2. Size: To fit joined reinforcing.
3. Manufacturers:
  - a. Dur-O-Wal; a Hohmann & Barnard company.
  - b. ERICO; nVent.
  - c. Symons by Dayton Superior.

E. Epoxy Coating Patching Material: Type as recommended by coating manufacturer.

## 2.5 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing of completed assembly.

B. Owner Inspection:

1. Make completed concrete reinforcing available for inspection at manufacturer's factory prior to packaging for shipment.
2. Notify Owner at least seven days before inspection is allowed.

C. Owner Witnessing:

1. Allow witnessing of factory inspections and test at manufacturer's test facility.
2. Notify Owner at least seven days before inspections and tests are scheduled.

D. Certificate of Compliance:

1. If fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved fabricator.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Place, support, and secure reinforcement against displacement.
- B. Do not deviate from required position beyond specified tolerance.
- C. Do not weld crossing reinforcement bars for assembly except as permitted by Engineer.
- D. Do not displace or damage vapor retarder.
- E. Accommodate placement of formed openings.
- F. Spacing:

1. Space reinforcement bars with minimum clear spacing equal to one bar diameter but not less than 1 inch.
  2. If bars are indicated in multiple layers, place upper bars directly above lower bars.
- G. Conform to applicable code for concrete cover over reinforcement.
- H. Provide following minimum concrete cover over reinforcement if required by applicable code for fire-resistive construction:
1. Slabs: 1-1/2 inches.
  2. Beams, Girders, and Trusses: 1-1/2 inches.
  3. Joists: 1-1/2 inches.
  4. Columns: 1-1/2 inches.
- I. Splice reinforcing according to manufacturer's instructions.

### 3.2 FIELD QUALITY CONTROL

- A. Perform field inspection and testing according to ACI 318.
- B. Provide unrestricted access to Work and cooperate with appointed inspection and testing firm.
- C. Reinforcement Inspection:
1. Placement Acceptance: Inspect specified and ACI 318 material requirements and specified placement tolerances.
  2. Welding: Inspect welds according to AWS D1.1.
  3. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.
  4. Weldability Inspection: Inspect for reinforcement weldability if formed from steel other than ASTM A706.
  5. Continuous Weld Inspection: Inspect reinforcement according to applicable code.
  6. Periodic Weld Inspection: Inspect other welded connections.

**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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, steel reinforcement bars, welded-wire reinforcement and finishes.

B. Related Requirements:

1. Section 312000 "Earth Moving" for drainage fill under slabs-on-ground.
2. Section 321313 "Concrete Paving" for concrete pavement and walks.
3. Section 321313 "Concrete Paving" for reinforcing related to concrete pavement and walks.
4. Section 034500 "Precast Architectural Concrete" for reinforcing used in precast architectural concrete.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project Site.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
  - a. Contractor's superintendent.
  - b. Independent testing agency responsible for concrete design mixtures.
  - c. Ready-mix concrete manufacturer.

- d. Concrete Subcontractor.
- e. Special concrete finish Subcontractor.

2. Review the following:

- a. Special inspection and testing and inspecting agency procedures for field quality control.
- b. Construction joints, control joints, isolation joints, and joint-filler strips.
- c. Steel-reinforcement installation.
- d. Semirigid joint fillers.
- e. Vapor-retarder installation.
- f. Anchor rod and anchorage device installation tolerances.
- g. Cold and hot weather concreting procedures.
- h. Concrete finishes and finishing.
- i. Curing procedures.
- j. Forms and form-removal limitations.
- k. Methods for achieving specified floor and slab flatness and levelness.
- l. Floor and slab flatness and levelness measurements.
- m. Concrete repair procedures.
- n. Concrete protection.
- o. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
- p. Protection of field cured field test cylinders.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following.

- 1. Each type of steel reinforcement.
- 2. Bar supports.
- 3. Portland cement.
- 4. Fly ash.
- 5. Slag cement.
- 6. Blended hydraulic cement.
- 7. Silica fume.
- 8. Performance-based hydraulic cement
- 9. Aggregates.
- 10. Admixtures:
  - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
- 11. Color pigments.
- 12. Fiber reinforcement.
- 13. Vapor retarders.
- 14. Floor and slab treatments.
- 15. Curing materials.

- a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.
16. Joint fillers.
  17. Repair materials.
- B. Design Mixtures: For each concrete mixture, include the following:
1. Mixture identification.
  2. Minimum 28-day compressive strength.
  3. Durability exposure class.
  4. Maximum w/cm.
  5. Calculated equilibrium unit weight, for lightweight concrete.
  6. Slump limit.
  7. Air content.
  8. Nominal maximum aggregate size.
  9. Steel-fiber reinforcement content.
  10. Synthetic micro-fiber content.
  11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
  12. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
  13. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
  14. Intended placement method.
  15. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Shop Drawings:
1. Construction and control Joint Layout: Indicate proposed construction and control joints required to construct the structure, and to verify control joint layout.
    - a. Location of construction joints is subject to approval of the Architect.
    - b. Control joint layout is subject to approval of Architect.
  2. Steel reinforcing shop drawings: Comply with ACI SP-066:
    - a. Include placing drawings that detail fabrication, bending, and placement.
    - b. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:
1. Concrete Class designation.
  2. Location within Project.
  3. Exposure Class designation.

4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

#### 1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Ready-mixed concrete manufacturer.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Fiber reinforcement.
4. Curing compounds.
5. Floor and slab treatments.
6. Bonding agents.
7. Adhesives.
8. Vapor retarders.
9. Semirigid joint filler.
10. Joint-filler strips.
11. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement
2. Portland cement.
3. Fly ash.
4. Slag cement.
5. Blended hydraulic cement.
6. Silica fume.
7. Performance-based hydraulic cement.
8. Aggregates.
9. Admixtures:

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Field quality-control reports.

F. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

G. Preconstruction Test Reports: For each mix design.

H. Minutes of preinstallation conference.

## 1.7 QUALITY ASSURANCE

A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

C. Mockups: Cast concrete slab-on-ground and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.

1. Slab-On-Ground: Build panel approximately 15 feet by 15 feet (3.35 meters by 3.35 meters) in the location indicated or, if not indicated, as directed by Architect.
  - a. Divide panel into four equal panels to demonstrate saw joint cutting.
2. Formed Surfaces: Build panel approximately 100 sq. ft. (9.3 sq. m) in the location indicated or, if not indicated, as directed by Architect.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.8 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.

1. Include the following information in each test report:
  - a. Admixture dosage rates.
  - b. Slump.
  - c. Air content.
  - d. Seven-day compressive strength.
  - e. 28-day compressive strength.
  - f. Permeability.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).
- B. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage and to avoid damaging coatings on steel reinforcement
  - 1. Store reinforcement to avoid contact with earth.
  - 2. Do not allow epoxy-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.

## 1.10 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 306.1 and as follows.
  - 1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 2. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
  - 3. Do not use frozen materials or materials containing ice or snow.
  - 4. Do not place concrete in contact with surfaces less than 35 deg F (1.7 deg C), other than reinforcing steel.
  - 5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:
  - 1. Maintain concrete temperature at time of discharge to not exceed 95 deg F (35 deg C).
  - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

## PART 2 - PRODUCTS

### 2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents.

### 2.2 CONCRETE MATERIALS

- A. Source Limitations:
  - 1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for

- entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
  3. Obtain aggregate from single source.
  4. Obtain each type of admixture from single source from single manufacturer.
- B. Cementitious Materials:
1. Portland Cement: ASTM C150/C150M, Type I/II.
  2. Fly Ash: ASTM C618, Class C or F.
  3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
- C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.
1. Alkali-Silica Reaction: Comply with one of the following:
    - a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
    - b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
    - c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. (2.37 kg/cu. m) for moderately reactive aggregate or 3 lb./cu. yd. (1.78 kg/cu. m) for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301 (ACI 301M).
  2. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
  3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Lightweight Aggregate: ASTM C330/C330M, 3/4-inch (19-mm) nominal maximum aggregate size.
1. Limit lightweight aggregate for internal curing to prewetted lightweight fine aggregate in accordance with ASTM C1761/C1761M.
- E. Air-Entraining Admixture: ASTM C260/C260M.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
  2. Retarding Admixture: ASTM C494/C494M, Type B.
  3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
  5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.

6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
7. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.
8. Color: As indicated by manufacturer's designation.

G. Water and Water Used to Make Ice: ASTM C94/C94M, potable.

## 2.3 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420).
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

## 2.4 REINFORCEMENT ACCESSORIES

- A. Epoxy-Coated Joint Dowel Bars: ASTM A615/A615M, Grade 60 (Grade 420), plain-steel bars, ASTM A775/A775M epoxy coated.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
  1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
    - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
    - b. For epoxy-coated dowel bars use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
- C. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch (1.2908 mm) in diameter.
- D. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A775/A775M.

## 2.5 FABRICATING REINFORCEMENT

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

## 2.6 VAPOR RETARDERS

- A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A, except with maximum water- vapor permeance of not less than 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

## 2.7 FLOOR AND SLAB TREATMENTS

- A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing No. 4 (4.75-mm) sieve.
- B. Slip-Resistive Aluminum Granule Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of not less than 95 percent fused aluminum-oxide granules.
- C. Emery Dry-Shake Floor Hardener: Unpigmented, factory-packaged, dry combination of portland cement, graded emery aggregate, and plasticizing admixture; with emery aggregate consisting of no less than 60 percent of total aggregate content.
  - 1. Color: As indicated by manufacturer's designation.
- D. Metallic Dry-Shake Floor Hardener: Unpigmented, factory-packaged, dry combination of portland cement, graded metallic aggregate, rust inhibitors, and plasticizing admixture; with metallic aggregate consisting of no less than 65 percent of total aggregate content.
  - 1. Color: As indicated by manufacturer's designation.
- E. Unpigmented Mineral Dry-Shake Floor Hardener: Factory-packaged dry combination of portland cement, graded quartz aggregate, and plasticizing admixture.
- F. Pigmented Mineral Dry-Shake Floor Hardener: Factory-packaged, dry combination of portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.
  - 1. Color: As indicated by manufacturer's designation.

## 2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:
  - a. Ambient Temperature Below 50 deg F (10 deg C): Black.
  - b. Ambient Temperature between 50 deg F (10 deg C) and 85 deg F (29 deg C): Any color.
  - c. Ambient Temperature Above 85 deg F (29 deg C): White.
- D. Curing Paper: Eight-foot- (2438-mm-) wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.
- E. Water: Potable or complying with ASTM C1602/C1602M.
- F. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.
- G. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- H. Clear, Waterborne, Membrane-Forming, Curing Compound: ASTM C309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- I. Clear, Solvent-Borne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.
- J. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

## 2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 in accordance with ASTM D2240.
- C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:
  1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Floor Slab Protective Covering: Eight-foot- (2438-mm-) wide cellulose fabric.

## 2.10 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3 mm) and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
  2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm) or coarse sand, as recommended by underlayment manufacturer.
  4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested in accordance with ASTM C109/C109M.
  5. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
  6. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  7. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
  8. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested in accordance with ASTM C109/C109M.

## 2.11 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301 (ACI 301M).
1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Fly Ash or Other Pozzolans: 25 percent by mass.
  2. Slag Cement: 50 percent by mass.
  3. Silica Fume: 10 percent by mass.
  4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
  5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, and concrete with a w/cm below 0.50.

## 2.12 CONCRETE MIXTURES

### A. Class A: Normal-weight concrete used for footings, grade beams, and tie beams.

1. Exposure Class: ACI 318 (ACI 318M) F0.
2. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
3. Maximum w/cm: 0.50.
4. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

### B. Class B: Normal-weight concrete used for foundation walls.

1. Exposure Class: ACI 318 (ACI 318M) F1.
2. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
3. Maximum w/cm: 0.45
4. Air Content:
  - a. Exposure Class F1: [5.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch (19-mm) nominal maximum aggregate size] [4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch (25-mm) nominal maximum aggregate size] [4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch (38-mm) nominal maximum aggregate size].
5. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

### C. Class C: Normal-weight concrete used for interior slabs-on-ground.

1. Exposure Class: ACI 318 (ACI 318M) F0.
2. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
3. Maximum w/cm: .45.
4. Minimum Cementitious Materials Content: Comply with ACI minimum levels for floors based on size of aggregate.
5. Air Content:
  - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.
6. Limit water-soluble, chloride-ion content in hardened concrete to .30 percent by weight of cement.

7. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of 1.0 lb/cu. yd. (0.60 kg/cu. m).
- D. Class D: Normal-weight concrete used for interior suspended slabs.
1. Exposure Class: ACI 318 (ACI 318M) F0.
  2. Minimum Compressive Strength: 4000 psi (27.6 MPa at 28 days).
  3. Maximum w/cm: .45.
  4. Minimum Cementitious Materials Content: Comply with ACI minimum levels for floors based on size of aggregate.
  5. Air Content:
    - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.
  6. Limit water-soluble, chloride-ion content in hardened concrete to .30 percent by weight of cement.
- E. Class E: Normal-weight concrete used for interior metal pan stairs and landings:
1. Exposure Class: ACI 318 (ACI 318M) F0.
  2. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
  3. Maximum w/cm: 0.53.
  4. Minimum Cementitious Materials Content: 470 lb/cu. yd. (279 kg/cu. m).
  5. Maximum Size Aggregate: 1/2 inch (13 mm).
  6. Slump Limit: 3 inches (75 mm), plus 1 inch (25 mm) or minus 2 inches (50 mm).
  7. Air Content: 0 percent, plus or minus 0.5 percent at point of delivery.
  8. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
  9. Retarding Admixture: Not allowed.
  10. Accelerating Admixture: Not allowed.
- F. Class F: Normal-weight concrete used for exterior slabs and parking garage walls and piers:
1. Exposure Class: ACI 318 (ACI 318M) F3, C2.
  2. Minimum Compressive Strength: 5000 psi (27.6 MPa) at 28 days.
  3. Maximum w/cm: .40.
  4. Minimum Cementitious Materials Content: Comply with ACI minimum levels for floors based on size of aggregate.
  5. Air Content:
    - a. Exposure Classes F2 and F3 (all Cast In Place elements of Parking Garage): [6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch (19-mm) nominal maximum aggregate size] [6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch (25-mm) nominal maximum aggregate size] [5.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch (38-mm) nominal maximum aggregate size].
  6. Limit water-soluble, chloride-ion content in hardened concrete to .15 percent by weight of cement.

- G. Class G: Structural lightweight concrete used for interior suspended slabs.
1. Exposure Class: ACI 318 (ACI 318M) Class F0.
  2. Minimum Compressive Strength: 4000 psi at 28 days.
  3. Maximum w/cm: .45
  4. Equilibrium Density: 115 lb/cu. Ft. plus or minus 4 lb/cu. Ft. in accordance with ASTM C567/C567M.
  5. Slump Limit: To be determined by mix design firm in accordance with ASTM C143 and ACI 301.
  6. Slump Flow Limit: To be determined by mix design firm in accordance with ASTM C1611.
  7. Air Content:
    - a. Total air content must not exceed 3 percent for concrete used in trowel-finished floors.
  8. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

B. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

- C. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

### 3.3 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
  - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
  - 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch (25 mm), not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318 (ACI 318M).
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
  - 1. Bars indicated to be continuous, and all vertical bars to be lapped not less than 36 bar diameters at splices, or 24 inches (610 mm), whichever is greater.
  - 2. Stagger splices in accordance with ACI 318 (ACI 318M).
- G. Install welded-wire reinforcement in longest practicable lengths.
  - 1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
    - a. For reinforcement less than W4.0 or D4.0, continuous support spacing to not exceed 12 inches (305 mm).
  - 2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches (50 mm) for plain wire and 8 inches (200 mm) for deformed wire.
  - 3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
  - 4. Lace overlaps with wire.

### 3.4 INSTALLATION OF EMBEDDED ITEMS

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

2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

### 3.5 INSTALLATION OF VAPOR RETARDER

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
  1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
  2. Face laps away from exposed direction of concrete pour.
  3. Lap vapor retarder over footings and grade beams not less than 6 inches (150 mm), sealing vapor retarder to concrete.
  4. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
  5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
  6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
  7. Protect vapor retarder during placement of reinforcement and concrete.
    - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches (150 mm) on all sides, and sealing to vapor retarder.
- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

### 3.6 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
  1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
  2. Place joints perpendicular to main reinforcement.
    - a. Continue reinforcement across construction joints unless otherwise indicated.
    - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
  3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
  4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder

- intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
  7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  8. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least of concrete thickness as follows:
1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
  2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints:
1. Install dowel bars and support assemblies at joints where indicated on Drawings.
  2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.
- F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

### 3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and

- deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
1. If a section cannot be placed continuously, provide construction joints as indicated.
  2. Deposit concrete to avoid segregation.
  3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301 (ACI 301M).
    - a. Do not use vibrators to transport concrete inside forms.
    - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer.
    - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Do not place concrete floors and slabs in a checkerboard sequence.
  2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  3. Maintain reinforcement in position on chairs during concrete placement.
  4. Screed slab surfaces with a straightedge and strike off to correct elevations.
  5. Level concrete, cut high areas, and fill low areas.
  6. Slope surfaces uniformly to drains where required.
  7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
  8. Do not further disturb slab surfaces before starting finishing operations.

### 3.8 FINISHING FORMED SURFACES

#### A. As-Cast Surface Finishes:

1. ACI 301 (ACI 301M) Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
  - a. Patch voids larger than 1-1/2 inches (38 mm) wide or 1/2 inch (13 mm) deep.
  - b. Remove projections larger than 1 inch (25 mm).
  - c. Tie holes do not require patching.
  - d. Surface Tolerance: ACI 117 (ACI 117M) Class D.
  - e. Apply to concrete surfaces not exposed to public view.
2. ACI 301 (ACI 301M) Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
  - a. Patch voids larger than 3/4 inch (19 mm) wide or 1/2 inch (13 mm) deep.
  - b. Remove projections larger than 1/4 inch (6 mm).
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 (ACI 117M) Class B.
  - e. Locations: Apply to concrete surfaces below access flooring.
3. ACI 301 (ACI 301M) Surface Finish SF-3.0:
  - a. Patch voids larger than 3/4 inch (19 mm) wide or 1/2 inch (13 mm) deep.
  - b. Remove projections larger than 1/8 inch (3 mm).
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 (ACI 117M) Class A.
  - e. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete, and for all occupied spaces.

#### B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:

1. Smooth-Rubbed Finish:
  - a. Perform no later than one day after form removal.
  - b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
  - c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
  - d. Maintain required patterns or variances as shown on Drawings or to match mockups.
2. Grout-Cleaned Rubbed Finish:

- a. Clean concrete surfaces after contiguous surfaces are completed and accessible.
- b. Do not clean concrete surfaces as Work progresses.
- c. Mix 1 part portland cement to 1-1/2 parts fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
- d. Wet concrete surfaces.
- e. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap, and keep surface damp by fog spray for at least 36 hours.
- f. Maintain required patterns or variances as shown on Drawings or to match mockups.

3. Cork-Floated Finish:

- a. Mix 1 part portland cement to 1 part fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint.
- b. Mix 1 part portland cement and 1 part fine sand with sufficient water to produce a mixture of stiff grout. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
- c. Wet concrete surfaces.
- d. Compress grout into voids by grinding surface.
- e. In a swirling motion, finish surface with a cork float.
- f. Maintain required patterns or variances as shown on Drawings or to match mockups.

C. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.9 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch (6 mm) in one direction.
3. Apply scratch finish to surfaces to receive concrete floor toppings or mortar setting beds for bonded cementitious floor finishes.

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 (ACI A117M) tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighen until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155 (ASTM E1155M), for a randomly trafficked floor surface:
  - a. Slabs on Ground:
    - 1) Carpeted floors (unless noted otherwise): Specified overall values of flatness,  $F_F$  25; and of levelness,  $F_L$  20; with minimum local values of flatness,  $F_F$  17; and of levelness,  $F_L$  15.
    - 2) Thin floor coverings: Specified overall values of flatness,  $F_F$  35; and of levelness,  $F_L$  25; with minimum local values of flatness,  $F_F$  24; and of levelness,  $F_L$  17.
    - 3) Polished concrete: Specified Overall Value (SOV):  $F_F$  50 and  $F_L$  25 with minimum local value (MLV):  $F_F$  40 and  $F_L$  17.
  - b. Suspended Slabs:
    - 1) Carpeted floors (unless noted otherwise): Specified overall values of flatness,  $F_F$  25; and of levelness,  $F_L$  20; with minimum local values of flatness,  $F_F$  17; and of levelness,  $F_L$  15.
    - 2) Thin floor coverings: Specified overall values of flatness,  $F_F$  35; and of levelness,  $F_L$  20; with minimum local values of flatness,  $F_F$  24; and of levelness,  $F_L$  15.

- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated on Drawings and where ceramic or quarry tile is to be installed by either thickset or thinset method.

While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
  2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
  2. Coordinate required final finish with Architect before application.
- G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate or aluminum granule finish to concrete stair treads, platforms, ramps as indicated on Drawings
1. Apply in accordance with manufacturer's written instructions and as follows:
    - a. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aggregate or aluminum granules over surface in one or two applications.
    - b. Tamp aggregate flush with surface, but do not force below surface.
    - c. After broadcasting and tamping, apply float finish.
    - d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate or aluminum granules.
- H. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces in accordance with manufacturer's written instructions and as follows:
1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. (49 kg/10 sq. m) unless greater amount is recommended by manufacturer.
  2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating.
  3. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
  4. After final floating, apply a trowel finish.
  5. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

### 3.10 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling In:
1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
  2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
  3. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still

green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches (100 mm) high unless otherwise indicated on Drawings, and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi (27.6 MPa)]> at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.
  - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - b. Cast anchor-bolt insert into bases.
  - c. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories, as shown on Drawings.
2. Screed, tamp, and trowel finish concrete surfaces.

### 3.11 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 (ACI 301M) and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h (1 kg/sq. m x h), calculated in accordance with ACI 305.1,) before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.

4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
  - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
  - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
  - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
  - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
  - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
    - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
    - 2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:
  - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
    - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
      - a) Lap edges and ends of absorptive cover not less than 12-inches (300-mm).
      - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
    - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive.
      - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
      - b) Cure for not less than seven days.
    - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
      - a) Water.

- b) Continuous water-fog spray.
- b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:
  - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
    - a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
    - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
  - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive.
    - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
    - b) Cure for not less than seven days.
  - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
    - a) Water.
    - b) Continuous water-fog spray.
  - 4) Floors to Receive Polished Finish: Contractor has option of the following:
    - Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
      - a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
      - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
    - 5) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
      - a) Water.
      - b) Continuous water-fog spray.
- c. Floors to Receive Chemical Stain:
  - 1) As soon as concrete has sufficient set to permit application without

- marring concrete surface, install curing paper over entire area of floor.
- 2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
  - 3) Butt sides of curing paper tight; do not overlap sides of curing paper.
  - 4) Leave curing paper in place for duration of curing period, but not less than 28 days.

d. Floors to Receive Urethane Flooring:

- 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
- 2) Rewet absorptive cover and cover immediately with polyethylene moisture-retaining cover with edges lapped 6 inches (150 mm) and sealed in place.
- 3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
- 4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.

e. Floors to Receive Curing Compound: (Use only with written approval by architect.)

- 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
- 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
- 3) Maintain continuity of coating, and repair damage during curing period.
- 4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

f. Floors to Receive Curing and Sealing Compound:

- 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
- 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
- 3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

### 3.12 REINFORCING STEEL

- A. Conform to ACI 117 (ACI 117M).

### 3.13 APPLICATION OF LIQUID FLOOR TREATMENTS

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

### 3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
  - 1. Defer joint filling until concrete has aged at least one month.
  - 2. Do not fill joints until construction traffic has permanently ceased.
  
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
  
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints.
  
- D. Overfill joint, and trim joint filler flush with top of joint after hardening.

### 3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete:
  - 1. Repair and patch defective areas when approved by Architect.
  - 2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
  
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
  
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete.

- a. Limit cut depth to 3/4 inch (19 mm).
  - b. Make edges of cuts perpendicular to concrete surface.
  - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
  - d. Fill and compact with patching mortar before bonding agent has dried.
  - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
    - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    - b. Compact mortar in place and strike off slightly higher than surrounding surface.
  3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces:
1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
    - a. Correct low and high areas.
    - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  3. After concrete has cured at least 14 days, correct high areas by grinding.
  4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
    - a. Finish repaired areas to blend into adjacent concrete.
  5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
    - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
    - b. Feather edges to match adjacent floor elevations.
  6. Correct other low areas scheduled to remain exposed with repair topping.
    - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm)

- to match adjacent floor elevations.
- b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
7. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete.
    - a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around.
    - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
    - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
    - d. Place, compact, and finish to blend with adjacent finished concrete.
    - e. Cure in same manner as adjacent concrete.
  8. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar.
    - a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
    - b. Dampen cleaned concrete surfaces and apply bonding agent.
    - c. Place patching mortar before bonding agent has dried.
    - d. Compact patching mortar and finish to match adjacent concrete.
    - e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.16 FIELD QUALITY CONTROL

- A. Special Inspections and Testing Agency: Owner will engage a qualified testing and inspecting agency/special inspection to perform tests and inspections and to submit reports.
1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
  2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
  3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
    - a. Test reports shall include reporting requirements of ASTM C31/C31M,

ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

- 1) Project name.
- 2) Name of testing agency.
- 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
- 4) Name of concrete manufacturer.
- 5) Date and time of inspection, sampling, and field testing.
- 6) Date and time of concrete placement.
- 7) Location in Work of concrete represented by samples.
- 8) Date and time sample was obtained.
- 9) Truck and batch ticket numbers.
- 10) Design compressive strength at 28 days.
- 11) Concrete mixture designation, proportions, and materials.
- 12) Field test results.
- 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
- 14) Type of fracture and compressive break strengths at seven days and 28 days.

B. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

C. Inspections:

1. Steel reinforcement placement.
2. Headed bolts and studs.
3. Verification of use of required design mixture.
4. Concrete placement, including conveying and depositing.
5. Curing procedures and maintenance of curing temperature.
6. Verification of concrete strength before removal of shores and forms from beams and slabs.
7. Batch Plant Inspections: On a random basis, as determined by Architect.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
  - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M:
  - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - b. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete;
  - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M:
  - a. One test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31/C31M:
  - a. Cast and laboratory cure two sets of four 6-inch (150 mm) by 12-inch (300 mm) or 4-inch (100 mm) by 8-inch (200 mm) cylinder specimens for each composite sample.
  - b. Cast, initial cure, and field cure two sets of four standard cylinder specimens for each composite sample. Use field cured cylinders to verify adequacy of concrete that may be in question due to site conditions (such as freezing).
6. Compressive-Strength Tests: ASTM C39/C39M.
  - a. Test one set of four laboratory-cured specimens at seven days and one set of two specimens at 28 days.
  - b. Test one set of four field-cured specimens at seven days and one set of two specimens at 28 days.
  - c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. Unit Weight: ASTM C138-C138M density of fresh structural lightweight concrete.
  - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture. The fresh density should be consistent with that associated with the equilibrium density within a tolerance of plus or minus 4 lb/ft.<sup>3</sup>.
8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa) if specified compressive strength is 5000 psi (34.5 MPa), or no compressive strength test value is less than 10 percent of

- specified compressive strength if specified compressive strength is greater than 5000 psi (34.5 MPa).
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
  11. Additional Tests:
    - a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
      - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 (ACI 301M), section 1.6.6.3.
  12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
  13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness in accordance with ASTM E1155 (ASTM E1155M) within 48 hours of completion of floor finishing and promptly report test results to Architect.

### 3.17 PROTECTION

- A. Protect concrete surfaces as follows:
1. Protect from petroleum stains.
  2. Diaper hydraulic equipment used over concrete surfaces.
  3. Prohibit vehicles from interior concrete slabs.
  4. Prohibit use of pipe-cutting machinery over concrete surfaces.
  5. Prohibit placement of steel items on concrete surfaces.
  6. Prohibit use of acids or acidic detergents over concrete surfaces.
  7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
  8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

**END OF SECTION**

## SECTION 03 49 00

### GLASS-FIBER-REINFORCED CONCRETE (GFRC)

#### PART 1 - GENERAL

##### 1.1 SUMMARY

A. Section includes glass-fiber-reinforced concrete (GFRC) panels, consisting of GFRC, panel frames, anchors, and connection hardware.

1. GFRC brackets, soffits, fascia and balustrade at historical balcony.

B. Related Requirements:

1. Section 018316 "Exterior Enclosure General Requirements" for additional requirements related to the building enclosure including but not limited to:

- a. Performance and design requirements for the exterior building enclosure.
- b. Coordination of Work required to complete the Exterior Enclosure.
- c. Quality Assurance and Control procedures required for the work of the Exterior Enclosure.
- d. Exterior Enclosure Mock-ups including Pre-Construction Mock-ups.
- e. Independent inspection and testing required to verify performance of the work of this section.

2. Section 051200 "Structural Steel Framing" for supporting steel framing.

3. Section 054000 "CFMF" for soffit and miscellaneous framing.

4. Section 076500 "Cold Fluid Applied Flashing and Traffic Coating" for balcony traffic coating.

5. Section 079205 "Exterior Joint Sealants" for elastomeric joint sealants and sealant backings.

##### 1.2 DEFINITIONS

A. Definitions: Refer to Division 01 Section "Exterior Enclosure General Requirements" for definitions related to Exterior Enclosure.

B. Architect's Control Sample: Sample of approved GFRC color, finish and texture, preapproved by Architect, and available for review by bidders at Architect's office.

##### 1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate work of this section with adjacent components of the exterior enclosure. Participate in coordination required in Division 01 Section "Exterior Enclosure General Requirements".

- B. Preinstallation Meetings:
  - 1. Preinstallation Conference: Conduct conference at Project site.
  - 2. In addition to requirements specified in Division 01 Section "Project Management and Coordination," include the following:
- C. Exterior Enclosure Coordination Workshops: Participate in workshops indicated in Division 01 Section "Exterior Enclosure Performance Requirements."
- D. Sequencing / Scheduling: Comply with requirements specified in Division 1 Section "Exterior Enclosure Performance Requirements".

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include GFRC design mixes.
- B. Shop Drawings: Show fabrication and installation details for GFRC panels including the following:
  - 1. Panel elevations, sections, and dimensions.
  - 2. Thickness of facing mix, GFRC backing, and bonding pads for typical panels.
  - 3. Finishes.
  - 4. Joint and connection details.
  - 5. Erection details.
  - 6. Panel frame details including sizes, spacings, thicknesses, and yield strengths of various members.
  - 7. Locations and details of connection hardware attached to structure.
  - 8. Sizes, locations, and details of flex, gravity, and seismic anchors for typical panels.
  - 9. Other items sprayed into panels.
  - 10. Erection sequence for special conditions.
  - 11. Relationship to adjacent materials.
  - 12. Description of loose, cast-in, and field hardware.
- C. Samples for Verification: For each type of finish indicated on exposed GFRC surfaces, representative of finish, color, and texture variations expected, approximately 12 by 12 inches by actual thickness.
  - 1. Provide range samples as indicated in Quality Assurance article.
- D. Delegated-Design Submittal: For GFRC panels, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  - 1. Calculations shall be cross-referenced directly to the GFRC concrete shop drawings by drawing and detail number.
  - 2. Calculations shall be signed and sealed by the delegated design engineer.
  - 3. The GFRC drawings that describe anchorage to the structure and the anchorage of GFRC elements to each other shall be signed and sealed by the delegated design engineer.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Welding certificates.
- C. Mill Certificates: For structural-steel shapes and hollow structural sections used in panel framing.
- D. Source Quality-Control Program: For GFRC manufacturer.
- E. Source Quality-Control Test Reports: For GFRC, inserts, and anchors.

## 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating GFRC that meet or exceed performance requirements indicated and of documenting this performance by certification, labeling, and inclusion in lists. Manufacturer shall either have demonstrated experience or certification.
  - 1. Experience: Minimum five (5) years producing products similar to those required for this Project. Provided products for three (3) projects of scope, schedule and complexity similar to this Project within last two (2) years as acceptable to Architect.
    - a. Certify compliance. Include project descriptions with Owner and Design Professional contacts for previous experience and resume for designer.
  - 2. Certification: Designated a PCI-certified plant for Group G - Glass Fiber Reinforced Concrete or designated an APA-certified plant for GFRC production or otherwise qualified as determined by Architect
  - 3. Single Source Requirements: Products shall be supplied by one (1) manufacturer. Accessory products including, for example, fasteners, sealants and anchors may be from other than primary manufacturer if approved in writing by primary manufacturer and Architect.
- B. Delegated Design Engineer: Professional Engineer, licensed in State of Delaware and having a minimum of five (5) years documented experience designing systems similar to those required for this Project. Delegated Design Engineer shall sign and seal calculations and shop drawings.
  - 1. Delegated Design Engineer shall sign and seal calculations and shop drawings.
  - 2. Delegated Design Engineer's scope shall include everything indicated for delegated design submittals unless provided by manufacturers engineers. Provide multiple engineers with appropriate expertise to provide full scope of submittals if necessary.
  - 3. Delegated Design Engineer shall select proprietary anchors including but not limited to embedded slot anchors, cast-in anchors, chemical anchors, undercut

- anchors, and wedge anchors based on manufacturers test data and requirements for loading.
  - 4. Certify compliance. Include project descriptions with Owner and Design Professional contacts for previous experience and resume for designer.
  - C. Installer Qualifications: Company with experience and knowledge required for proper installation of this Project.
    - 1. Experience: Minimum five (5) years installing products similar to those required for this Project.
    - 2. Completed three (3) projects of scope, schedule and complexity similar to this Project using systems similar to those required for this Project within last two (2) years as acceptable to Architect.
    - 3. Certify compliance. Include project descriptions with Owner and Design Professional contacts for previous experience.
  - D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," and AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
  - E. Architect's Control Sample: Match Architect's Control Samples for color, quality and all visual effects.
  - F. Factory Pre-Assembly Inspection:
    - 1. Assemble the complete balcony inside of the fabricators plant, including brackets, soffit panels, fascia, and balustrade.
    - 2. Provide temporary support structure on which to assemble all components of the GFRC balcony.
    - 3. Provide approximately 100 photographs recording in detail the condition of the GFRC elements, joints, anchorage, and surface uniformity.
    - 4. Schedule so Architect can inspect the pre-assembled balcony before shipping to the project.
    - 5. After approval by Architect, protect GFRC, disassemble, package or crate, and otherwise prepare for shipping without damage.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Handle and transport GFRC panels supported on nonstaining material and with nonstaining resilient spacers between panels.
  - B. Store GFRC panels off of ground on firm, level, and smooth surfaces supported on nonstaining material and with nonstaining resilient spacers between panels. Place stored panels so identification marks are clearly visible.

## 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: (excluding GFRC louver panels)
1. Stromberg Architectural.
  2. Advanced Architectural Stone
  3. GFRC Cladding
- B. Source Limitations: Obtain GFRC panels from single source from single manufacturer, except GFRC louver panels may be obtained from an alternate manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design GFRC panels, including panel frames, anchors, and connections.
1. Delegated Design Engineer shall be responsible to design every component of the GFRC panels including the anchorage and support of the panels back to the structural frame. The extent of the structural frame is indicated on the structural drawings. Include reinforcing of structural frame at points of connection if necessary for loading.
  2. GFRC anchorage to structure shall be at points indicated on drawings and approved by structural engineer.
- B. General Performance: Comply with performance criteria indicated in Section 018320 "Exterior Enclosure General Requirements" and additional criteria indicated herein.
1. Color and Texture shall be evaluated by Architect according to criteria in Section 018320.
- C. Structural Performance: GFRC panels, including panel frames, anchors, and connections, shall withstand the following design loads as well as the effects of thermal- and moisture-induced dimensional changes within limits and under conditions indicated:
1. Loads: Delegated design engineer shall determine Cladding and Component loads per ASCE 7 based on criteria indicated on Structural Drawings.
    - a. Design balustrade to withstand guard loading criteria per code.
  2. Deflection Limits: Design panel frames to withstand design loads without lateral deflections greater than 1/240 of wall span.

- D. Movement of the Structure: Accommodate the following movement of the structural frame:
  - 1. Lateral Movement:  $H/400$ .
  - 2. Deflection of structure supporting the precast concrete and supporting edge of slab:
    - a. Typical live load deflection criteria:  $\text{span}/360$ .
    - b. Typical total load deflection criteria:  $\text{span}/280$ .
- E. Thermal Movements: Provide for in-plane thermal movements resulting from annual ambient temperature changes of 120 deg F and a surface temperature range of 180 deg. F. without causing undue stress on GFRC units, supports or anchors, sealed joint failure or other detrimental effects. Base engineering calculations on surface temperatures of materials due to both solar heat gain and night time sky heat loss.
- F. Design connections to permit adjustments sufficient for compliance with specified installation tolerances, without creating eccentricities resulting in non-compliance with specified structural requirements.
- G. Provide panels in as long of lengths as practical.
- H. PCI Manuals: Comply with requirements and recommendations in the following PCI manuals unless more stringent requirements are indicated:
  - 1. PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels."
  - 2. PCI MNL 130, "Manual for Quality Control for Plants and Production of Glass Fiber Reinforced Concrete Products."
- I. AISI Specifications: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- J. AISC Specifications: Comply with AISC 360, "Specification for Structural Steel Buildings."

## 2.3 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that provides continuous GFRC surfaces within tolerances; nonreactive with GFRC and capable of producing required finish surfaces.
  - 1. Mold-Release Agent: Commercially produced liquid-release agent that does not bond with, stain, or adversely affect GFRC surfaces and does not impair subsequent surface or joint treatments of GFRC.

## 2.4 GFRC MATERIALS

- A. Portland Cement: ASTM C 150/C 150M; Type I, II, or III, white.

1. For surfaces exposed to view in finished structure, use white of same type, brand, and source throughout GFRC production.
- B. Glass Fibers: Alkali resistant, with a minimum zirconia content of 16 percent, 1 to 2 inches long, specifically produced for use in GFRC, and complying with ASTM C 1666/C 1666M.
- C. Sand: Washed and dried silica, complying with composition requirements in ASTM C 144; passing a No. 20 sieve with a maximum of 2 percent passing a No. 100 sieve.
  1. Use white sand.
  2. Sand for exposed surfaces shall be dried and stored in waterproof containers to maintain a consistent moisture content at time of mixing throughout the project, including for making of samples.
- D. Facing Aggregate: ASTM C 33/C 33M, except for gradation, and PCI MNL 130, 1/4-inch maximum size.
  1. Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; white to match sample.
  2. Fine Aggregate: Natural or manufactured white sand with a maximum of 5 percent passing a No. 100 sieve and a maximum of 3 percent passing a No. 200 sieve, white to match sample.
  3. Aggregate for exposed surfaces shall be dried and stored in waterproof containers to maintain a consistent moisture content at time of mixing throughout the project, including for making of samples.
- E. Coloring Admixture: ASTM C 979/C 979M, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant.
- F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of GFRC and complying with chemical limits in PCI MNL 130.
- G. Polymer-Curing Admixture: Acrylic thermoplastic copolymer dispersion complying with PCI MNL 130.
- H. Air-Entraining Admixture: ASTM C 260/C 260M, containing not more than 0.1 percent chloride ions.
- I. Chemical Admixtures: ASTM C 494/C 494M, containing not more than 0.1 percent chloride ions.

## 2.5 ANCHORS, CONNECTORS, AND MISCELLANEOUS MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M, finished as follows:
  1. Finish: Zinc coated by hot-dip process according to ASTM A 123/A 123M, after fabrication, or ASTM A 153/A 153M, as applicable.

- B. Carbon-Steel Bars: ASTM A 108, Grade 1018, not less than 1/4 inch (6 mm) in diameter, finished as follows:
  - 1. Finish: Zinc coated by [hot-dip process according to ASTM A 123/A 123M, after fabrication, or ASTM A 153/A 153M, as applicable.
- C. Malleable-Iron Castings: ASTM A 47/ A 47M, Grade 32510 (Grade 22010).
- D. Carbon-Steel Castings: ASTM A 27/A 27M, Grade 60-30 (Grade 415-205).
- E. Bolts: ASTM A 307 or ASTM A 325 (ASTM F 568M or ASTM A 325M), finished as follows:
  - 1. Finish: Zinc coated by hot-dip process according to ASTM A 123/A 123M, after fabrication, and ASTM A 153/A 153M, as applicable.

## 2.6 PANEL FRAME MATERIALS

- A. Cold-Formed Steel Framing: Manufacturer's standard C-shaped steel studs, complying with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members," with minimum uncoated steel thickness of 0.053 inch of web depth indicated; with stiffened flanges, U-shaped steel track; and of the following steel sheet:
  - 1. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, structural-steel sheet, G90 (Z275) zinc coating, of grade required by structural performance of framing.
- B. Hollow Structural Sections: Steel tubing, ASTM A 500/A 500M, Grade B, or ASTM A 513, finished as follows:
  - 1. Finish: Shop primed with organic zinc-rich primer complying with SSPC-Paint 20 on surfaces prepared to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- C. Steel Channels and Angles: ASTM A 36/A 36M, finished as follows:
  - 1. Finish: Shop primed with organic zinc-rich primer complying with SSPC-Paint 20 on surfaces prepared to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

## 2.7 GFRC MIXES

- A. Mist Coat: Portland cement, sand slurry, and admixtures; of same proportions as backing mix without glass fibers.
- B. Backing Mix: Proportion backing mix of portland cement, glass fibers, sand, and admixtures to comply with design requirements. Provide nominal glass-fiber content of not less than 5 percent by weight of total mix.

- C. Polymer-Curing Admixture: 6 to 7 percent by weight of polymer-curing admixture solids to dry portland cement.
- D. Air Content: 8 to 10 percent; ASTM C 185.
- E. Coloring Admixture: Not to exceed 10 percent of cement weight.

## 2.8 PANEL FRAME FABRICATION

- A. Fabricate panel frames and accessories plumb, square, true to line, and with components securely fastened.
  - 1. Fabricate panel frames using jigs or templates.
  - 2. Cut cold-formed metal framing members by sawing or shearing; do not torch cut.
  - 3. Fasten cold-formed metal framing members by welding. Comply with AWS D1.3/D1.3M.
  - 4. Fasten framing members of hollow structural sections, steel channels, or steel angles by welding. Comply with AWS D1.1/D1.1M.
  - 5. Weld anchors to panel frames.
- B. Reinforce framing assemblies, as necessary, to withstand erection stresses.
- C. Galvanizing Repair: Touch up damaged galvanized surfaces according to ASTM A 780/A 780M.
- D. Painting Repair: Touch up damaged painted surfaces using same primer.

## 2.9 MOLD FABRICATION

- A. Construct molds that result in finished GFRC complying with profiles, dimensions, and tolerances indicated, without damaging GFRC during stripping. Construct molds to prevent water leakage and loss of cement paste.
  - 1. Coat contact surfaces of molds with form-release agent.
  - 2. Coat contact surfaces of molds with surface retarder.
- B. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during GFRC application. Coat form liner with form-release agent.
- C. Locate, place, and secure flashing reglets accurately.

## 2.10 GFRC FABRICATION

- A. Proportioning and Mixing: For backing mix, meter sand/cement slurry and glass fibers to spray head at rates to achieve design mix proportions and glass-fiber content according to PCI MNL 130 procedures.

- B. Spray Application: Comply with general procedures as follows:
1. Spray mist coat over molds to a nominal thickness of 1/8 inch (3 mm) on planar surfaces.
  2. Spray or place face mix in thickness indicated on Shop Drawings.
  3. Proceed with spraying backing mix before [face mix] [mist coat] has set, using procedures that produce a uniform thickness and even distribution of glass fibers and matrix.
  4. Consolidate backing mix by rolling or other technique to achieve complete encapsulation of glass fibers and compaction.
  5. Measure thickness with a pin gage or other acceptable method at least once for every 5 sq. ft. of panel surface. Take no fewer than six measurements per panel.
- C. Hand form and consolidate intricate details, incorporate formers or infill materials, and overspray before material reaches initial set to ensure complete bonding.
- D. Attach panel frame to GFRC before initial set of GFRC backing, maintaining a minimum clearance of 1/2 inch from GFRC backing, and without anchors protruding into GFRC backing.
- E. Build up homogeneous GFRC bonding pads over anchor feet, maintaining a minimum thickness of 1/2 inch over tops of anchor feet, before initial set of GFRC backing. Measure bonding pad thickness at 25 percent of anchor locations.
- F. Inserts and Embedments: Build up homogeneous GFRC bosses or bonding pads over inserts and embedments to provide enough anchorage and embedment to comply with design requirements.
- G. Provide a 1/2" wide quarter round drip approximately 1 1/2" back from face on all bottom edges or soffit conditions.
- H. Curing: Employ initial curing method that ensures sufficient strength for removing units from mold. Comply with PCI MNL 130 procedures.
1. Keep moisture off of the surfaces of mixes with polymer curing admixtures during the first three hours of curing. Maintain temperature between 60 and 120 deg F during the first 16 hours.
  2. Prevent drying of moist curing mixes during the first 24 hours. Maintain units in surface-damp condition at a temperature above 60 deg F and 95 percent relative humidity for seven days.
- I. Panel Identification: Mark each GFRC panel to correspond with identification mark on Shop Drawings. Mark each panel with its casting date.

## 2.11 FABRICATION TOLERANCES

- A. Manufacturing Tolerances: Manufacture GFRC panels so each finished unit complies with the following dimensional tolerances. For dimensional tolerances not listed below, comply with PCI MNL 130.

1. Overall Height and Width of Units, Measured at the Face Adjacent to Mold: As follows:
    - a. 10 feet or less, plus or minus 1/8 inch.
    - b. More than 10 feet, plus or minus 1/8 inch per 10 feet; 1/4 inch maximum.
  2. Edge Return Thickness: Plus 1/2 inch, minus zero inch.
  3. Architectural Facing Thickness: Plus 1/8 inch, minus zero inch.
  4. Backing Thickness: Plus 1/4 inch, minus zero inch.
  5. Panel Depth from Face of Skin to Back of Panel Frame or Integral Rib: Plus 3/8 inch, minus 1/4 inch.
  6. Angular Variation of Plane of Side Mold: Plus or minus 1/32 inch per 3 inches of depth, or plus or minus 1/16 inch total, whichever is greater.
  7. Variation from Square or Designated Skew (Difference in Length of Two Diagonal Measurements): Plus or minus 1/8 inch per 72 inches or plus or minus 1/4 inch total, whichever is greater.
  8. Local Smoothness: 1/4 inch per 10 feet.
  9. Bowing: Not to exceed L/240 unless unit complies with erection tolerances using connection adjustments.
  10. Length and Width of Block Outs and Openings within One Unit: Plus or minus 1/4 inch.
  11. Location of Window Opening within Panel: Plus or minus 1/4 inch.
  12. Maximum Permissible Warpage of One Corner out of the Plane of the Other Three: 1/16 inch per 12 inches of distance from nearest adjacent corner.
- B. Position Tolerances: Measured from datum line locations, as indicated on Shop Drawings.
1. Panel Frame and Track: Plus or minus 1/4 inch.
  2. Flashing Reglets at Edge of Panel: Plus or minus 1/4 inch.
  3. Inserts: Plus or minus 1/2 inch.
  4. Special Handling Devices: Plus or minus 3 inches.
  5. Location of Bearing Devices: Plus or minus 1/4 inch.
  6. Blockouts: Plus or minus 3/8 inch.
- C. Panel Frame Tolerances: As follows:
1. Vertical and Horizontal Alignment: 1/4 inch per 10 feet.
  2. Spacing of Framing Member: Plus or minus 3/8 inch.
  3. Squareness of Frame: Difference in length of diagonals of 3/8 inch.
  4. Overall Size of Frame: Plus or minus 3/8 inch.
- D. Criteria for damaged, defective or marred GFRC elements is defined under "Surface Visual Uniformity in Section 018316 – 1.2/A.6.

## 2.12 FINISHES

- A. Exposed faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints, shall be uniform, straight, and sharp. Finish exposed-face surfaces of GFRC to match approved samples and as follows:
  - 1. Match color and surface texture of XXXXXXXXXXXXXXXX

## 2.13 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Establish and maintain a quality-control program for manufacturing GFRC panels according to PCI MNL 130.
  - 1. Test materials and inspect production techniques.
  - 2. Quality-control program shall monitor glass-fiber content, spray rate, unit weight, product physical properties, anchor pull-off and shear strength, and curing period and conditions.
  - 3. Prepare test specimens and test according to ASTM C 1228, PCI MNL 130, and PCI MNL 128 procedures.
  - 4. Test GFRC inserts and anchors according to ASTM C 1230 to validate design values.
  - 5. Produce test boards at a rate of no fewer than one per work shift per operator for each spray machine and for each mix design.
    - a. For each test board, determine glass-fiber content according to ASTM C 1229 and flexural yield and ultimate strength according to ASTM C 947.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine structure and conditions for compliance with requirements for installation tolerances, bearing surfaces, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Examine each piece of GFRC for damage immediately before erection. Discard damaged panels and replace with undamaged panels before erection.

### 3.2 ERECTION

- A. Install clips, hangers, and other accessories required for connecting GFRC panels to supporting members and backup materials.

- B. Install GFRC panels level, plumb, square, and in alignment. Provide temporary supports and bracing as required to maintain position, stability, and alignment of panels until permanent connections are completed.
  - 1. Maintain horizontal and vertical joint alignment and uniform joint width.
  - 2. Remove projecting hoisting devices.
- C. Connect GFRC panels in position by bolting or welding, or both, as indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as possible after connecting is completed.
- D. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.3/D1.3M requirements for welding, appearance, quality of welds, and methods used in correcting welding work.
  - 1. Protect GFRC panels from damage by field welding or cutting operations, and provide noncombustible shields as required.
- E. At bolted connections, use lock washers or other acceptable means to prevent loosening of nuts.

### 3.3 ERECTION TOLERANCES

- A. Erect GFRC panels to comply with the following noncumulative tolerances:
  - 1. Plan Location from Building Grid Datum: Plus or minus 1/2 inch.
  - 2. Top Elevation from Nominal Top Elevation: As follows:
    - a. Exposed Individual Panel: Plus or minus 1/4 inch.
    - b. Nonexposed Individual Panel: Plus or minus 1/2 inch.
    - c. Exposed Panel Relative to Adjacent Panel: 1/4 inch.
    - d. Nonexposed Panel Relative to Adjacent Panel: 1/2 inch.
  - 3. Support Elevation from Nominal Elevation: As follows:
    - a. Maximum Low: 1/2 inch.
    - b. Maximum High: 1/4 inch.
  - 4. Maximum Plumb Variation over the Lesser of Height of Structure or 100 Feet: 1 inch.
  - 5. Plumb in Any 10 Feet of Element Height: 1/4 inch.
  - 6. Maximum Offset in Alignment of Matching Edges: 1/4 inch.
  - 7. Face Width of Joint: As follows (governs over joint taper):
    - a. Panel Dimension 20 Feet or Less: Plus or minus 1/4 inch.
    - b. Panel Dimension More Than 20 Feet: Plus or minus 3/8 inch.
  - 8. Maximum Joint Taper: 3/8 inch.
  - 9. Maximum Joint Taper in 10 Feet: 1/4 inch.

10. Differential Bowing, as Erected, between Adjacent Members of Same Design:  
1/4 inch.

### 3.4 REPAIRS

- A. Repairs are not allowed on GFRC elements that were damaged before installation. Inspect each GFRC element and do not install elements with damage.
- B. Limited repairs are permitted provided structural adequacy of GFRC panel and appearance are not impaired, as approved by Architect and if repair is not visible as defined under "Surface Visual Uniformity in Section 018316 – 1.2/A.6.
- C. Repairs are limited as follows:
  1. Patches less than 2 square inches
  2. Scratches less than 6" long.
  3. No more than one repaired patch or scratch per 50 square feet.
  4. No more than one repaired patch or scratch in any 5 balustrade elements.
- D. Mix patching materials and repair GFRC so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces.
- E. Prepare and repair accessible damaged galvanized coatings with galvanizing repair paint according to ASTM A 780/A 780M.
- F. Wire brush and clean accessible weld areas on prime-painted components and paint with same type of shop primer.
- G. Remove and replace damaged GFRC panels when repairs do not comply with requirements.

### 3.5 CLEANING AND PROTECTION

- A. Perform cleaning procedures, if necessary, according to GFRC manufacturer's written instructions. Clean soiled GFRC surfaces with detergent and water, using soft fiber brushes and sponges, and rinse with clean water. Prevent damage to GFRC surfaces and staining of adjacent materials.

**END OF SECTION 034900**

## SECTION 03 54 16

### HYDRAULIC CEMENT UNDERLAYMENT

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Polymer-modified, self-leveling, hydraulic cement underlayment for application below interior floor coverings.

##### 1.2 PREINSTALLATION MEETINGS

- ###### A. Preinstallation Conference: Conduct conference at Project site.

##### 1.3 ACTION SUBMITTALS

###### A. Product Data: For the following:

1. Hydraulic cement underlayment.
2. Primer.

- ###### B. Shop Drawings: Include plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.

##### 1.4 INFORMATIONAL SUBMITTALS

###### A. Qualification Data: For Installer.

###### B. Test Reports:

1. For fire-resistant ratings, from a qualified testing agency.
2. For STC-rated assemblies, from a qualified testing agency.

##### 1.5 QUALITY ASSURANCE

- ###### A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.

## 1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
1. Place hydraulic cement underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F (10 and 27 deg C).

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL Fire Resistance Directory or from the listings of another qualified testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
1. STC Rating: As indicated on Drawings.

### 2.2 HYDRAULIC CEMENT UNDERLAYMENTS

- A. Hydraulic Cement Underlayment: Polymer-modified, self-leveling, hydraulic cement product that can be applied in minimum uniform thickness of 1/4 inch (6 mm) and that can be feathered at edges to match adjacent floor elevations.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Ardex; K-15 Self-Leveling Underlayment Concrete.
    - b. L&M Construction Chemicals, Inc.; Levelex.
    - c. Maxxon Corporation; Level-Right.
    - d. Teck Specialties; Teck 2800.
  2. Cement Binder: ASTM C150/C150M, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C219.
  3. Compressive Strength: Not less than 4000 psi (27.6 MPa) at 28 days when tested according to ASTM C109/C109M.
  4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.
- B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm); or coarse sand as recommended by underlayment manufacturer.
1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.

- C. Water: Potable and at a temperature of not more than 70 deg F (21 deg C).
- D. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance of the Work.
- B. Proceed with application only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Prepare and clean substrate according to manufacturer written instructions.
  - 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
  - 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
  - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test, ASTM F1869: Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/100 sq. m) in 24 hours.
    - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 85 percent relative humidity level measurement, or as recommended by hydraulic cement underlayment manufacturer.
- C. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer written instructions.

#### 3.3 INSTALLATION

- A. Mix and install underlayment components according to manufacturer written instructions.
  - 1. Close areas to traffic during underlayment installation and for time period after installation recommended in writing by manufacturer.
  - 2. Coordinate installation of components to provide optimum adhesion to substrate and between coats.
  - 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.

- B. Apply primer over prepared substrate at manufacturer recommended spreading rate.
- C. Install underlayment to produce uniform, level surface.
  - 1. Install a final layer without aggregate to product surface.
  - 2. Feather edges to match adjacent floor elevations.
- D. Cure underlayment according to manufacturer written instructions. Prevent contamination during installation and curing processes.
- E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a hollow sound when tapped.

### 3.4 PROTECTION

- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

**END OF SECTION**

**NOT FOR BID**