

ADDENDUM #01

PROJECT: **RENOVATIONS TO PALMERTON WEIGHT ROOM**
ISSUE DATE: Tuesday, February 27, 2024

The following clarifications, amendments, additions, deletions, revisions and modifications in this Addendum forms a part of the Contract Documents and modifies the original Bidding Documents as noted below. This addendum must be acknowledged in the form of proposal in the space provided for this purpose. Failure to so acknowledge this addendum may subject the Bidder to disqualifications.

GENERAL

1. The Pre-bid meeting is to be held on 2/28/24 at 3pm. The pre-bid meeting is **non-mandatory**. Revise to all “mandatory pre-bid” language in specifications to “non-mandatory pre-bid”.

DRAWINGS

N/A

SPECIFICATIONS:

ADDED SPECIFICAITONS:

011100 – SUMMARY OF THE PROJECT
011200 – SUMMARY OF MULTIPLE CONTRACTS
011400 – WORK RESTRICTIONS
012100 – QUANTITY ALLOWANCES
012200 – UNIT PRICES
012300 – ALTERNATES
012600 – CONTRACT MODIFICATION PROCEDURES
012900 – PAYMENT PROCEDURES
013100 – PROJECT MANAGEMENT AND COORDINATION
013200 – CONSTRUCTION PROGRESS DOCUMENTATION
013300 – SUBMITTAL PROCEDURES
014000 – QUALITY REQUIREMENTS
014200 – REFERENCES
015000 – TEMPORARY FACILITIES AND CONTROLS
016000 – PRODUCT REQUIREMENTS
017300 – EXECUTION
017329 – CUTTING AND PATCHING
017419 – CONSTRUCTION WASTE MANAGEMENT
017700 – CLOSEOUT PROCEDURES
017823 – OPERATION AND MAINTENANCE DATA

017829 – PROJECT RECORD DOCUMENTS
017900 – DEMONSTRATION AND TRAINING
018109 – TESTING FOR INDOOR AIR QUALITY
019113 – GENERAL COMMISSIONING REQUIREMENTS

SECTION 01.1000- SUMMARY**PART 1- GENERAL****1.1 THE PROJECT**

- A. The Project consists of the RENOVATIONS TO PALMERTON WEIGHT ROOM
- B. The owner intends to award as multiple Stipulated Sum Contract for performance of all work required by the Contract Documents.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

Architect Identification: The Architect, acting as a consultant on this Project is the following:

**RANDY GALIOTTO, AIA
ALLOY5 ARCHITECTURE
530 WEST BROAD STREET,
BETHLEHEM PA 18018**

- A. Project will be constructed under concurrent multiple contracts. See Section 01.1200 "Summary of Multiple Contracts" for description of work included under each multiple contracts and for the responsibilities of Project coordinator. Prime Contracts for this project include:

- 1. GENERAL CONSTRUCTION CONTRACT**
- 2. PLUMBING CONTRACTION**
- 3. ELECTRICAL CONTRACT**

HVAC WORK IS CONTRACTED THROUGH MCCLURE COMPANY (ESCO) AND THE PALMERTON AREA SCHOOL DISTRICT. WORK IS NOT INCLUDED IN THE SCOPE OF THIS PROJECT.

1.3 WORK SEQUENCE

A. All work shall be conducted in a single phase, as indicated on the Drawings and elsewhere in the Contract Documents. Milestone dates include:

- | | |
|-----------------------------------|---|
| 1. OUT TO BID: | FEBRUARY 16, 2024 |
| 2. PRE-BID MEETING: | FEBRUARY 28, 2023 AT 3:00PM |
| 3. RFI CUT-OFF DATE: | MARCH 8, 2024 |
| 4. BIDS DUE: | MARCH 13, 2024 AT 3:00PM |
| 5. NOTICE TO AWARD: | MARCH 19, 2024 |
| 6. INSURANCE DUE: | APRIL 11, 2024 (INCLUDING EXECUTED CONTRACT) |
| 7. MOBILIZE: | APRIL 22, 2024 |
| 8. SUBSTANTIAL COMPLETION: | SEPTEMBER 6, 2024 |
| 9. FINAL COMPLETION: | SEPTEMBER 27, 2024 |

B. The work shall be conducted shown above and shall be in compliance with the milestone dates listed. Any deviation from these phases or the work and milestone dates included in each phase shall be subject to approval of the Owner.

C. The CPM schedule and coordination and sequence of work shall be in full compliance with the project phasing and milestone dates.

D. The entire work of all the contracts shall be substantially complete no later than the date indicated, based on a Notice to Proceed issued no later than date indicated. If the notice to proceed or start of any phase is delayed by the Owner, all subsequent phasing dates, substantial and final completion dates will be extended by the exact same number of days of the delay. No additional time other than the extension noted above and no costs will be considered for such approved delay. Furthermore, by submitting a bid and executing a contract with the owner, the contractor forfeits all rights to delay claims should the Notice to Proceed be delayed for any reason at all and the contractor understands that at any time the owner reserves the right to move the start date APRIL 22, 2024 with substantial completion date being SEPTEMBER 6, 2024 and final completion being SEPTEMBER 27, 2024.

E. Work in the building shall be performed in a sequence to ensure that all building systems are systematically installed in an efficient manner. The mechanical and electrical rooms shall be constructed in an early sequence to permit rough-in.

F. All work must be completed in a sequence approved by the Owner and Architect.

G. The General Construction Contractor shall be the coordinating contractor among the sub contractors for the project. All other sub contractors shall cooperate and coordinate their work with the General Construction Contractor.

H. Work not properly coordinated with the General Construction Contractor and within the design intent shall be reinstalled by the respective sub contractor including all associated work at no additional cost to the Owner.

J. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

1.4 OWNER OCCUPANCY

A. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion, provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. Obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.
2. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
3. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections, training and tests shall have been successfully completed. Upon occupancy the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

4. Upon occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

B. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
2. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
3. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of building.
4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.5 USE OF PREMISES

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

1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
2. Burial of Waste Materials is not permitted.
3. Reference Phasing Plan and Not.
4. Owner Occupancy: Allow for Owner occupancy of site.
5. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. General Contractor shall be responsible for site access control, coordination and cleaning of site and public roads.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
6. Comply with the requirements of municipal agencies having authority and project NPD ES permit requirements. Each Contractor shall be required to be named as a co-permittee on the Owner's Application.

B. Emergency Egress: Contractor shall maintain required emergency egress exists and access corridors from all occupied spaces in the existing building throughout the construction period.

1.6 WORK RESTRICTIONS

A. On-Site Work Hours: Work shall be generally performed inside the existing building during normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, except otherwise indicated. All work required in existing occupied building is must be coordinated and approved with the owner.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.
3. Electrical Tie-in's must occur on weekends or in the evening.

C. Nonsmoking Building: Smoking is not permitted within the construction area or within 25 feet (8 m) of entrances, operable windows, or outdoor air intakes.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSVSC's "MasterFormat" numbering system.

1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

- a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon(:) is used within a sentence or phrase.

1.8 MISCELLANEOUS PROVISIONS

A. Existing Utilities: The Contractor shall call 800-242-1776 "One Call System" as indicated prior to performing any excavation work.

1. Locate existing underground utilities in areas of excavation work prior to beginning excavation operations. Visibly mark or stake existing utilities for the duration of construction and renovations. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
3. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by Owner and then only after acceptable temporary utility services have been provided.
4. Provide minimum 48-hour notice to Owner and receive written notice to proceed before interrupting any utility.

B. Pennsylvania Statutes and Regulations Act 247: Each Contractor shall comply with the requirements set forth in the "Pennsylvania Statutes and Regulations Act 247, Notice to Bidders- Recent Anti-Pollution Legislation". The Contractor shall agree to comply with the provisions of this Act as amended and that it is made part of the Contract Documents.

C. Compliance with Pennsylvania Acts 287 and 222: Contractors shall call 800-248-1786 (One Call System) to verify the exact location of underground facilities within not less than three (3) nor more than ten (10) working days prior to beginning any excavation or demolition work as required by General Assembly of the Commonwealth of Pennsylvania Act 172 (HB 1735).

1. The General Prime Contractor shall perform periodic inspections of the building progression to insure compliance with the "Building Energy Conservation Act", Act 222 and agrees to sign the inspection section of the "Certificate of Design" form and the "Final Certification of Compliance" form, as required by Act 222.

D. Soil Erosion Control: Comply with the requirements of the Pennsylvania Department of Environmental Resources' "Soil Erosion and Sedimentation Control Manual" (Latest Edition). Secure forms and permits as required.

E. Right to Know Act: All Contractors shall comply with and require their sub-contractors and suppliers etc., to comply with the requirements of the Pennsylvania Act 194 "Right to Know Act".

F. Pennsylvania Human Relations Act 222: The provisions of the Pennsylvania Human Relations Act, Act 222 of October 27, 1955 (P.L. 744)(43 P.S. Section 951, et seq.) of the Commonwealth of Pennsylvania prohibit discrimination because of race, color, religious creed, ancestry, age, sex, national origin, handicap or disability, by employers, employment agencies, labor organizations, contractors and others.

The contractor shall agree to comply with the provisions of this Act as amended that is made part of this specification. Your attention is directed to the language of the Commonwealth's non-discrimination clause in 16 PA. Code 49.101.

G. Discrimination Prohibited: Each contract entered into by a government agency for the construction, alteration or repair of any public building or public work shall contain the following provisions:

1. According to 62 Pa. C.S.A. § 3701, the contractor agrees that:

- a. In the hiring of employees for the performance of work under the contract or any subcontract, no contractor, subcontractor or any person acting on behalf of the contractor or subcontractor shall be reason of gender, race, creed, or color discriminate against an citizen of this Commonwealth who is qualified and available to perform the work to which the employment relates.
- b. No contractor or subcontractor or any person on their behalf shall in any manner discriminate against or intimidate any employee hired for the performance of work under the contract on account of gender, race, creed or color.
- c. The contract may be canceled or terminated by the government agency, and all money due or to become due under the contract may be forfeited for a violation of the terms or conditions of that portion of the contract.

H. Standard of Quality: The various materials and products specified in the specifications by name or description are given to establish a standard of quality and of cost for bid purposes. It is not the intent to limit the bidder, the bid or the evaluation of the bid to any one material or product specified but rather to describe the minimum standard. When proprietary names are used, they shall be followed by the words "or alternatives of the quality necessary to meet the specifications". A bid containing an alternative which does not meet the specifications may be declared non-responsive. A bid containing an alternative may be accepted, but, if an award is made to that bidder, the bidder will be required to replace any alternatives which do not meet the specifications.

I. Provision for the use of Steel and Steel Products made in the United States: In accordance with Act 3 of the 197 68 General Assembly of the Commonwealth of Pennsylvania, if any steel or steel products are to be used or supplied in the performance of the contract, only those produced in the United States as defined therein shall be used or supplied in the performance of the contract or any subcontracts there under.

1. In accordance with Act 161 of 1982, cast iron products shall also be included and produced in the United States. Act 141 of 1984 further defines "steel products" to include machinery and equipment. The act also provides clarifications and penalties.

J. Workmen:

1. Citizen Workmen: Only citizens of the United States of America shall be employed, in any capacity in the performance of any work under the Contract; provided, however, that apprentices to a trade or profession who maybe under twenty-one (21) years of age shall not be subject to the foregoing restriction.
2. Competent Workmen: No workmen shall be regarded as competent first class, within the meaning of this Act, except those who are duly skilled in their respective branches of labor, and who shall be paid not less than such rates of wages and for such hours work as shall be established and current rates of wages paid for such hours by employers of organized labor in doing of similar work in the district where work is being done.

K. Asbestos: Whether indicated or not, all products on this project shall be asbestos-free. If any suspected asbestos-containing material are installed, the Owner has the right to have the material in question tested and if

proven to contain asbestos, the Contractor shall remove all material in question and replace it with acceptable material at no additional cost to the Owner.

L. Protection of Employees, and Public: Take necessary precautions and provide adequate safeguards to employees and the public against damage or injury which may result from operations under Contract. Particular attention should be given to the playground areas.

M. Project Sign: Not Required

N. Schedule of Values and Cost Breakdowns: Within 15 days after award of contract, each prime Contractor shall provide a breakdown of the contract sum in sufficient detail to facilitate continued evaluation of payment requests. Break down principal sub-contract amounts into several line items. The Architect reserves the right to required additional further breakdowns upon notification at no additional cost to the Owner.

O. Surveys: The General Construction Contractor shall retain a competent registered engineer to lay out building on site, establish grade lines and levels for his own work and that of all trades, do other usual engineering work required. Any discrepancies between established lines, existing conditions and drawings shall be immediately reported to Architect for correction and adjustment Engineer shall establish a permanent bench mark in the field, as well as other suitable reference points for use of those concerned in erection and checking offlines and levels. The engineer shall profile rock before and after excavation.

P. Use of Tobacco Products: smoking and other use of tobacco is prohibited in buildings and property owned by or under the control of Cedar Crest College....Contractors and their employees working on Cedar Crest College property are similarly prohibited from smoking in College owned buildings.

Q. Safety: Contractor is responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work.

1. Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury, or loss to all employees on the Work and all other persons who may be affected thereby.
2. Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations, codes and standards bearing on the safety of persons or property or their protection from damage, injury or loss, including without limitation, compliance with the requirements of the Occupational Safety and Health Act (OSHA) as amended from time to time. Nothing in this agreement or any other company directive or document relieves the Contractor from fully understanding and complying with the foregoing. Contractor shall develop and implement safety program responsive to the standards of OSHA, communicate such safety program to its employees, and Contractor will strictly enforce the safety rules under such safety program.
3. Barricades and Guard Lights - Provide and maintain barricades, railings, and guard lights at obstructions, trenches, excavations, newly laid concrete, etc., wherever necessary to safeguard public and in accordance with applicable codes and ordinances.

R. Americans with Disabilities ACT (ADA): Whether indicated or not, the Contractor must comply with Americans with Disabilities Act Guidelines (ADAG) and ANSI 117.1-1986, including but not limited to mounting heights of all equipment, fixtures, accessories, clearances, hardware, railings, signage, etc.

S. Sales and Use Taxes: The Owner is **not** exempt from the Pennsylvania State Sales Tax. Contractors shall pay any and all applicable taxes in accordance with the Pennsylvania State Sales Tax.

T. Taxes: Contractor shall pay when due, all taxes or assessments applicable to the Contractor. The Contractor shall comply with the provisions of the applicable statutes and the regulations of the applicable taxation authority. Any taxes levied upon this contract, the transaction, or the equipment, goods or services delivered pursuant hereto shall be the responsibility of the Contractor. The Contractor will be required to accept liability for payment of all payroll taxes or deductions required by local and federal law, including, but not limited to old age pension, social security, or annuities.

1. See Division 01 "Payment Procedures" for requirements to be included in the Schedule of Values regarding taxes.

U. Protection Requirements:

1. Bracing, Shoring, and Sheeting: Provide shoring, bracing, and sheeting required to safely execute work under contract and remove it after it has served its purpose.
2. Loss by Theft, or other Causes: Contractor shall protect against loss of material, work, or equipment by theft, vandalism or other causes and take such precautions as he sees fit to protect himself against loss therefrom. To safeguard building and contents, stored materials, and equipment may necessitate watchman's service and Contractor shall bear the cost for such service.
3. Weather Protection: Provide adequate protection of work and materials against damage by elements, rain, snow, wind, storms, frost, or heat. At end of day's work, protect new work liable to damage with temporary covering.
4. Fire Protection: Take reasonable precaution to guard against damage by fire and provide suitable fire protection equipment as deemed necessary. Do not build fire on premises.
5. Site Protection: Protect roads, curbs, sidewalks, and landscape work from damage, providing guards and covering, whether on site, on adjacent properties, or on public streets. Repair or replace damaged work at Contractor's expense.
6. Adjoining Property: Take adequate precautions and provide safeguards to protect adjoining property, buildings, fences etc., against damage from blasting, excavating, moving equipment or other operations under this control.

PART 2- PRODUCTS (Not Used)

END OF SECTION 01.1000

SECTION 01.1200- SUMMARY OF MULTIPLE CONTRACTS**PART 1- GENERAL****1.1 SUMMARY**

A. This Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.

B. Specific requirements of each contract are also indicated in individual Specification Sections and on Drawings.

C. Related Sections include the following:

1. Division 01 Section "Summary of Work" for the Work covered by Contract Documents and for work sequence.
2. Division 01 Section "Work Restrictions" for use of the Project site and for requirements for continued Owner occupancy of premises.
3. Division 01 Section "Project Management and Coordination" for general coordination requirements.
4. Division 01 Section "Temporary Facilities and Controls" for specific requirements for temporary facilities and controls.
5. Division 01 Section 017419 "Construction Waste Management" for additional information and procedures.
6. Division of Section 019113 "General Commissioning Requirements" for additional information and procedures.

1.2 DEFINITIONS

A. Permanent Enclosure: As determined by Architect and/or Construction Manager, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial (watertight and insulated) temporary closures.

B. Coordinate: The term "coordinate" means "to cooperate with related trades to furnish and install all connections between the trades in correct sequence size and location to create a complete system ready for intended use."

C. Verify: The term "verify" means "to measure, investigate, review, test, check the accuracy or correctness of and prove by demonstration, evidence, or testimony the location, size, dimension and condition of an item."

D. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations."

E. Install: The term “install” is used to describe operations at the project site including the actual “unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, performing, coordinating with other trades, protecting, cleaning, and similar activities.”

F. Provide: The term “provide” means “to furnish and install, complete and ready for the intended use

1.3 COORDINATION

A. Project Coordinator shall be responsible for coordination between the General Construction Contract, Plumbing Contract, Electrical Contract.

1. General Construction Contractor shall act as and assume responsibilities of Project Coordinator which are designated throughout the Contract Documents.

B. Plumbing & Electrical Coordinators, who shall be subordinate to Project Coordinator, shall be responsible for coordination between the Plumbing Contract and Electrical Contract. The General Contractor shall be responsible for the assembly of coordination drawings for himself and the inclusion of coordination drawings provided by the Electrical and Plumbing Contractors. The General Contractor shall be the primary E/P coordinator and shall be responsible for the preparation of AutoCAD electronic coordination drawings between plumbing and electrical trades. The Plumbing and Electrical Contractors shall provide such information electronically to fully coordinate their work with that of the other primes and in the format requested by the General Contractor. All Prime Contractors shall cooperate and be responsible for preparation and compliance with coordination drawings. See Section 013117 for requirements for all Prime Contractors.

D. GC shall coordinate all work in accordance with project phasing requirements and scheduled activities of all other contractors. GC shall perform cutting and patching of all roofing materials including metal deck. Any structural reinforcement required is by the General Contractor.

1.4 PROJECT COORDINATOR

A. Project Coordinator: Full-time Project Coordinator shall be experienced in administration and supervision of building construction, including plumbing and electrical work.

1. Coordination activities of Project Coordinator include, but are not limited to, the following:

- a. Provide overall coordination of the Work.
- b. Coordinate shared access to work spaces.
- c. Coordinate product selections for compatibility
- d. Provide overall coordination of temporary facilities and controls.
- e. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
- f. Coordinate construction and operations of the Work with work performed by each contract.

- g. Prepare Coordination Drawings to coordinate work by more than one contract except for electrical and plumbing coordination drawings which are the responsibility of the respective Contractors and primarily the General Contractor.
- h. Coordinate sequencing and scheduling of the Work. Include the following:
- 1) Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with contractors for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
 - 2) Prepare a combined Contractor's Construction Schedule for entire Project. Base schedule on Preliminary Construction Schedule. Secure time commitments for performing critical construction activities from contractors. Show activities of each contract on a separate sheet. Prepare a summary sheet indicating combined construction activities of contracts.
 - 3) Distribute copies of schedules to Architect, Owner, and contractors.
- i. Provide quality-assurance and quality-control services specified in Division 01 Section "Quality Requirements."
- j. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
- k. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
- l. Perform field engineering, construction layout and locate existing permanent benchmarks and control points. Provide similar reference points and establish permanent benchmarks, control points and elevations on project site for use by other prime contractors and all trades.
- m. Provide field surveys of in-progress construction and site work.
- n. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked. Progress cleaning of building and site shall be performed on a daily basis. Site cleaning shall include removal of mud and debris from all areas and in particular all sidewalks and streets.
- o. Provide final cleaning of building except for floor waxing.
- p. Coordinate cutting and patching.
- q. Coordinate protection of the Work.
- r. Coordinate firestopping.

- s. Coordinate preparation of Project Record Documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
- t. Collect Record Specification Sections from other contractors, collate Sections into numeric order and submit complete set.
- u. Coordinate preparation of operation and maintenance manuals if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
- v. Coordinate efforts to meet the requirement for all Contractors and Subcontractors to dispose of their construction waste in accordance with the Construction Waste Management Plan in compliance with Section 017419.
- w. Complete IAQ checklist on a scheduled basis.

B. Plumbing, Electrical Coordinators: Full-time, Plumbing, Electrical Coordinators shall be experienced in coordination of plumbing, and electrical construction, including coordination of type of operations required for this Project.

1. Coordination activities of Plumbing, Electrical Coordinators
Include, but are not limited to, the following:

- a. Schedule and sequence Plumbing, electrical, and general construction activities.
- b. Coordinate sharing access to work spaces by electrical and plumbing contractors.
- c. Coordinate integration of electrical and plumbing work into limited spaces.
- d. Coordinate protection of electrical and plumbing contractors' work.
- e. Coordinate cutting and patching for electrical and plumbing work.
- f. Prepare electrical and plumbing Coordination Drawings.
- g. Coordinate tests and inspections for electrical work.
- h. Coordinate electrical and plumbing temporary services and facilities.
- i. Coordinator shall coordinate activities related to the Construction IAQ Management Plan in compliance with Section 018113. Refer to Section 013117 Coordination Drawings for specific requirements.

1.5 CONTRACTS, GENERAL

A. Extent of Contract: Unless the Contract Documents contain a more specific description of the Work, names and terminology on Drawings and in Specification Sections determine which contract includes a specific element of Project.

1. Unless otherwise indicated, the Work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
2. Local custom and trade-union jurisdictional settlements do not control the scope of the Work of each contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, affected contractors shall negotiate a reasonable settlement to avoid or minimize interruption and delays.
3. Trenches for the Work of each contract shall be provided by each contract for its own Work unless noted otherwise.
4. Cutting and patching for the Work of each contract shall be provided by each contract for its own Work. Refer to Section 017329 Cutting and Patching.
5. Firestopping for the Work of each contract shall be provided by each contract for its own Work.
6. Submit schedules showing construction operations sequenced and coordinated with overall construction and provide all scheduling and coordination information required for the complete scope of work.
7. Refer to "Field Engineering" specification for responsibilities of each trade.

B. Substitutions: Each contractor shall cooperate with other contractors involved to coordinate approved substitutions with remainder of the Work.

C. Temporary Facilities and Controls: See specific responsibilities for temporary facilities and controls indicated in Division 01 Section "Temporary Facilities and Controls," and noted on the Contract Documents.

D. The Contractor responsible for installation of the systems and equipment is responsible for commissioning each system, and for the coordination with Owner's Commissioning Agent. The minimum commissioning requirements in accordance with Section 019113 and other specific project requirements, including coordination and verification, shall be the responsibility of the Contractor.

1.6 MULTIPLE PRIME COORDINATION CLARIFICATIONS

A. General Contractor shall furnish and install lintels and structural supports required for openings and recesses in new construction to allow the passage of the Work of his Contract and the Work of the Plumbing and Electrical Prime Contracts.

B. During placement of concrete slabs, each Prime Contractor that has rough-in requirements in the slab shall provide on-site personnel while slabs are being poured to direct, supervise, locate, mark, and configure rough-in requirements. Sleeves required for floor, wall and roof penetrations shall be furnished and installed by the Prime Contractor(s) that require the sleeves. The Prime Contractor using the sleeves is responsible for installing sealant, firesafing and/or escutcheons necessary for a finished installation.

C. Prime Contractors who fail to properly coordinate their work in new construction work and whose work requires an opening, or recess, in completed construction shall be responsible to provide that alteration; to furnish and install lintels and structural supports required; and to patch the construction to match the completed unaltered.

D. General Contractor shall apply sealant around wall mounted outside air intake louvers provided by the ESCO Contractor.

E. General Contractor shall provide sanitary and storm sewer system from a point five feet outside the perimeter of the building, unless noted otherwise. Plumbing Contractor shall provide sanitary and storm system within building including open air enclosed courtyards and underground to a point five feet outside the building perimeter, unless noted otherwise and shall make final connection to storm and sanitary system.

F. General Contractor shall provide site water supply system from a point five feet outside the perimeter of the building unless noted otherwise. Plumbing Contractor shall provide plumbing water supply system within building and underground to a point five feet outside the building perimeter, and shall make final connection to water supply system. The Plumbing Contractor shall provide fire suppression system within building and underground to a point five feet outside the building perimeter, unless noted otherwise, and shall make final connection to water supply system.

I. Plumbing Contractor shall make final connections and shall provide valved connections to make-up water feeders to chilled water and hot water system, as indicated.

J. General; Plumbing; and Electrical Contractors shall disconnect items of food service equipment scheduled for non-reuse, relocation or reuse.

K. Electrical Contractor shall provide electrical service and connection of food service equipment and auxiliary equipment.

L. Plumbing Contractor shall provide water and sewer connections to food service and auxiliary equipment.

M. Plumbing Contractor shall make final connections on gas-fired equipment as indicated.

N. Plumbing Contractor shall provide devices for food service equipment such as hose bibbs, washing machine outlet box, water conditioner, water filter and pet cock for icemaker, hose reel with control units.

O. Interior concrete bases and pads required for plumbing, fire suppression, heating, ventilation, and air conditioning, and electrical equipment shall be provided by the contractor installing the equipment unless noted otherwise. General Contractor shall provide exterior concrete pads and bases with exception of exterior light

bases, generator pad and transformer pad. Exterior light pole bases, generator pads, and transformer pads are by the Electrical Contractor.

P. and Plumbing Contractors shall provide control interlock wiring for their associated system equipment.

Q. Electrical Contractor shall provide disconnect switches for Plumbing system equipment except where such items are factory installed as an integral part of the equipment.

R. Electrical Contractor shall provide manual motor starters, or magnetic motor starters, for Plumbing equipment except where such equipment is provided with factory installed starters as an integral part of the equipment or equipment control panel. Variable frequency drives shall be an integral part of HVAC equipment and variable speed pumping package.

S. Electrical Contractor shall provide fuses for disconnects and disconnect/starter switches. and Plumbing Contractors shall furnish the Electrical Contractor with required motor data to properly size and select fuses and overload protection in accord with the National Electrical Code requirements. Plumbing Contractors shall furnish to the Electrical Contractor the equipment manufacturers' circuit protection data.

T. Where fireproofing is indicated for the project each Prime Contractor shall install clips, hangers, supports, sleeves, runners, and other items required prior to installation of fireproofing. Each Prime Contractor shall protect fireproofing material; damages to fireproofing shall be repaired by the General Contractor and charged to the Prime Contractor responsible for the damage; this includes items installed out of sequence.

U. Plumbing and Electrical Contractors shall provide miscellaneous steel members for support of hanging systems installed under their contract, and shall reinforce joists for non-panel point concentrated loads. When run parallel to joists, hanging systems shall be supported from steel installed perpendicular to joists and spanning a minimum of three (3) joists. All miscellaneous steel required shall be provided by contractor installing the systems under their contract; do not use joists for support. Supporting from metal roof deck and deck systems is prohibited.

V. All grease waste piping is by the Plumbing Contractor. Grease interceptor shall be by the Plumbing Contractor.

W. General Contractor shall provide door louvers.

X. Contractor shall install ductwork extension from dryer and for dishwasher and make final connections. Contractor shall install ductwork extension from fume hoods and make final connections.

Y. Contractor shall set controls, panelboards, and appurtenances installed in pipe lines and ductwork and shall provide control wiring.

Z. Electrical Contractor shall provide devices, wiring within casework and final connections for educational casework as provided for in the contract documents.

AA. Plumbing Contractor to provide all fixtures, traps, etc. to provide all installation and final connections of sinks, faucets, and fittings. Coordinate this work with the General Contractor as provided in the contract documents.

BB. Plumbing Contractor to coordinate tie-in of sprinkler system to fire alarm system with Electrical Contractor. Plumbing Contractor to provide flow and tamper switches for connection to fire alarm system.

CC. Plumbing and Electrical Prime Contracts shall furnish any access panels which are required for access to their work. Coordinate opening requirements with the General Contractor for installation by GC.

DD. The Mechanical Contractor shall furnish and install all exterior louvers.

EE. The disconnection and/or reconnection of existing equipment shall be by the Plumbing//Electrical Contractor as applicable.

FF. All removal and demolition of rooftop equipment will be by necessary M/E/P Primes. Patching of existing roof will be by GC with one (1) week notice.

GG. All roofing work will be performed by GC

i. GC shall coordinate all work in accordance with project phasing requirements and scheduled activities of all other contractors. GC shall perform cutting and patching of all roofing materials including metal deck. Any structural reinforcement required is by the General Contractor.

ii. The GC shall be responsible to maintain water tight conditions between the roof and all MEP curbs or penetrations for both permanent and temporary flashing. The MC, PC, and EC shall be responsible for providing temporary enclosures that are watertight for all roof penetrations and openings that are part of their scope in order to maintain water tight conditions beyond the roofer's flashings

iii. General Contractor shall also provide chases and openings 12" x 12" or larger for equipment in new construction, including all roof areas, as directed, supervised, located, marked, and configured within the project structure, by the Plumbing; ; and Electrical Prime Contractors' personnel on-site. All these openings shall be sealed by the prime contractor requiring the opening. All sleeves, conduits and sealing of the same shall be furnished and installed by the prime contractor that requires the access for installation of systems. Roofing Contractor shall perform cutting and patching of roof materials as directed by the other Prime Contractors for the implementation of their work. The Prime Contractors shall be responsible to seal all roof openings. GC is responsible up to curb flashings.

iv. For work on the existing building, the GC shall furnish and install roof drains and pipe from the drain up to and including the first elbow. GC shall tie in the new pipe to the existing pipe or new pipe (furnished by Plumbing Contractor). For work on the new building additions, the GC shall furnish and install the roof drain. The Plumbing Contractor (PC) shall install all piping and tie the new piping, including elbow, into the roof drain.

v. For all rooftop equipment, the Prime Contractor responsible for providing the equipment shall also provide and install all wood blocking required to accommodate and adjust for the scope of the roof prior to installation of the equipment curbs.

1.7 MULTIPLE PRIME COORDINATION FOR ELECTRONIC / ELECTRIC TEMPERATURE CONTROLS, DIVISION 23

A. The Electrical Contractor shall provide electric power wiring to new plumbing and equipment. Contractor shall provide electric power wiring and control wiring for ATC equipment and devices.

B. The Electrical Contractor shall furnish duct smoke detectors. The Mechanical Contractor shall install and wire duct smoke detectors to the ATC/BAS system. The Electrical Contractor shall connect each smoke detector to the building fire alarm system, and provide the wiring to de-energize the fans. The ATC/BAS subcontractor shall make final connection to the unit.

C. The Electrical Contractor shall provide all interlock wiring specific to equipment.

1.8 GENERAL CONSTRUCTION CONTRACT (GC)

A. The Work under the General Construction Contract includes site work, demolition, architectural and structural construction and other activities traditionally recognized as general construction required by any of the Contract Documents including, but not limited to, the architectural, civil, structural and food service drawings, specification Divisions 00 through 13, 31, 32 and 33 except when specifically assigned to another Contract for construction. Work in the General Construction Contract includes, but is not limited to, the following:

1. Field engineering, site and building layout.
2. Site preparation, including demolition, clearing, earthwork and construction waste management for sitework and demolition.
3. Site improvements, including roadways, parking lots, pedestrian paving and landscaping.
4. Site utility piping and trenches shown on site drawings or referenced from site drawings.
5. Excavation and backfill of all site and utility trenches unless noted as responsibility of other contractors.
6. Site water supply and distribution.
7. Site sanitary sewer.
8. Site storm sewer.
9. GC responsibilities for gas service shall be as stated on the Civil Drawings.
10. Site stairs, rails and walls.
11. Road improvements and site signage as indicated.
12. Foundations, including footings, foundation walls.
13. Slabs-on-grade, including earthwork, subdrainage systems, and insulation.

14. Below-grade building construction, including excavation, backfill, and thermal and moisture protection.
15. Superstructure, including floor and roof construction.
16. Insulation and fireproofing.
17. Exterior closure, including walls, doors, windows.
18. Masonry work, rough and finish carpentry.
19. Framing for all roof and floor openings and supported equipment, including coordination for all roof work.
20. Installation of all roof curbs furnished by MC.
21. Interior construction, including partitions, doors (wood, hollow metal, aluminum, etc.), fittings, finish, hardware and glazing.
22. Fire suppression specialties and fire-rated framing and glass.
23. Scuttles and roof accessories.
24. Stairs, including railings and finishes.
25. Finishes.
26. Food service equipment and work.
27. Lockers.
28. Furnishings, including casework, specialty casework and window treatments.
29. Firestopping of General Contractor work.
30. Implementation of a construction waste management plan for the project.
31. Openings including windows, doors and hardware
32. Specialties
33. Starting, commissioning, adjusting and training of all General Construction systems and equipment.
34. Provide all aluminum windows, storefronts, entrance doors, glass, and glazing.
35. Provide all drywall, metal studs, insulation, acoustical ceilings.
36. Provide all expansion joints and covers.

37. Removal of storage tanks and other accessories.

1.9 PLUMBING CONTRACT (PC)

A. The Work under the Plumbing Construction Contract includes all construction and other activities traditionally recognized as plumbing work required by any of the Contract Documents including, but not limited to, the plumbing drawings, specification Divisions 00, 01, 02, 03, 07, 11, 13, 31, 21 and 22 except when specifically assigned to another contract for construction. Work in the Plumbing Contract includes, but is not limited to, the following:

1. Storm sewer, water service from five (5) feet outside building
2. Domestic water distribution, including main water service systems from five (5) feet outside building.
3. Plumbing fixtures
4. Sanitary waste.
5. Stormwater drainage.
6. Fire suppression sprinklers including sprinkler piping, heads, flow and tamper switches, trim, accessories and support.
7. Fire suppression hydraulic calculations to size fire suppression system.
8. Acid neutralizing traps at Science demonstration tables.
9. Plumbing connections to equipment furnished by the General Construction Contract, Plumbing Contract, Contract and Electrical Contract.
10. Preparing of sprinkler and plumbing drawings and assisting Contractor in preparation of coordination drawings.
11. Coordinate work with all contractors including, but not limited to electrical, general and contractors. Coordinate and confirm locations and rough-in for all work with all contractors. Make location adjustments as required.
12. Roof drain piping installation.
13. Food Service connections and accessories
14. Firestopping of Plumbing Contractor Work.
15. Grease waste piping inside the building and grease interceptor.

16. Starting, adjusting commissioning and training for all plumbing equipment.
17. Provide demolition of existing plumbing equipment and accessories. Disconnect and cap all utilities to plumbing items.
18. Provide temporary water service for construction per Temporary Facilities.
19. Maintain operation of existing systems at occupied areas.

1.10 ELECTRICAL CONTRACT (EC)

A. The Work under the Electrical Construction Contract includes all construction and other activities traditionally recognized as electrical work required by any of the Contract Documents including, but not limited to, the electrical drawings, specification Divisions 00, 01, 02, 03, 07, 08, 11, 13, 26, 27, 28 and 31 except when specifically assigned to another contract for construction. Work in the Electrical Contract includes, but is not limited to, the following:

1. Site excavation required for electrical systems
2. Site electrical distribution.
3. Site lighting.
4. Site communications and security.
5. Electrical distribution.
6. Electrical grounding.
7. Lighting and power branch wiring.
8. Communication and systems.
9. Special electrical systems, including the following:
 - Packaged engine generator systems.
10. Electrical connections to equipment furnished under other contracts.
11. Structural supports, hangers, sleeves and inserts.
12. Starting, commissioning, adjusting and training of all electrical systems and equipment.
13. Testing, adjusting, balancing and training for electrical systems and equipment.
14. Luminaires, lighting controls and all accessories.
15. Fire detection and notification systems.
16. Conduits and raceway for special systems
 - 16.1 Card access system (conduit and complete system required cabling)
 - 16.2 Closed circuit camera monitoring system (conduit and Cat 6 cable)
 - 16.3 Wireless access system (conduit and Cat 6 cable)
17. Intrusion detection system.
18. Door access and security systems as defined in Division 08 specifications.
19. Emergency lighting systems.
20. Coordinate work with all contractors including, but not limited to plumbing, general contractors. Coordinate and confirm locations and rough-in for all work with all contractors. Make location adjustments as required.
21. Cable tray for all work as specified.
22. Raceways for all work.

23. Spare site underground conduits.
24. All rough-in including conduit, pull wire in conduit, and back boxes for all work.
25. Floor and wall boxes for all work.
26. Data and telephone wiring installed in raceways, conduits, sleeves and cable tray.
27. Data jacks and related data equipment.
28. Wiring, terminations, accessories for complete CATV system.
29. Furnish and install all accessories, hangers, Velcro wraps, etc.
30. Provide electrical dimensions and drawings and assisting General Contractor in preparation of coordination drawings.
31. Food Service connections and accessories.
32. Firestopping of Electrical Contractor Work.
33. Furnish and install fiber and inner duct associated with telecommunication systems infrastructure as indicated in contract drawings and specifications.
34. Furnish and install Cat 6 wiring.
35. Furnish and install Cat 6feeder wires for phones.
36. Furnish and install racks, patch panels, cross connect and punch blocks.
37. Furnish and install wall jacks and face plates.
40. Provide final electrical power connection of educational casework. Provide all electrical wiring and devices within education plastic laminate casework unless noted otherwise.
41. Furnish and install patch cables, PA speakers, exterior door access systems, and audio enhancement system as described in Contract Documents.
42. Furnish and install projectors and mounts in the Cafeteria and Auditorium as described in the Contract Documents.
43. Install Owner furnished items, including, but not limited to phones, security cameras, projectors, and projector mounts as described in Contract Documents.

END OF SECTION 01.1000

SECTION 01.1400 – WORK RESTRICTIONS**PART 1 – GENERAL**

1.1 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
1. The work hours must comply with local township ordinance.
 2. Limits: Confine constructions operations to the legal property boundaries.
 3. Owner Occupancy: Owner will vacate the building and site throughout the construction period. Refer to the Phasing Drawings, which outline the general sequence of construction as it relates to the Work being conducted on property. All contractors must comply with phasing and milestone dates listed in the contract documents.
 4. Perform the Work so as not to interfere with public access and adjacent public streets and residences. At all times, provide measures to ensure safe access by the Owner and the public.
 5. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's representatives, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Conduct construction operations in accordance with acceptable procedure to minimize noise and dust. Fugitive dust from roadways and the site is to be reduced by means of water sprayed from a water truck or tank supplied and operated continuously by the General Contractor during construction operations.
 - b. General Contractor shall be responsible for site access control, coordination and cleaning of site and public roads. The General Contractor will arrange for roadway cleaning and mechanical sweeping on a daily basis as needed and directed by the Architect
 - c. Use roadways, driveways and entrances designated for construction only.
 6. Comply with the requirements of municipal agencies having authority and project NPDES permit requirements.
 7. General Contractor shall provide protection, barriers, signage and traffic controls necessary to maintain public streets and sidewalk access and to facilitate access to temporary and permanently occupied areas during construction.
 8. All contractors shall provide protection, barriers and signage for any specific scope of work under their contract that affects the public access on roads and sidewalks.

9. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - a. Notify Owner not less than two days in advance of proposed utility interruptions.
 - b. Do not proceed with utility interruptions without Owner's written permission.
10. Comply with School District tobacco use policies. In any case, smokeless tobacco use and smoking in any form is prohibited on the site and within any part of structure at any phase of construction. Smoking will be permitted only in areas designated by Owner.
11. Contractor will comply with all District regulations and policies while on District property, as well as any special regulations adopted by the Owner relating to this Project. Contractor, subcontractors and their agents and employees shall not socialize with students or faculty.
12. Inappropriate language, dress or conduct will not be tolerated on the construction site. Violations of the above shall be grounds for dismissal.
13. IDENTIFICATION: The Owner reserves the right to require all construction employees to be visually identified by the use of badges. In the event this security measure is implemented, the Owner will issue badges to all authorized employees in conjunction with the Prime Contractors and record their issuance with names, addresses, etc. Termination of employment of the construction employees will require the respective badges to be returned to the Owner for record keeping purposes. All employees must wear the badge on the job site. Employees without badges will not be permitted on the premises.
14. Contractor, subcontractors and their agents and employees, shall not be permitted in existing school facilities except in areas then currently being renovated, absent receiving prior approval from Owner or Owner's Representative.
15. Any persons violating any of the above requirements shall be subject to immediate and permanent exclusion from the School District site.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 COMPLY WITH THIS SECTION SO EXISTING OPERATIONS ARE NOT AFFECTED

A. The existing property is to be maintained in continuous operation during the entire construction period. Work is to be scheduled and conducted by each contractor such that work will not impede vehicular traffic and activities, create potential hazards to existing facilities or persons at the site or cause dust, odor, noise or other nuisances. In performing the Work all contractors shall plan their work to meet operating requirements and schedule any additional requirements outlined in this section to avoid interruption to any School operations.

B. Each Contractor has the option of providing additional temporary facilities that can eliminate a constraint in the Phasing and Milestones provided it is done without cost to the Owner and provided it does not require any other prime contractor to perform additional work and provided that all of the requirements of these specifications are met. At all times the Work must be completed in a sequence and fashion approved by the Owner. In the event of any delay in the Work that will impact the relocation or moving of furnishings or equipment, the Owner has the discretion to adjust its move or relocation milestone schedule by up to 30 days. Such action by the Owner shall be issued in writing to the contractor not less than 30 days prior to the anticipated milestone date.

C. Each contractor shall have on hand and in close proximity to the work, all tools, equipment and materials both temporary and permanent, to complete each work category without interruption. Prefabrication of assemblies shall be completed to the greatest degree possible prior to any building system shutdown to minimize the duration of the shutdown.

D. Electrical service and data service and telephone service to all operating areas is to remain in service during the construction period. Temporary shut-downs to tie in new services and systems are to be completed outside of normal operating hours and at times that are convenient to the Owner. The Electrical Contractor shall lock out and tag circuit breakers and switches and shall check cables and wires to ensure they are deenergized to ground potential before work begins.

E. All cutting and demolition work that creates noise levels in excess of 50dBA for adjacent occupied areas shall be performed after school hours, holidays or on weekends unless prior permission from the Owner has been obtained.

F. All utility interruptions shall be scheduled and shall be performed after school hours, holidays or weekends unless prior permission from the Owner has been obtained.

END OF SECTION 01.1400

SECTION 01.2129 – QUANTITY ALLOWANCES**PART 1 – GENERAL**

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements governing allowances.
 - 1. Certain materials and equipment including installation are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. See bid forms.
 - 2. NO CASH allowances for any purpose are included in the project.
- C. Related Sections include the following:
 - 1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 2. Division 01 Section "Unit Prices" for procedures for using unit prices.
 - 3. Refer to individual Prime Contract Proposal Forms for exact amount of material and unit prices.

1.2 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.3 UNUSED MATERIALS ALLOWANCES

- A. Use the material allowance only as directed by Architect for Owner's purposes and only by Allowance Adjustments that indicate amounts to be charged to the allowance.
- B. Allowance Adjustments authorizing use of funds from the material allowance shall include Contractor's related costs and reasonable overhead and profit margins.

- C. At Project closeout, credit unused amounts remaining in the material allowance to Owner by Change Order.

1.4 UNUSED MATERIALS

- A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF QUANTITY ALLOWANCES

- A. AS INDICATED ON THE INDIVIDUAL BID FORMS.

END OF SECTION 01.2129

SECTION 01.2200 – UNIT PRICES**PART 1 – GENERAL**

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices if stated on the bid form.
- B. Related Sections include the following:
 - 1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 2. Division 01 Section "Quality Requirements" for general testing and inspecting requirements.

1.2 DEFINITIONS

- A. Unit price is stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, taxes overhead, and profit.
- B. Measurement and Payment: The Architect will verify units of measurement with the Contractor. Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Specification Sections should be referenced for requirements and materials described under each unit price.

PART 2 - PRODUCTS (Not Used)**PART 3 - EXECUTION**

3.1 LIST OF UNIT PRICES

- A. REFER TO THOSE INDICATED ON THE INDIVIDUAL BID FORMS.

END OF SECTION 01.2200

SECTION 01.2300 – ALTERNATES**PART 1 – GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing Alternates.

1.3 DEFINITIONS

- A. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

- 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate that Work into the Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.
- B. Notification: Immediately following the award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate whether alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other Work of this Contract including project schedule, milestones and phases required for completion of the work.
- D. Schedule: Specification sections and drawings contain requirements for materials and systems necessary to achieve the Work described under each alternate. Contract Proposal Form will identify each Alternate in a format such as: 1, 2, etc.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. See GC Bid Form 00.4116
- B. See PC Bid Form 00.4118
- C. See EC Bid Form 00.4119

END OF SECTION 01.2300

SECTION 01.2600 - CONTRACT MODIFICATION PROCEDURES**PART 1 – GENERAL****1.1 SUMMARY**

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections include the following:

1. Division 01 Section "Allowances" for procedural requirements for handling and processing allowances.
2. Division 01 Section "Unit Prices" for administrative requirements for using unit prices.
3. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.2 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. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within Ten (10) days 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 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.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change.

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 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.
5. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.3 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 AIA Document G710, "Architect's Supplemental Instructions."

1.4 ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 21 days after such authorization.

1. Do not include Contractor's or subcontractors indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01.2600

SECTION 01.2900 – PAYMENT PROCEDURES**PART 1 – GENERAL**

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Unit Prices" for administrative requirements governing use of unit prices.
 - 2. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

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 VALVES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate 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. Submittals Schedule.
 - 2. Submit the Schedule of Values to the Architect at earliest possible date but no later than 14 days after the notice to proceed.
- B. Format and Content: Use the 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. Prepare Schedule of Values to clearly separate the work for each phase of the project scheduled to be occupied by the Owner.
 - 3. Prepare Schedule of Values in compliance with costs loaded CPM schedule unless otherwise approved by Architect.
 - 4. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division and in compliance with cost loaded schedule.

- 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.
 - i. Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
5. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
6. Round amounts to nearest whole dollar total shall equal the Contract Sum.
7. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
8. 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.
9. 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.
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.
 - b. Mechanical, Plumbing and Electrical Contractors shall include a separate Schedule of Values line item for coordination drawings.
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 shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for submission of each application for payment is the 25th day of each month. The period covered by each Application for Payment ends on the FINAL day of each month. Pencil copies of applications for payment shall be submitted in advance for review by Architect, and Owner no later than the 20th day of each month. All payment applications must comply with project scheduling requirements. These dates are subject to change for the duration of the Project by the Owner prior to the first application for payment.

- C. Payment Application Forms: Use AIA Documents as form for Applications for Payment. Provide certification signature lines for the Architect. Utilize AIA G732-2009.
- D. Application Preparation: Complete every entry on form. Notarize and execute 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 of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit four (4) signed and notarized original copies of each Application for Payment to the Architect by a method ensuring receipt within 24 hours.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Initial Application for Payment: The following minimum administrative actions and submittals must precede the submittal of first Application for Payment:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's CPM Construction Schedule (preliminary if not final).
 4. Products list.
 5. Schedule of unit prices.
 6. Submittals 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 pre-construction conferences.
 13. Initial settlement survey and damage report if required.
 14. Construction Waste Management Plan.
 15. Construction IAQ Management Plan (preliminary if not final).

The first payment application will not be processed unless these, and any other items required by the Architect, are processed.

- G. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
 3. Provide any other documentation including warranties, manuals or other information requested by Architect.

- H. Final Payment Application: 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. AIA Document G707A, "Consent of Surety to Reduction in or Partial Release of Retainage."
 8. Evidence that claims have been settled.
 9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01.2900

SECTION 01.3100 – PROJECT MANAGEMENT AND COORDINATION**PART 1 – GENERAL**

1.1 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Conservation.
 - 3. Coordination Drawings.
 - 4. Administrative and supervisory personnel.
 - 5. Project meetings.

- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 2. Division 01 Section "Closeout Procedures" for coordinating Contract closeout.
 - 3. Division 01 Section 019113 "General Commissioning Requirements" for additional information and procedures.
 - 4. Division 01 Section 017419 "Construction Waste Management" for additional information and procedures.

1.2 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.

- B. If necessary, 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 and separate contractors if coordination of their Work is required.

- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Construction Waste Management Plan activities.
 8. Construction IAQ Management Plan activities.
 9. Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.
- E. Each Contractor shall:
1. Perform his Work as mandated by the project schedule to maintain the required sequence and the overall progress of the project.
 2. Coordinate Work of his own employees and subcontractors.
 3. Expedite his Work to assure compliance with approved schedules.
 4. Coordinate his Work with that of other Prime Contractors and work by the Owner.
- F. Modifications to the Work made necessary by a Contractor's failure to properly coordinate the Work, shall be made by that Contractor, at no cost to the Owner.
- G. Remove Work installed out of sequence that prohibits a separate Prime Contractor the ability to install Work that is dependent on their prior installation of materials or equipment. No additional compensation or time extension will be considered for the uncovering or removal of the out of sequence Work.
- H. Each Prime Contractor shall coordinate space requirements and installation of mechanical and electrical work indicated diagrammatically on the Contract Drawings. Follow routing shown for pipes, ducts and conduit as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs.
- I. Where availability of space is limited, the Architect and each Prime Contractor shall coordinate installation of different components with other Prime Contractors to assure maximum accessibility for required maintenance, service and repair and to meet governing code requirements.
- J. Each Prime Contractor shall make adequate provisions to accommodate items scheduled for later installation.
- K. Each Prime Contractor shall, in finished areas except as otherwise indicated, conceal pipes, ducts and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements provided by other Contractors.
- L. Each Prime Contractor shall verify utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

- M. Each Prime Contractor shall coordinate Testing and Inspection Services:
1. Verify required laboratory personnel are present.
 2. Verify tests are made in accord with specified standards.
 3. Review test reports for compliance with specified standards.
 4. Recommend and administer any required retesting.
 5. Submit copies to the Owner, Architect/Engineer.
 6. Coordinate with Owner's Geotechnical Engineer for compaction and moisture content testing. Notify Geotechnical Engineer in advance of need for testing in accord with Project Construction Schedule.
 7. Coordinate with Owner's Inspection Agency for concrete, masonry and steel testing and inspection. Notify agency in advance when testing and inspection is required.
- N. Each Prime Contractor shall coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion, and for portions of Work designated for Owner's partial occupancy.
- O. Each Prime Contractor shall, after Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accord with Contract Documents, to minimize disruption of Owner's activities.
- P. In addition to its project superintendent, each Prime Contractor shall provide other administrative and supervisory personnel required for proper performance of Work, including special personnel required for coordination of operations with other Prime Contractors.

1.3 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Indicate relationship of components shown on separate Shop Drawings.
 2. Indicate required installation sequences.
 3. Refer to Division 23 Section "Basic Mechanical Materials and Methods" and Division 26 Section "Basic Electrical Materials and Methods" for specific Coordination Drawing requirements for mechanical and electrical installations.
- B. Staff Names: Within 7 days of starting construction operations, submit a list of principal staff 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 and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.
 2. Provide list to Owner and Architect

1.4 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1. Include special personnel required for coordination of operations with other contractors.

1.5 PROJECT MEETINGS

A. Preconstruction Conference: The Owner's representative and Architect will schedule a preconstruction conference before starting construction, at a time convenient to Owner, Architect and Contractor(s) within 15 days after execution of the Agreement. The conference will held at Project site or another convenient location. The meeting will review responsibilities and personnel assignments and other pertinent issues to the project.

1. Attendees: Authorized representatives of Owner, Architect and their consultants; Prime Contractor(s) and their superintendent; major subcontractors and other Owner pre-approved parties shall attend the conference. All 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 progress, including the following:
 - a. Tentative construction schedule.
 - b. Critical work sequencing.
 - c. Designation of responsible personnel.
 - d. Procedures for processing field decisions and Change Orders.
 - e. Procedures for processing Applications for Payment.
 - f. Distribution of the Contract Documents.
 - g. Submittal procedures.
 - h. Preparation of Record Documents.
 - i. Use of the premises.
 - j. Responsibility for temporary facilities and controls.
 - k. Parking availability.
 - l. Office, work, and storage areas.
 - m. Equipment deliveries and priorities.
 - n. First aid.
 - o. Security.
 - p. Progress cleaning.
 - q. Working hours.
 - r. LEED certification if applicable.
 - s. Construction Waste Management Plan activities.
 - t. Construction IAQ Management Plan activities.

B. Preinstallation Conferences: Prime Contractors shall conduct a pre-installation 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 the Architect and Owner 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 Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Submittals.
 - g. Review of mockups.
 - h. Possible conflicts.
 - i. Compatibility problems.
 - j. Time schedules.
 - k. Weather limitations.
 - l. Manufacturer's written recommendations.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Required performance results.
 - u. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements.
 4. 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.
- C. Progress Meetings: Attend progress meetings as scheduled or when notified. Meeting will be generally held every other week unless progress or significant issues arise in the progress or lack thereof of the work.
1. Attendees: In addition to representatives of Owner 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 conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. 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.
 - b. Review present and future needs of each entity present, including the following:
 - i. Interface requirements.
 - ii. Sequence of operations.

- iii. Status of submittals.
 - iv. Deliveries.
 - v. Off-site fabrication.
 - vi. Access.
 - vii. Site utilization.
 - viii. Temporary facilities and controls.
 - ix. Work hours.
 - x. Hazards and risks.
 - xi. Review of open RFI's
 - xii. Progress cleaning.
 - xiii. Quality and work standards.
 - xiv. Change Orders.
 - xv. Documentation of information for payment requests.
 - xvi. Site security and safety issues.
3. Reporting: The Architect will distribute minutes of the meeting to each party present and to parties who should have been present. Minutes will include a brief summary, in narrative form, of progress since the previous meeting and report.
 - a. The Contractor shall revise the 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. Two week look ahead.
- D. Weekly Superintendent Meetings: Attend weekly superintendent meetings scheduled and chaired by the General Contractor.
1. Attendees: In addition to representatives of the Owner and Architect, each contractor and subcontractor responsible for work in the upcoming two weeks to be represented.
 2. Agenda: Review the work planned in the next two weeks and other items that may affect work in the short term including:
 - a. Deliveries
 - b. Site traffic patterns
 - c. Subcontractors working at the site
 - d. Maintenance of erosion and sediment control features
 - e. Site cleanliness
 - f. Planned work hours
 - g. Coordination items
 3. At each coordination meeting, each Prime Contractor is to provide a written two week look ahead schedule to the General Contractor and Architect for review and comment.
 4. The General Contractor shall write meeting minutes for each coordination meeting and distribute them to each Prime Contractor and to the Architect for review within two days after the meeting.

PART 2 - PRODUCTS (Not Used)**PART 3 - EXECUTION (Not Used)****END OF SECTION 01.3100**

SECTION 01.3200 - CONSTRUCTION PROGRESS DOCUMENTATION**PART 1 - GENERAL**

1.1 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Construction schedule updating reports.
3. Daily construction reports.
4. Site condition reports.

1.2 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. 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.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Float: The measure of leeway in starting and completing an activity.

1. Float time belongs to Owner.

1.3 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.
3. Two paper copies.

B. 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.

C. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

D. Construction Schedule Updating Reports: Submit with Applications for Payment.

E. Daily Construction Reports: Submit at bi-weekly intervals.

F. Site Condition Reports: Submit at time of discovery of differing conditions.

1.4 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, Prime Contractors, submittal schedules, 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 commencement of the Work to date of Substantial 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 013300 "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 and Construction Manager'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. 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.
5. Work Stages: Indicate important stages of construction for each major portion of the Work.

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. 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.

F. Recovery Schedule: When periodic update indicates the Work is 14 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.

2.2 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 to Proceed.

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.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. CPM Schedule: Prepare Contractor's construction schedule using a resource-loaded, time-scaled CPM network analysis diagram for the Work.

C. 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.

D. 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.

E. 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).

F. 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.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report 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.
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. 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.

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 01.3200

SECTION 01.3300 - SUBMITTAL PROCEDURES**PART 1 - GENERAL****1.1 SUMMARY**

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 01.3200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
2. Section 01.7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

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.

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.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. 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, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 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 10 days for review of each resubmittal.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

- a. Project name.
- b. Date.
- c. Name of Architect.
- d. Name of Contractor.
- e. Name of subcontractor.
- f. Name of supplier.
- g. Name of manufacturer.
- h. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06.1000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06.1000.01.A).

- j. Number and title of appropriate Specification Section.
- k. Drawing number and detail references, as appropriate.
- l. Location(s) where product is to be installed, as appropriate.
- m. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

- a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

- a. Transmittal Form for Paper Submittals: Use AIA Document G810 or CSI Form 12.1A .
- b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

- 1) Project name.
- 2) Date.
- 3) Destination (To:).
- 4) Source (From:).
- 5) Name and address of Architect.
- 6) Name of Contractor.
- 7) Name of firm or entity that prepared submittal.
- 8) Names of subcontractor, manufacturer, and supplier.
- 9) Category and type of submittal.
- 10) Submittal purpose and description.
- 11) Specification Section number and title.
- 12) Specification paragraph number or drawing designation and generic name for each of multiple items.
- 13) Drawing number and detail references, as appropriate.
- 14) Indication of full or partial submittal.
- 15) Transmittal number, numbered consecutively.
- 16) Submittal and transmittal distribution record.
- 17) Remarks.
- 18) Signature of transmitter.

E. 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 decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.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 electronic form 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.
- j. 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, numbered consecutively.
- p. Submittal and transmittal distribution record.
- q. Other necessary identification.
- r. Remarks.

Metadata: Include the following information as keywords in the electronic submittal file metadata:

- a. Project name.
- b. Number and title of appropriate Specification Section.
- c. Manufacturer name.
- d. Product name.

F. Options: Identify options requiring selection by Architect.

G. Deviations: Identify deviations from the Contract Documents on submittals.

H. 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.

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

J. Use for Construction: 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:

1. Submit electronic submittals via email as PDF electronic files.
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, unless submittal based on Architect's digital data drawing files is otherwise permitted, as designated specifically by Architect.

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 (215 by 280 mm)**, but no larger than **30 50 by 42 inches (750 by 1067 mm)**.

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.

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.

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 three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

1) 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. Submit product schedule in the following format:

a. PDF electronic file.

F. Coordination Drawings Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 01.3200 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01.2900 "Payment Procedures."

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01.4000 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01.7700 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

L. 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.

M. 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.

N. 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.

O. 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.

P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

R. 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.

S. 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.

T. 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.

U. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."

V. 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.

W. 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.

X. 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.

Y. 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 two 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.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "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. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:

1. *Reviewed: Further submission not required. Fabrication may be undertaken, but does not authorize changes to contract Sum or Time.*

2. *Reviewed as Noted: Drawings may be used to start work, but shall be immediately corrected and resubmitted for final review, if requested. "Reviewed as Noted" does not authorize changes to contract Sum or Time.*

3. *Return for Corrections: Insufficient information and lack of detail. Fabrication may not be undertaken. Correct and resubmit.*

4. *Not Reviewed: Drawings returned without checking, not in accordance with the Contract Documents.*

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

D. 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 not be reviewed and may be discarded.

END OF SECTION 01.3300

SECTION 01.4000 - QUALITY REQUIREMENTS**PART 1 – GENERAL**

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

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

1. 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.
2. 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.

C. See Divisions 02 through 49 Sections for specific test and inspection requirements.

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 used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples.

D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work

and for completed Work.

I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to 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 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.

9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory

Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. 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. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.

J. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 02 through 49.

1.6 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. 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. 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.

C. Contractor's Responsibility: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. 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.

1. 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.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or

inspecting will be performed.

3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

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.

1.7 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

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

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01.4000

SECTION 01.4200 - REFERENCES**PART 1 - GENERAL**

1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved" / "Reviewed": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" or "reviewed" 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," "approved," "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," "detailed" and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Installer": Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- J. "Experienced": When used with an entity, "experienced" means having successfully completed a minimum of five (5) previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- K. Project Site: The Project site is the space available to the Contractor for performing construction activities,

either exclusively or in conjunction, with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

L. Testing Agencies: A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

M. Building Code: The term "building code" and the term "code" refer to regulations of governmental agencies having jurisdiction over the Project.

N. Similar: The term "similar" means in its general sense and not necessarily identical.

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, unless otherwise indicated.

C. Conflicting Requirements: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

1. 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.

D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available on request.

1.3 ABBREVIATIONS AND ACRONYMS

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

END OF SECTION 01.4200

SECTION 01.5000 - TEMPORARY FACILITIES AND CONTROLS**PART 1 - GENERAL**

1.1 SUMMARY

A. This Section includes requirements for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.

B. Temporary utilities include, but are not limited to, the following:

1. Water service and distribution.
2. Temporary electric power and light.
3. Temporary heat.
4. Ventilation.
5. Telephone service.
6. Sanitary facilities, including drinking water.
7. Storm and sanitary sewer.

C. Support facilities include, but are not limited to, the following:

1. Field offices and storage sheds.
2. Temporary roads and paving.
3. Dewatering facilities and drains.
4. Temporary enclosures.
5. Hoists and temporary elevator use.
6. Temporary project identification signs and bulletin boards.
7. Waste disposal services.
8. Rodent and pest control.
9. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities include, but are not limited to, the following:

1. Temporary fire protection.
2. Barricades, warning signs, and lights.
3. Sidewalk bridge or enclosure fence for the site.
4. Environmental protection.

1.2 SUBMITTALS

A. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Within 15 days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.

1.3 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, fire department, and rescue squad rules.
5. Environmental protection regulations.

B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."
2. General Services: Comply with the "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.

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

1.4 PROJECT CONDITIONS

A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

C. Temporary Construction: Before any construction operation is started, construction documents shall be filed with the code official showing the design and construction of all sidewalk sheds, temporary vehicular passageways, trestles, foot bridges, guard fences and other similar devices required in the operation. Approval shall be secured from the authority having jurisdiction before the commencement of any work.

D. Temporary Encroachments: Sidewalk sheds, underpinning and other temporary protective guards and devices shall not project beyond the interior and street lot lines except where required to insure the safety of the adjoining property and the public, subject to approval. Where necessary, the consent of the adjoining property owner shall be obtained.

PART 2 - PRODUCTS**2.1 MATERIALS**

A. General: Provide new materials. If acceptable to the Architect, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.

B. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry."

1. For job-built temporary offices, shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing, and siding.
2. For signs and directory boards, provide exterior-type, Grade B-B high-density concrete form overlay plywood of sizes and thicknesses indicated.
3. For fences and vision barriers, provide minimum 3/8-inch- (9.5-mm-) thick exterior plywood.
4. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch- (16-mm-) thick exterior plywood.

C. Gypsum Wallboard: Provide gypsum wallboard on interior walls of temporary offices.

D. Roofing Materials: Provide UL Class A standard-weight asphalt shingles or UL Class C mineral-surfaced roll roofing on roofs of job-built temporary offices, shops, and sheds.

E. Paint: Comply with requirements of Division 9 Section "Painting."

1. For job-built temporary offices, shops, sheds, fences, and other exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
2. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
3. For interior walls of temporary offices, provide 2 coats interior latex-flat wall paint.

F. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.

G. Water: Provide potable water approved by local health authorities.

H. Open-Mesh Fencing: Provide temporary chain link fencing and gates fabricated from 2-1/4" square, galvanized steel chain link fencing. Fence shall be six (6) foot high. Panels shall be in 12 foot lengths with one 12 foot wide gate where designated by the Owner. Panels shall be supported by manufacturer's standard portable concrete set-up blocks. Provide gates as indicated. Provide "Rent-A Guard" fence panels as manufactured by Sonco Fence Manufacturing (301-779-1100) (215-464-4880) or an approved equal. General Contractor shall provide locking mechanism required at gates. Fencing shall be maintained by the General Contractor and shall be removed immediately prior to Substantial Completion and restore disturbed areas to design conditions.

2.2 EQUIPMENT

- A. General: Provide new equipment. If acceptable to the Architect, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide 3/4-inch (19-mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet (30 m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
- G. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.
- H. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
Contractor may not use existing facilities
- I. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve

the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.

1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect. Neither the Owner nor Architect will accept cost or use charges as a basis of claims for Change Orders.

B. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

1. Sterilization: Sterilize temporary water piping prior to use.

C. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear.

1. Install electric power service underground, except where overhead service must be used.
2. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, ac 20 Ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
3. The Owner shall pay for all electric power consumed.
4. The Contractor shall pay for all electric power consumed.

D. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching.

1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.
2. The Owner shall pay for all electric power consumed for lighting.

3. The Contractor shall pay for all electric power consumed for lighting.

E. Temporary Heat: Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

F. Temporary Heat: The Contractor shall provide temporary heat required by construction activities, for curing or drying of completed installations, or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

1. The Contractor shall maintain the temporary heat to a minimum of 60 degrees F.
2. Prior to the permanent heating system being operational, and when necessary for the proper prosecution of the work, the Contractor shall provide, maintain, operate and pay all cost including fuel for sufficient approved heat.
3. Temporary/Permanent Heat: At 90 days prior to substantial completion, the Owner shall pay for fuel and electric energy used to operate the permanent heating or cooling and exhaust system for temporary means provided that due care is exercised to avoid excessive use of fuel.
4. Portable heaters will not be acceptable during final finishing operations.
5. The permanent heating, cooling and exhaust system or any portion thereof may be used by the Contractor to provide temporary heat and exhaust as required for the proper prosecution of the work only when outside air is supplied directly to the burners. The Contractor shall, when operating the permanent system do all servicing and adjusting to maintain the system in proper running order to prevent damage to the building or it's equipment during the construction period.
6. When the Contractor performs startup and begins using the permanent HVAC systems, the Contractor must provide pre-filters and or other modifications to the systems necessary to prevent dirt, dust and other contaminants from entering the system. If measures implemented do not prevent dust from entering the systems, the Contractor shall perform cleaning of duct, coil and other HVAC components necessary to provide clean HVAC systems at Substantial Completion of the Project.
7. Prior to turning over the permanent heating and ventilating system to the Owner, the Contractor shall thoroughly clean the system, provide new filters, make re-adjustments as required and bear all cost to place the system in first class operating condition. The warranty period of individual pieces of equipment of the permanent system used during the construction period shall be extended during the temporary use period and the starting date used for determination of expiration for such warranties shall begin upon final acceptance of the project by the Owner.
8. Work which is damaged as a result of improper or insufficient climate control shall be removed and replaced.

G. Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

1. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.
2. When operating the permanent heating system do all servicing and adjusting to maintain the system in proper running order to prevent damage to the building or its equipment during the construction period.

H. Temporary Ventilation: Temporary ventilation, whenever necessary for proper execution of work shall be provided by Contractor at his expense. Contractor may use permanent heating/ventilating system for temporary ventilation. Prior to turning over the permanent heating and ventilating system to the Owner, the Contractor shall thoroughly clean the system, provide new filters, make readjustments as required and bear all cost to place the system in first class operating condition. The warranty period of individual pieces of equipment of the permanent system used during the construction period shall be extended during the temporary use period and the starting date used for determination of expiration for such warranties shall begin upon final acceptance of the project by the Owner. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.

I. Temporary Telephones: Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities. Install telephone on a separate line for each temporary office and first-aid station.

1. Separate Telephone Lines: Provide additional telephone lines for the following:
 - a. Where an office has more than 2 occupants, install a telephone for each additional occupant or pair of occupants.
 - b. Provide a dedicated telephone line for a fax machine in the field office.
 - c. Provide a separate line for the Owner's use.

2. At each telephone, post a list of important telephone numbers.

J. Sanitary facilities include temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.

1. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.

K. Toilets: Use of the Owner's existing toilet facilities will be permitted, so long as facilities are cleaned and maintained in a condition acceptable to the Owner. At Substantial Completion, restore these facilities to the condition prevalent at the time of initial use.

L. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.

1. Provide separate facilities for male and female personnel.

M. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

1. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

N. Drinking-Water Fixtures: Provide drinking-water fountains where indicated, including paper cup supply.

O. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper supply.

1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F (7 to 13 deg C).

P. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.

1. Filter out excessive amounts of soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
2. Connect temporary sewers to the municipal system, as directed by sewer department officials.
3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.

Q. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

3.3 SUPPORT FACILITIES INSTALLATION

A. Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.

1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

B. Provide incombustible construction for offices, shops, and sheds located within the construction area or within 30 feet (9 m) of building lines. Comply with requirements of NFPA 241.

C. Field Offices: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at the Project Site. Keep the office clean and orderly for use for small progress

meetings. Furnish and equip offices as follows:

D. Storage and Fabrication Sheds: Install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on-site.

F. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water.

G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.

1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 sq. ft. (2.3 sq. m) or less with plywood or similar materials.
3. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
4. Where temporary wood or plywood enclosure exceeds 100 sq. ft. (9.2 sq. m) in area, use UL-labeled, fire-retardant-treated material for framing and main sheathing.

H. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

J. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.

1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.
2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

K. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.

L. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Architect.

B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

C. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.

E. Enclosure Fence: Before excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated, or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.

1. Provide open-mesh, chain link fencing with posts set in a compacted mixture of gravel and earth.
2. Provide plywood fence, 8 feet (2.5 m) high, framed with four 2-by-4-inch (50-by-100-mm) rails, and preservative-treated wood posts spaced not more than 8 feet (2.5 m) apart.

F. Covered Walkway: Erect a structurally adequate, protective covered walkway for passage of persons along the adjacent public street. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.

1. Construct covered walkways using scaffold or shoring framing. Provide wood plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage. Extend the back wall beyond the structure to complete the enclosure fence. Paint and maintain in a manner acceptable to the Owner and the Architect.

G. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of

construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

H. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

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.

2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, when 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 the 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 the Contractor's property. The Owner reserves the right to take possession of project identification signs.

2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.

3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:

a. Replace significantly worn parts and parts subject to unusual operating conditions.

b. Replace lamps burned out or noticeably dimmed by hours of use.

END OF SECTION 01.5000

SECTION 01.6000 - PRODUCT REQUIREMENTS**PART 1 – GENERAL****1.1 SUMMARY**

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 01.4200 "References" for applicable industry standards for products specified.

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 01.3300 "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 01.3300 "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. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

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 017700 "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 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 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 not 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 not 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 name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated 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 012500 "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 01.6000**

SECTION 01.7300 – EXECUTION**PART 1 – GENERAL**

1.1 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. General installation of products.
 - 3. Progress cleaning.
 - 4. Starting and adjusting.
 - 5. Protection of installed construction.
 - 6. Correction of the Work.

- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 01 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 3. Division 01 Section "Closeout Procedures".

PART 2 – PRODUCTS (Not Used)**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.

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

- C. Acceptance of Conditions: 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. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 5. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 6. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - i. Notify Owner not less than 30 days in advance of proposed utility interruptions.
 - ii. Do not proceed with utility interruptions without Owner's written permission.
 - iii. All utility interruptions shall be scheduled for weekends or holidays.
- C. 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.
- D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

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 promptly.
 - 1. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 2. Inform installers of lines and levels to which they must comply.
 - 3. Check the location, level and plumb, of every major element as the Work progresses.
 - 4. Notify Architect when deviations from required lines and levels exceed allowable tolerances.

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.
- 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. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels exceeding 80 dbA.
- F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 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.
- G. 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.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 PROGRESS CLEANING

- A. Each prime contractor is responsible to comply with progress cleaning. The General Contractor shall be responsible for overall progress cleaning. If in the opinion of the Architect, any contractor fails to comply with progress cleaning, and upon written request by the Architect to the affected contractor, the Architect is to prepare a deduct change order. The Owner also reserves the right to perform progress cleaning and deduct the cost from the contractor or contractors responsible. If multiple contractors are at fault, the costs may be apportioned solely in the judgment of the Architect. The amount deducted shall be a minimum of \$200.00 per day. Architect may also withhold processing of contractor's payment until cleanup duties are resumed to Architect's satisfaction.
- B. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. 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 materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- C. Site: Maintain Project site free of waste materials and debris.
- D. 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.
- E. 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.
- F. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- G. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- H. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 - 1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- I. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

- J. 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.
- K. 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.
- L. 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.

3.6 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. When finished work is installed, such as, but not limited to, flooring materials, toilet fixtures, roofing, doors, casework, countertops, finished wall surfaces or other materials that can be damaged during construction, provide appropriate protection immediately after installation to prevent damage.
- B. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.
- D. Contractors shall not use finished materials and surfaces as ladders, platforms or storage shelves. Tools and toolboxes shall not be placed on finished surfaces without adequate protection.
- E. Architect can deduct \$200.00 per day from any contractor not properly protecting their finished work or from any contractor working on, above or adjacent to finished work and not properly protecting such work.

3.8 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

END OF SECTION 01.7300

SECTION 01.7329 – CUTTING AND PATCHING**PART 1 – GENERAL**

1.1 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Requirements and limitations for cutting and patching of Work.
 - 1. A Contractor, subcontractor, or sub-subcontractor requiring the cutting of openings in new work installed by others, shall have such openings cut and patched by the trade which installed the work and such cutting and patching shall be at the expense of the Contractor, subcontractor or sub-subcontractor requiring the opening.
 - 2. A Contractor, subcontractor, or sub-subcontractor requiring the cutting of openings or patching of existing materials shall be performed by a sub-contractor with experience in cutting and patching of material being modified and shall be at the expense of the Contractor, subcontractor or sub-subcontractor requiring the opening.
 - 3. Approval to do such cutting and patching shall be received from the Architect prior to proceeding with the work and shall include installation of such reinforcement of the work as the Architect may direct.
 - 4. All blocking, bracing, reinforcement, or structural enhancement required due to cutting and patching shall be provided at no additional cost to Owner. All patching work shall match adjacent existing work unless otherwise noted.
- C. Related Sections include the following:
 - 1. Divisions 02 through 31 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements in this Section apply to plumbing, mechanical and electrical installations. Refer to Divisions 21 through 28 Sections for other requirements and limitations applicable to cutting and patching plumbing, mechanical and electrical installations.

1.2 DEFINITIONS

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

1.3 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.

2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and structural calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. 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.
 1. Primary operational systems and equipment.
 2. Air or smoke barriers.
 3. Fire-protection systems.
 4. Control systems.
 5. Communication systems.
 6. Conveying systems.
 7. Electrical wiring systems.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related 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.
 1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Exterior curtain-wall construction.
 4. Equipment supports.
 5. Piping, ductwork, vessels, and equipment.
 6. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces 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.

1. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.
 - a. Processed concrete finishes.
 - b. Ornamental metal.
 - c. Preformed metal panels.
 - d. Roofing.
 - e. Firestopping.
 - f. Window wall system.
 - g. Stucco and ornamental plaster.
 - h. Finished wood flooring.
 - i. Wall covering.
 - j. HVAC enclosures, cabinets, or covers.

E. 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.

1.5 WARRANTY

- A. Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void warranties.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 FINAL CLEANING

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing 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.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing 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. Cutting: Cut existing 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. Cutting tools or saws shall be equipped with bays or containers, or connected to vacuum systems, to minimize dust.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. To avoid marring existing finished surfaces cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete/Masonry: Cut using a cutting machine, such as a carborundum saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 02 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.
- C. 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 possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 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 existing 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, apply primer and intermediate paint coats 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 re-hang existing 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.
- D. Each Prime Contractor shall do cutting and patching in existing work or work already constructed required for the work involved in their Contract. Patch holes or openings left by him to match the unaltered existing construction:
1. In Work already constructed, lintels and structural supports required to maintain structural integrity shall be provided by the Contractor whose work requires the opening.
 2. Cutting of holes, installation of curbs and temporary, weatherproof and secured enclosures for penetrations through the existing Work shall be the responsibility of the Prime Contractor whose work requires the penetration. Actual roof flashing and associated work must be executed by a subcontractor, hired by the Prime Contractor, who is acceptable to the manufacturer of the existing roof which shall be certified, in writing, to the Owner and Architect/Engineer by the manufacturer. Existing warranty/guarantee shall be certified as remaining valid.
 3. For penetrations through new work, the Prime Contractor whose work requires the penetration, shall be responsible to provide the General Contractor of location, size and configuration required for the penetration well in advance of the scheduled work. Prime Contractor who requires penetrations through the new roof construction shall provide the prefabricated roof curb and temporary, weatherproof and secured enclosure on top of curb.
- E. Each Prime Contractor shall employ skilled and experienced installer to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
- F. Each Prime Contractor shall submit written request in advance of cutting or altering elements affecting:
1. Structural integrity of element.
 2. Integrity of weather-exposed or moisture-resistant elements.
 3. Efficiency, maintenance or safety of element.
 4. Visual qualities of sight-exposed elements.
 5. Work of Owner or separate contractor.
- G. Should conditions of work or the schedule indicate a change of products from original installation, each Prime Contractor shall submit request for substitution as specified in Section 01 60 00.
1. Inspect existing conditions of project, including elements subject to damage or to movement during cutting and patching.

2. After uncovering work, inspect conditions affecting installation of products or performance of work.
 3. Report unsatisfactory or questionable conditions to Architect/ Engineer, in writing; do not proceed with Work until Architect/Engineer has provided further instructions.
- H. Each Prime Contractor shall submit written notice to Architect designating the date and time the work will be uncovered.
1. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of work.
 2. Provide devices and methods to protect other portions of project from damage.
 3. Provide protection from elements for that portion of the project exposed by cutting and patching work and maintain excavations free from water.
- I. Each Prime Contractor shall execute cutting, fitting and patching including excavation and fill, to complete Work and to:
1. Make its several parts fit together properly.
 2. Uncover portions of the work to provide for installation of ill-timed work.
 3. Remove and replace defective work.
 4. Remove and replace work not conforming to requirements of the Contract Documents.
 5. Remove samples of installed work as specified for testing.
 6. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.
- J. Each Prime Contractor shall execute Work by avoiding damage to other work, and providing proper surfaces to receive patching and finishing.
- K. Each Prime Contractor shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- L. Each Prime Contractor shall restore Work with new products in accord with requirements of Contract Documents.
- M. Each Prime Contractor shall fit Work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- N. Each Prime Contractor shall maintain integrity of wall, ceiling or floor construction; completely seal voids.
- O. Each Prime Contractor shall refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- P. Each Prime Contractor shall identify hazardous substance or condition exposed during the Work to the Architect for decision or remedy.
1. Lead-Based Paint Disturbance: Each Prime Contractor shall be responsible for lead-based paint disturbance precautions. Painted and varnished surfaces must be assumed to be coated with lead-based paint. When these surfaces are disturbed, that disturbance shall be conducted in accord with the Environmental Protection Agency (EPA) 40 CFR, Part 745 "Lead, Renovation, Repair and Painting Program". Compliance to include using EPA licenses and certified trained renovators,

Owner and occupant notifications, work area containment, dust minimization and clean-up certification. Architect/Engineer shall be copied on the Owner and occupant notifications.

END OF SECTION 01.7329

SECTION 01.7419 – CONSTRUCTION WASTE MANAGEMENT**PART 1 – GENERAL**

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste
 - 2. Recycling nonhazardous demolition and construction waste
 - 3. Disposing of nonhazardous demolition and construction waste
- B. Related Requirements:
 - 1. Division 01 Section 011000 "Summary" for coordination of responsibilities for waste management.
 - 2. Division 02 Section 024119 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.
 - 3. Division 04 Section "Unit Masonry Assemblies" for disposal requirements for masonry waste.
- C. Sample construction waste management (CWM) forms, referenced in this Section, are included as attachments at the end of this Section.

1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS AND RESPONSIBILITIES

- A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent, minimum, by weight of total non-hazardous solid waste generated by the demolition and new construction Work. Practice

efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including but not limited to the following:

1. Demolition Waste:
 - a. Concrete.
 - b. Concrete reinforcing steel.
 - c. Concrete masonry units.
 - d. Bricks
 - e. Roofing
 - f. Cast stone
 - g. Wood studs
 - h. Wood flooring
 - i. Wood joists
 - j. Other wood materials
 - k. Structural and miscellaneous steel
 - l. Rough hardware.
 - m. Insulation.
 - n. Doors and frames.
 - o. Door hardware.
 - p. Windows.
 - q. Glazing.
 - r. Metal studs.
 - s. Gypsum board.
 - t. Acoustical tile and panels.
 - u. Carpet.
 - v. Demountable partitions.
 - w. Equipment.
 - x. Cabinets.
 - y. Plumbing fixtures.
 - z. Piping.
 - aa. Supports and hangers.
 - bb. Valves.
 - cc. Mechanical equipment.
 - dd. Refrigerants.
 - ee. Electrical conduit.
 - ff. Copper wiring.
 - gg. Lighting fixtures.
 - hh. Lamps.
 - ii. Ballasts.
 - jj. Electrical devices.
 - kk. Switchgear and panelboards.
 - ll. Transformers.
2. Construction Waste:
 - a. Masonry and CMU.
 - b. Insulation.
 - c. Carpet and Pad.
 - d. Gypsum board.

- e. Piping.
- f. Electrical conduit.
- g. Lumber.
- h. Wood sheet materials.
- i. Wood trim.
- j. Metals.
- k. Roofing.
- l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - i. Paper.
 - ii. Cardboard.
 - iii. Boxes.
 - iv. Plastic sheet and film.
 - v. Polystyrene packaging.
 - vi. Wood or any type of recyclable crates, including shipping pallets
 - vii. Plastic pails.

1.4 ACTION SUBMITTALS

- A. Waste Management Plan: General Contractor shall submit plan within fifteen (15) days of date established for Notice to Proceed.
- B. For All Construction:
The General Contractor shall develop and implement a Construction Waste Management Plan for the entire project, quantifying by weight, the percentage of waste materials diverted from landfill disposal and meeting the 75 percent by weight criteria. All Contractors and Subcontractors are required to pay for and dispose of all their construction waste in accordance with the CWMP and its provisions throughout demolition activities.

1.5 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Each Contractor shall submit monthly waste management reports to the General Contractor. Each month, the General Contractor shall compile the data from all Contractors, complete the LEED On-line CWM template update, and, with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Qualification Data: For waste management coordinator.
- H. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: An experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED-Accredited Professional or a person meeting the Sustainability Field Coordinator qualification requirements in Section 01 8113, as waste management coordinator. Waste management coordinator may also serve as Contractor's LEED coordinator.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Waste Management Conference: General Contractor and Architect shall conduct conference at Project site with all Contractors to comply with requirements in Division 01 Section "Project Meetings." Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of waste management coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.

1.7 WASTE MANAGEMENT PLAN

- A. General: Each Contractor shall provide sufficiently detailed waste management information for its Work as needed by the Construction Waste Manager hired by the General Contractor for a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall include waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Use Form CWM-1 for construction waste and Form CWM-2 for demolition waste. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste and Form CWM-4 for demolition waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.
- 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. Use Form CWM-5 for construction waste and Form CWM-6 for demolition waste. 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. Include 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 PLAN IMPLEMENTATION**

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Division 01 Section "Temporary Facilities and Controls."
- B. Waste Management Coordinator: General Contractor shall employ a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - 2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: Permitted on Project site.
- C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area on-site, designated by Owner.

- 5. Protect items from damage during transport and storage.
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- F. Plumbing Fixtures: Separate by type and size.
- G. Lighting Fixtures: Separate lamps by type and protect from breakage.
- H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING, DEMOLITION, AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

- A. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 - 1. Pulverize concrete to maximum 1-1/2-inch size.
- B. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Pulverize masonry to maximum 1-1/2-inch size.
 2. Clean and stack undamaged, whole masonry units on wood pallets.
- C. Metals: Separate metals by type.
1. Structural Steel: Stack members according to size, type of member, and length.
 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- D. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- E. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
- F. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.
- G. Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
1. Store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- H. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- I. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 2. Polystyrene Packaging: Separate and bag materials.
 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.6 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
 - C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 01.7419

SECTION 01.7700 - CLOSEOUT PROCEDURES**PART 1 - GENERAL**

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Project Record Documents.
3. Operation and maintenance manuals.
4. Warranties.
5. Instruction of Owner's personnel.
6. Final cleaning.

B. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Division 01 Section "Construction Progress Documentation" for submitting Final Completion construction photographs and negatives.
3. Division 01 Section "Execution Requirements" for progress cleaning of Project site.
4. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for products of those Sections.
5. Division 01 Section "Construction Waste Management" for recycling and disposal of nonhazardous construction waste.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion (AIA Document G704) 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. Reinspections: Request reinspections 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.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspections: Request reinspections when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect and Owner's Representative.
 - d. Name of Contractor.
 - e. Page number.

B. Time to Complete Punchlist Items: Contractor shall complete punchlist items within 15 days after the date set for Substantial Completion.

1.5 PROJECT RECORD DOCUMENTS

A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's and Owner's Representative's reference during normal working hours.

B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.

1. 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 prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
3. Mark important additional information that was either shown schematically or omitted from original Drawings.
4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.

C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy 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. Note related Change Orders, Record Drawings, and Product Data, where applicable.

D. Record Product Data: Submit one copy of each Product Data submittal. Mark one set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.

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 Drawings, and Record Specifications, where applicable.

E. Miscellaneous Record Submittals: 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.

1.6 OPERATION AND MAINTENANCE MANUALS

A. Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:

1. Operation Data:

- a. Emergency instructions and procedures.
- b. System, subsystem, and equipment descriptions, including operating standards.
- c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
- d. Description of controls and sequence of operations.
- e. Piping diagrams.

2. Maintenance Data:

- a. Manufacturer's information, including list of spare parts.
- b. Name, address, and telephone number of Installer or supplier.
- c. Maintenance procedures.
- d. Maintenance and service schedules for preventive and routine maintenance.
- e. Maintenance record forms.
- f. Sources of spare parts and maintenance materials.
- g. Copies of maintenance service agreements.

h. Copies of warranties and bonds.

B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.7 WARRANTIES

A. Submittal Time: 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.

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 the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) 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.

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.

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Provide instructors experienced in operation and maintenance procedures.
2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation,

provide similar instruction at the start of each season.

3. Schedule training with Owner, through Owner's Representative, with at least seven days' advance notice.
4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.
5. Coordinate equipment with the A.T.C. Contractor.

B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. For each training module, develop a learning objective and teaching outline. Include instruction for the following:

1. System design and operational philosophy.
2. Review of documentation.
3. Operations.
4. Adjustments.
5. Troubleshooting.
6. Maintenance.
7. Repair.

3.2 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. 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 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; shampoo 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. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

k. Remove labels that are not permanent.

l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

n. Replace parts subject to unusual operating conditions.

o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

q. Clean ducts, blowers, and coils if units were operated without filters during construction.

r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

s. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01.7700

SECTION 01.7823 – OPERATION AND MAINTENANCE DATA**PART 1 – GENERAL**

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Maintenance manuals for the care and maintenance of products, materials, finishes systems and equipment.

- B. Related Sections include the following:
 - 1. Division 01 Section "Summary of Multiple Contracts" for coordinating operation and maintenance manuals covering the Work of multiple contracts.
 - 2. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 3. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 4. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 - 5. Section 019113 "General Commissioning Requirements" for related commissioning activities.
 - 6. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for products in those Sections.

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 SUBMITTALS

- A. Initial Submittal: Submit 3 draft copies of each manual at least 21 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return 1 copy of draft and mark whether general scope and content of manual are acceptable.

- B. Final Submittal: Submit 3 copies of each manual in final form at least 21 days before final inspection. Architect will return copy with comments within 15 days after final inspection.

1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.4 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 – PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: 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 the 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."
- F. Provide O&M documentation in accordance with Commissioning requirements defined in Section 019113.

2.2 MANUALS, GENERAL

- 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: Enclose title page in transparent plastic sleeve. 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, address, and telephone number of Contractor.
 6. Name and address of Architect.
 7. 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.
- 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.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (115-by-280-mm) 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. 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 diskettes for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch (115-by-280-mm), 20-lb/sq. ft. (75-g/sq. m) 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.
- E. Provide Manuals in accordance with Commissioning requirements defined in Section 019113.

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.
 2. Performance and design criteria if Contractor is 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.
 2. Manufacturer's name, phone numbers and address for support.
 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 MANUAL

- 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 crossreference Specification Section number and title in Project Manual.
- 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 MANUAL

- 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 the 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.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard printed 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 videotape, 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 Division 01 Section "Project Record Documents."
- G. Comply with Division 01 Section "Closeout Procedures" for the schedule for submitting operation and maintenance documentation.

END OF SECTION 01.7823

SECTION 01.7839 - PROJECT RECORD DOCUMENTS**PART 1 - GENERAL**

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. See Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.2 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up Record Prints.

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one copy of each Product Data submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

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 prepare the 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. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

3. Note Construction Change Directive numbers, 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. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of each container with identification. If container does not include a complete set, identify Drawings included.
3. Record CAD Drawings: Organize CAD 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 CAD 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. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

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.

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.

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 modifications to Project Record Documents as they occur; do not wait until the 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 01.7839

SECTION 01.7900 – DEMONSTRATION AND TRAINING**PART 1 – GENERAL**

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of all systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of all systems, subsystems, and equipment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for requirements for pre-instruction conferences.

1.2 SUBMITTALS

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. At completion of training, submit two complete training manuals for Owner's use.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- 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.
- E. Provide approved final Operations and Maintenance Manuals for use during the training sessions.

1.3 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

- C. Schedule training only after all systems have been tested and are fully operational.

1.4 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 – PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
 - 1. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices.
 - 2. HVAC instrumentation and controls.
 - 3. Electrical service and distribution system.
 - 4. Packaged engine generators, including transfer switches.
 - 5. Lighting equipment and controls.
 - 6. Communication systems, including equipment. Inter-communication, clocks and programming voice and data and television.
 - 7. Food Service Equipment
 - 8. Fire suppression system
 - 9. Plumbing systems
 - 10. Equipment
 - 11. Finishes
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:

- a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error 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 combined training manual.
- B. Set up instructional equipment at instruction location.
- C. Provide the final training manual, a site-specific agenda and the resume of the training instructor to the Architect two weeks prior to the scheduled training session.

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. Owner will furnish Contractor with names and positions of participants.
 - 2. Schedule training only after system has been tested and is fully operational
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season. Schedule training with Owner, through Architect, with at least fourteen days advance notice. Start up and commission of systems must be completed before scheduling instructional session.
- D. Review all valve tags, labeling and access locations and provide summary or plans of all valves, shutoffs and maintenance access locations.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration 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.
- G. DVD Taping: Provide DVD of training session in digital format requested by Owner and provide copies to Owner within 10 days of training session

END OF SECTION 01.7900

SECTION 01.8109 – TESTING FOR INDOOR AIR QUALITY**PART 1 – GENERAL**

1.1 SUMMARY

- A. General: This section provides requirements for Baseline Indoor Air Quality (IAQ) Testing for maximum indoor pollutant concentrations for acceptance of the facility.
- B. Indoor Air Quality Testing (IAQ Testing): The Owner’s Testing Agency shall conduct this testing outside of the Construction Contract and must provide a copy of the report documenting the results of IAQ testing. This IAQ testing shall be conducted with the cooperation of, and in coordination with, the GC, HVAC, EC and PC.

1.2 RELATED SECTIONS

- A. Coordinate with Commissioning activities specified in Section 019113 “General Commissioning Requirements”.
- B. Coordinate with Division 23 Section “Testing, Adjusting and Balancing”.

1.3 SUBMITTALS

- A. Baseline IAQ Testing: Submit a report for each test site specified for IAQ baseline testing as prescribed herein below and in Division 23 “Testing, Adjusting, and Balancing.” Report on air concentrations of targeted pollutants identified in Subsection 3.1 of this section.

1.4 SEQUENCING AND SCHEDULING

- A. Identify, program, and schedule all IAQ testing well in advance of completing construction in a manner to prevent delays to the performance of the work of this Contract in order to perform and complete all testing after the completion of construction activities and prior to occupancy.

PART 2 – PRODUCTS (Not Used)**PART 3 - EXECUTION**

3.1 BASELINE IAQ TESTING

- A. HVAC System Verification: To assure compliance with recognized standards for indoor air quality including ASHRAE Standard 62.1-2004, the HVAC Contractor shall verify the performance of each HVAC system prior to IAQ Testing, including space temperature and space humidity uniformity, outside air quantity, filter installation, drain pan operation, and any obvious contamination sources.
- B. Indoor Air Quality Testing: Upon verification of HVAC system operation the Owner may, at its discretion, hire an independent contractor to test levels of indoor air contaminants for compliance with specified requirements.

1. A test plan shall be submitted to all Contractors for coordination with their activities. The plan shall specify procedures, times, instrumentation, and sampling methods that will be employed.
 2. Conduct baseline IAQ testing using testing protocols consistent with the United States Environmental Protection Agency Compendium of Methods for the Determination of Air Pollutants in Indoor Air.
 3. Perform IAQ testing for at least the minimum number of required sampling locations, determined as follows: For each portion of the building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft., or for each contiguous floor area, whichever is larger, and include areas with the least ventilation as calculated by Ventilation Rate Procedure of ASHRAE Standard 62.1-2004 and greatest presumed source strength as identified by Owner.
 - a. Verify areas to be tested with the Owner's Representative. Areas with 100% outside air ventilation rates, such as laboratories, are excluded from these testing requirements. The Owner's Representative is the sole judge of areas exempt from testing.
 4. Perform IAQ testing following the completion of all interior construction activities and prior to occupancy. The building shall have all interior finishes installed, including but not limited to millwork, doors, paint, carpet and acoustic tiles. Perform testing prior to installation of furniture, workstation components, and casework.
 5. Perform IAQ testing within the breathing zone, between 3'-0" and 6'-0" above the finished floor and over a minimum 4-hour period.
 6. Collect air samples during normal occupied hours (prior to occupancy) with the building ventilation system starting at the daily normal start times and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
 7. Sample and record outside air levels of formaldehyde and TVOC contaminants at three outside air locations (as determined by Owner) simultaneously with indoor tests to establish basis of comparison for these contaminant levels by averaging the three outdoor readings for each contaminant.
 8. Perform airborne mold and mildew sampling to identify species present with simultaneous indoor and outdoor readings.
 9. Acceptance of respective portions of the building by the Owner is subject to compliance with specified limits of indoor air quality contaminant levels.
- C. Compliance Indoor air quality shall conform to the following standards and limits:
1. Carbon Monoxide: Not to exceed 9 ppm.
 2. Carbon Dioxide: Not to exceed 530 ppm higher than outdoor ambient levels.
 3. Airborne Mold and Mildew: Indoor species distribution cannot vary by more than 10% from exterior sampling speciation.
 4. Maximum Air Concentration Standards: Indoor room air concentration levels, emission rates, and qualities of the listed contaminants shall not exceed the limits specified in Table 3.1 below.
- D. Test Reports: Prepare test reports showing the results and location of each test, a summary of the HVAC operating conditions, a listing of any discrepancies and recommendations for corrective actions, if required.
1. Include certification of test equipment calibration with each test report.

- E. For each sampling point where the maximum concentration limits listed in Table 3.1 are exceeded, the HVAC Contractor is responsible for conducting additional flush-out with outside air and retesting the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, take samples from the same locations as in the first test. Retesting shall be performed at no additional expense to the Owner.

Table 3.1 MAXIMUM INDOOR AIR CONCENTRATION STANDARDS

Indoor Contaminants	Maximum Concentration
Formaldehyde	50 parts per billion
Total Particulates (PM10)	50 micrograms per cubic meter
Total Volatile Organic Compounds (TVOC)	500 micrograms per cubic meter
4-Phenylcyclohexene (4-PCH)*	6.5 micrograms per cubic meter
Carbon Monoxide (CO)	9 parts per million and no greater than 2 parts per million above outdoor levels

* This test is only required if carpets and fabrics with styrene butadiene rubber (SBR) latex backing material are installed as part of the base building systems.

END OF SECTION 01.8109

SECTION 01.9113 – GENERAL COMMISSIONING REQUIREMENTS**PART 1 – GENERAL**

1.1 SUMMARY

A. This Section includes:

1. Commissioning: Commissioning is a systematic process involving the Commissioning Agent (CA), the Testing Adjusting and Balancing professional (TAB), the Contractors, the Architect, Manufacturer and other entities to ensure that selective 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.
 - c. Verify that O&M documentation left on site is complete.
 - d. Verify that the Owner's operating personnel are adequately trained.
 - e. The commissioning process does not take away from or reduce the responsibility of the Contractor to meet the Contract Documents.
3. Related Sections include the following:
 - a. General Conditions, Article 9.8, for definition of Substantial Completion.
4. The requirements of the General Conditions, the Supplementary General Conditions, and the applicable portions of Division 1, General Requirements shall apply to this section of the specifications.
5. Separate commissioning services (Commissioning Agent) have been established directly with the Owner. The Commissioning Agent will lead the commissioning process, The Commissioning Team and will have overall responsibility for planning and coordinating the commissioning process. The Owner, Architect, Engineer, and all Prime Contractors will all have responsibilities for commissioning and shall be included in the commissioning team. Each responsibility is identified elsewhere in this document.
6. Commissioning is an ongoing process and shall be performed throughout construction. Commissioning shall conclude with the completion of all required testing, training and system documentation as specified and required to ensure the proper operation of the equipment and systems.
7. Project Commissioning Requirements:
 - a. The following systems are to be inspected, tested, signed off as complete and operational, and operated for the commissioning agent:
 - i. HVAC Systems Including ATC System
 - ii. Plumbing Systems

- iii. Electrical Systems
- iv. System Verification Checklist (SVC):
 - 1. System Verification Checklists shall be defined as follows: a checklist that is used by the Commissioning Agent as approved by the commissioning team to document that each component / system is installed completely and correctly. This checklist is to included, but not be limited to the proper installation of piping, duct, electrical, controls (Including all Graphics), communications, fixtures, components, devices, interfaces, etc. as required to make each system complete.
 - 2. The SVC shall be developed and provided by the Commissioning Agent, similar to system checklists included in the AABC Commissioning Guideline. Contractors shall be responsible to assist the Commissioning Agent, by participating in the completion of the System Verification Checklist(s) for each system identified above.
- v. Functional Performance Testing Checklist:
 - 1. Functional Performance Testing Checklist shall be defined as follows: a checklist that completely documents the full range of checks and tests carried out to determine if all components, subsystems, systems and interfaces between systems function in accordance with the Contract Documents. In this context, “function” includes all modes and sequences of control operation, all interlocks and conditional control responses, and all specified responses to emergency conditions in all seasons modes. The Commissioning Agent shall define the testing scope and document the results.
 - 2. All associated subcontractors are to participate in the Functional Performance Testing, as defined above and support the Commissioning Agent / Commissioning Team as required to confirm each component / system(s) are complete

1.2 ABBREVIATIONS

- A. Abbreviations: The following are common abbreviations used in the Specifications and in the Commissioning Plan. Definitions are found in Article 1.7.

A/E Architect and Design Engineers	GC General Contractor
BMS Building Management System	HC HVAC Contractor
CA Commissioning authority	IC Installing Contractor
CC Construction checklist	PC Plumbing Contractor
Cx Commissioning	
Cx Plan Commissioning Plan Document	Subs Subcontractors or Sub-subcontractors
EC Electrical Contractor	TAB Testing, Adjusting & Balancing
ATCC Automatic Temperature Control Contractor	

1.3 DEFINITIONS

- A. Acceptance Phase - phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occur.

- B. 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.
- C. Architect / Engineer (A/E) - the Owner's design consultants who comprise the design team, including the HVAC mechanical designer/engineer and the electrical designer/engineer.
- D. Owner's Project Requirements - The Owner's Project Requirements is the documentation of the primary thought processes and assumptions behind design decisions that were made to meet the design intent. The Owner's Project Requirements describes the systems, components, conditions, and methods chosen to meet the intent. Some reiterating of the design intent may be included.
- E. Commissioning Authority (CA) - The CA directs and coordinates the day-to-day commissioning activities. The CA does not take an oversight role.
- F. Commissioning Plan - an overall plan, developed after bidding that provides the structure, schedule and coordination planning for the commissioning process.
- G. Construction Checklist (CC) - a list of items to inspect and elementary component tests to conduct to verify proper installation of equipment/work; provided by the CA to each Contractor. Construction 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 construction 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). Construction Checklists are used prior to functional testing. Construction checklists augment and are combined with the manufacturer's start-up checklist and the specified equipment checkout sheet(s). Even without a commissioning process, contractors typically perform some, if not many, of the construction 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 completion of construction checklists, except for larger or more critical pieces of equipment.
- H. Contract Documents - the documents binding on parties involved in the construction of this project (drawings, specifications, change orders, amendments, contracts, etc.).
- I. Control system - the central building energy management control system.
- J. Data logging - monitoring flows, currents, status, pressures, etc. of equipment using stand-alone data loggers separate from the control system.
- K. Deferred Functional Tests – FTs that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that prevent the test from being performed.
- L. 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.

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- M. 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.
 - N. Factory Testing - testing of equipment on-site or at the factory by factory personnel with a Project Manager present.
 - O. Functional Performance Test (FT) - test of the dynamic function and operation of equipment and systems using manual (direct observation), trending or remote 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 air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Traditional air or water testing, adjusting and balancing (TAB) is not functional testing, in the commissioning sense of the word. The TAB Agency'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. FTs are performed after construction checklists and start-up activities are complete.
 - 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. Installing Contractor – contractor who installs specific equipment and/or systems.
 - R. R. Manual Test - using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
 - S. Monitoring - the recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems.
 - T. Non-Compliance - see Deficiency.
 - U. Non-Conformance - see Deficiency.
 - V. Over-written Value - 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."
 - W. Owner-Contracted Tests - tests paid for by the Owner outside the contract and for which the CA does not oversee. These tests will not be repeated during functional tests if properly documented.
 - X. Phased Commissioning - commissioning that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order to minimize the total construction time.

- Y. Sampling - Functionally testing only a fraction of the total number of identical or near identical pieces of equipment. Refer to Subparagraph 3.4-F.8 for details.
- Z. Seasonal Performance Tests – Functional tests that are deferred until the system(s) will experience conditions closer to their design conditions.
- AA. 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 box).
- BB. Simulated Signal - disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to the transducer and DDC system to simulate a sensor value.
- CC. Specifications - the construction specifications of the Contract Documents.
- DD. Startup - the initial starting or activating of dynamic equipment, including executing construction checklists.
- EE. Subs - Subcontractors or Sub-subcontractors who furnish and install building components and systems.
- FF. Test Procedures - the step-by-step process, which must be executed to fulfill the test requirements. The CA develops the test procedures.
- GG. Test Requirements - requirements specifying what modes and functions, etc. shall be tested. The test requirements are not the detailed test procedures.
- HH. Trending - monitoring using the building management system.
- II. Vendor - supplier of equipment.
- JJ. Warranty Period - warranty period for entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least the duration specified.
- KK. ATCC, FMS, ATC refers to the HVAC control subcontractor, vendor or manufacturer, and installer of the HVAC control systems.

1.4 COORDINATION

- A. A. Commissioning Team. The members of the commissioning team consist of the CA, the Contractors, the Architect and Design Engineers (particularly the Mechanical Engineer), the TAB representative, and the ATC/FMS contractor and other installing Subs or suppliers of equipment or work that is part of systems to be commissioned. If known, the Owner's building or plant operator/engineer is also a member of the commissioning team.

- B. Management. The CA directs and coordinates the commissioning activities and reports to the Architect. All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents.
- C. Scheduling. The CA will work with the Contractors according to established protocols to schedule the commissioning activities. The CA will provide sufficient notice to the Contractors for scheduling commissioning activities. Each Contractor shall provide scheduling information for his commissioning activities to the GC. The GC, with assistance from the CA, shall coordinate and integrate all commissioning activities into the master Project Construction Schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.
 - 1. The CA will provide the initial schedule of primary commissioning events at the initial commissioning meeting. The Commissioning Plan will provide a format for this schedule. As construction progresses and more detailed schedules are available from the Contractors, the CA will adjust the commissioning schedule accordingly.

1.5 COMMISSIONING PROCESS

- A. Commissioning Plan. The Commissioning Plan will be developed and provided by the CA after certain information is received from and coordinated between the Contractors. The Cx Plan shall be binding on the Contractors. The Cx Plan provides guidance in the execution of the commissioning process. The Specifications will take precedence over the Commissioning Plan.
- B. Commissioning Process. The following narrative provides a brief overview of the minimum and typical commissioning tasks during construction and the general order in which they occur.
 - 1. Commissioning during construction begins with an initial Commissioning meeting conducted by the CA where the commissioning process is reviewed with the commissioning team members.
 - 2. Additional meetings will be required throughout construction, scheduled by the CA with necessary parties attending, to plan, coordinate, schedule future activities and resolve problems.
 - 3. Equipment documentation is distributed by the Architect to the CA during the normal submittal process, including manufacturers' detailed start-up procedures.
 - 4. The CA works with each Contractor in developing startup plans and documentation formats, including providing each Contractor with construction 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 construction checklists being completed before functional testing.
 - 6. The Contractors, under their own direction, execute and document the construction checklists and perform startup and initial checkout. The CA documents that the checklists and startup were completed according to the approved plans. This may include the CA witnessing startup of selected equipment. Refer to Article 3.2.
 - 7. The CA develops specific equipment and system functional performance test procedures. The Contractors review the procedures. Refer to Article 3.4.
 - 8. The functional testing and procedures are executed by the Contractors, under the direction of and documented by the CA. Refer to Article 3.4.

9. Items of non-compliance in material, installation or setup are corrected by the Contractors at the Contractors' expense and the system retested. Refer to Articles 3.2, 3.4 & 3.5.
10. The CA reviews the O&M documentation for completeness.
11. Except for deferred/ seasonal testing, the project will not be considered substantially complete until the conclusion of Commissioning functional testing procedures as defined in the Cx Plan and Contract Documents.
12. The CA reviews, pre-approves and coordinates the training provided by the Contractors and verifies that it was completed. Refer to Article 3.7.
13. Deferred testing is conducted, as specified or required. Refer to Article 3.8.
14. The entire process must be witnessed by the Architect and the independent Testing, Adjusting, and Balancing contractor.

1.6 RESPONSIBILITIES

- A. The responsibilities of various parties in the commissioning process are provided in this Section 019113 and in Divisions 21, 22, 23, 26, 27, and 28. Services and responsibilities of the A/E and CA as set forth in these documents are included for the Contractors' reference and information. Responsibilities will be similarly listed in the Commissioning Plan.
 1. Where field commissioning activities require the participation of multiple Contractors and other entities, the CA will assign the appropriate Prime Contractor to be responsible for coordinating the completion of the checklists. As with other aspects of construction, the Contractors shall cooperate and coordinate accordingly with all entities involved.
- B. All Parties:
 1. Follow the Commissioning Plan.
 2. Attend an initial commissioning meeting and additional meetings, as necessary.
- C. All Contractors:
 1. Construction and Acceptance Period:
 - a. Facilitate coordination of the commissioning work by the CA, and with the GC and Architect, ensure that commissioning activities are being scheduled into the master Project Construction Schedule.
 - b. Include the cost of commissioning activities pertinent to the Contract in the bid.
 - c. In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training.
 - d. Ensure that all sub-contractors execute their commissioning responsibilities according to the Contract Documents and schedule.
 - e. Contractor's representative, subcontractors, and vendors shall attend the initial commissioning meeting and other commissioning meetings scheduled by the Architect and CA to facilitate the Cx process unless such presence is not necessary as determined by the Architect.
 - f. Coordinate and schedule the training of owner personnel through Architect.
 - i. Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
 - g. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
 - h. Assist in equipment testing per agreements with sub-contractors.

- i. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to the Contract Documents.
 - j. Provide DVD recordings with audio of the training sessions for Owner's personnel, cataloged in an approved format, and submitted with the O&M manuals.
 - k. Provide information requested by the CA and Architect regarding equipment sequence of operation and testing procedures.
 - i. Review test procedures for equipment installed by factory representatives.
 - ii. Provide instruction and demonstration for the Owner's designated operation and maintenance staff, in conjunction with the commissioning agent and mechanical engineer, and with the participation of qualified technicians from major equipment suppliers.
 - iii. Notify the Commissioning Agent a minimum of two weeks in advance of scheduled equipment and system startups, to allow witness by the commissioning team.
 - iv. Provide sufficient personnel to assist the commissioning as required during system verification and functional performance testing.
 - v. Prior to startup, inspect, check and confirm the correct and complete installation of all equipment and systems for which system verification checklists are included in the commissioning plan. Support the Commissioning Agent in the process of documenting the results of all inspections, testing and checks.
 - vi. Notify the Commissioning Agent a minimum of two weeks in advance of the time for start of the TAB work. Attend the initial TAB meeting for review of the TAB procedures.
 - vii. Provide equipment and system startup resources as specified and as required. If during an attempted equipment or system startup, deficient or incomplete work is discovered that would preclude safe operation, the startup shall be aborted until corrective action has been taken. Ensure such action is taken and verified before rescheduling a new startup.
 - viii. Carry out performance checks to ensure that all equipment and systems are fully functional and ready for the commissioning team to witness formal functional performance testing.
 - ix. Provide a schedule to identify the activities when O&M manuals, training sessions, duct and pipe cleaning/flushing, equipment startup, TAB activities and any other tasks important to the commissioning process.
 - x. Update drawings for as-built condition and review with the commissioning team.
 - xi. Assemble O&M manuals on all equipment and submit to the Engineer.
 - xii. Participate in and schedule vendor equipment O&M staff training.
 - xiii. Notify the Commissioning Agent, in writing, when all equipment and systems are complete.
 - xiv. Assist the Independent Commissioning Agent hired by the Owner to complete the System Verification Checklists and the Functional Performance Testing Checklists.
2. Warranty Period:
 1. Ensure that Subcontractors execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.

- D. Ensure that Subcontractors correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.
- E. Owner:
1. Develop and commit to the Owner's Program for the facility and its use.
 2. Support the Commissioning Program, including commissioning meeting attendance.
 3. Assign operations and maintenance personnel to participate in various commissioning meetings, observations/inspections, and training sessions.
 4. Review and approve any changes made to the design intent or the construction documents.
 5. Review and comment on the Commissioning System Verification checklists and Functional Performance Testing.
 6. Review and accept the Commissioning Report.
- F. Architect / Engineer:
1. Provide documentation of basis of design from the information received from Owner's Requirements.
 2. Support the Commissioning Program, including commissioning meeting attendance.
 3. Provide contract documents outlining system design parameters and revisions to the initial basis of design as necessary, after obtaining approval by the Owner.
 4. Prepare contract documents and include Commissioning Agent supplied Commissioning Specification.
 5. Attend construction coordination meetings and perform site inspections of installation for compliance with the contract documents.
 6. Review contractor submittals for compliance with the contract documents.
 7. Review TAB procedures submitted by the TAB Contractor.
 8. Review system verification checklist and functional performance test procedures.
 9. Review and accept TAB report and final Commissioning Report.
 10. Review and approve any changes made to the design intent or the construction documents.
 11. After reviewing commissioning activities coordinate the commissioning schedule with contractors and incorporate it into the construction schedule prepared by the GC.
 12. Coordinate construction of systems and equipment. Ensure that installing contractors perform all installation requirements and commissioning responsibilities.
 13. Process the following to the Owner:
 - a. Shop drawings
 - b. As-built drawings
 - c. Manufacturer's Operation and Maintenance Manuals
 - d. Manufacturer's service contracts
 - e. Test and balance reports
 14. The Architect is the coordinator of the commissioning team's efforts and shall work closely with the Commissioning Agent to ensure the success of the commissioning process, including commissioning meeting attendance.
- G. Commissioning Agent:
1. Support the Commissioning Program.
 2. The Commissioning Agent shall support the Owner, Architect/Engineer and the Construction Administrator to ensure the success of the commissioning program including leading the commissioning meetings.

3. Shall complete a submittal review and provide any comments to the Architect/Engineers.
4. The Commissioning Agent shall develop and complete the System Verification Checklists and the Functional Performance Testing Checklists.
5. Perform and documents field inspections to confirm correct equipment/system installation.
6. Chair commissioning meetings, as required and provide meeting minutes to the commissioning team.
7. Perform system verification of completeness and document the results on the System Verification Checklists.
8. Witness and documents equipment/system startup.
9. Perform, with the assistance of the responsible contractors, and document the functional testing of each system. The results documented on the associated Functional Performance Test Checklists.
10. Perform and document trending, with the assistance of the ATC contractor.
11. Coordinate and participate in owner training.
12. Inspect and confirm the complete assembly of accurate O&M manuals.
13. Process the following to the Construction Administrator:
 1. Approved Commissioning Plan
 2. Completed System Verification Checklists
 3. Completed Functional Testing Reports.
 4. Final Commissioning Report.

H. TAB Contractor:

1. This contractor shall support the Commissioning Agent to ensure the success of the commissioning program, including commissioning meeting attendance.
2. Submit TAB procedures to the Commissioning Agent and the commissioning team for review and acceptance.
3. Process the following to the Commissioning Agent:
 - a. Air balance sheets
 - b. Water balance sheets
4. This subcontractor shall include in their quote the cost of participating in the commissioning process.
5. Provide instruction and demonstration for the Owner's designated operation and maintenance staff, in conjunction with the commissioning agent and mechanical engineer, and with the participation of qualified technicians.
6. Notify the Commissioning Agent a minimum of two weeks in advance of scheduled system startups, to allow witness by the commissioning team.
7. Provide sufficient personnel to assist the commissioning as required during system verification and functional performance testing.
8. Support the Commissioning Agent in the process of documenting the results of all inspections, testing and checks.
9. Carry out performance checks to ensure that all equipment and systems are fully functional and ready for the commissioning team to witness formal functional performance testing.
10. Provide a schedule to identify when TAB activities and any other tasks important to the commissioning process.
11. Notify the Commissioning Agent, in writing, when all TAB work is completed.
12. Include 10% Commissioning Agent directed spot checks for both air and water. These checks can be for any systems selected by the Commissioning Agent.

1.7 SYSTEMS TO BE COMMISSIONED

- A. The commissioning program shall include but is not limited to the following systems, equipment, components for complete system verification including the following:

HVAC SYSTEMS		PLUMBING SYSTEMS
1. Building Automation System		1. Domestic Hot Water System
2. Chillers		2. Building Energy Meters
3. Boilers		3. Domestic Water Preheater
4. Air Handling Units		
5. Packaged Air Handling Units		
6. Packaged Rooftop Air Handling Units		ELECTRICAL SYSTEMS
7. Computer Room Air Conditioners		1. Emergency Generator
8. Dedicated Outdoor Air Systems		2. Transfer Switches
9. Hot Water Distribution Systems		3. Automatic Load Transfer System (Substation)
10. Chiller Water Distribution Systems		4. Lighting & Lighting Controls
11. VAV Terminal Units		5. Communication & Paging Systems
12. Exhaust Fans		6. Building Energy Meters
13. Glycol Systems		
14. Convectors		
15. Cabinet Heaters		
16. Unit Heaters		
17. Heat Recovery Systems		
18. Building Energy Meters		
19. Fire Smoke Dampers		

1.8 REFERENCE STANDARDS

- B. AABC – Associated Air Balancing Council (AABC) Commissioning Guideline.
- C. ASHRAE – Guideline 1-1996 The HVAC Commissioning Process.
- D. SMACNA – HVAC Systems Commissioning Manual

1.9 COORDINATION AND COOPERATION

- A. Installing Contractor responsible for Work under Divisions 22, 23 and 26 shall provide commissioning support as described in this document and as included in the design documents.

PART 2 – PRODUCTS

2.1 TEST EQUIPMENT

- A. All testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Installing Contractor for the equipment being tested, unless indicated otherwise. For example, the HC shall be responsible for all testing equipment for the HVAC system and controls except for equipment specific to and used by the TAB Agency for its responsibilities. The Installing Contractor shall provide two-way radios for use during testing by its personnel and the CA.
- B. Special equipment, tools and instruments (only available from vendor; specific to a piece of equipment) required for testing equipment according to the Contract Documents shall be included in the base bid price and shall be turned over to and become the property of the Owner.
- C. Temporary data logging equipment and software required to test equipment will be provided by the CA, but shall not become the property of the Owner.
- D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.
- E. Refer to Section 019113, Part 3 for details regarding equipment that may be required to simulate required test conditions.
- F. The installing contractor shall coordinate and provide any equipment necessary for access to all systems to accomplish commissioning tasks.

PART 3 – EXECUTION

3.1 TEST EQUIPMENT

- A. A. Initial Commissioning Meeting: Within 60 days of commencement of construction, the CA will schedule, plan and conduct a commissioning meeting with the entire commissioning team in attendance. Meeting minutes will be distributed to all parties by the CA. Information gathered from this meeting will allow the CA to further develop, maintain and revise the Commissioning Plan, which will be distributed to all parties.
- B. Progress Commissioning Meetings: Other meetings will be planned and conducted by the CA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with particular Contractors. The CA will plan these meetings and will minimize unnecessary time being spent by Contractors. The commissioning meeting agenda will include, but will not be limited to, a review of latest: design details, submittal status and content, commissioning field reports (generated by the commissioning agent), project schedule, commissioning activities schedule, RFIs, field installation status, equipment access issues, owner training, etc.

- C. Typically, these meetings will be held twice per month or as needed to support the schedule of the project.
- D. A review of the System Verification Checklists (SVC), Test Adjust and Balancing (TAB) Report information and the Functional Performance Testing Checklists (FPTC) data will be the main focus of the group.

3.2 START-UP, CONSTRUCTION CHECKLISTS AND INITIAL CHECKOUT

- A. The following procedures apply to all equipment to be commissioned. Some systems that are not comprised so much of actual dynamic machinery may have very simplified CCs and startup.
- B. General: Construction checklists are important to ensure that equipment and systems are hooked up correctly and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full construction checkout. No sampling strategies are used. The start-up and initial checkout testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.
- C. Start-up and Initial Checkout Plan: The CA will assist the commissioning team members responsible for startup of equipment in developing detailed start-up plans for all equipment. The primary role of the CA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures have been completed. Parties responsible for construction checklists and startup are identified in the initial commissioning meeting and in the checklist forms.
 - 1. The CA provides construction checklists and procedures from Sections 019113, 230800, 260800, and other applicable specification sections. 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. The CA provides these checklists and tests to the appropriate Prime Contractor. Each form will usually have more than one trade responsible for its execution.
 - 3. The Contractor responsible for the purchase of the equipment develops the full start-up plan by combining (or adding to) the CA's checklists with the manufacturer's detailed start-up and checkout procedures from the O&M manual and the normally used field checkout sheets. The plan will 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.
 - a. The full start-up plan could consist of something as simple as:
 - i. The CA's construction checklists.
 - ii. The manufacturer's standard written start-up procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
 - iii. The manufacturer's normally used field checkout sheets.
 - 4. The Contractor submits the full startup plan to the CA for review and approval.
 - 5. The CA reviews and approves the procedures and the format for documenting them, noting any procedures that need to be added.
 - 6. The CA submits the plan for review and approval by Architect.
- D. Sensor and Actuator Calibration:

1. All field-installed temperature, relative humidity, CO, CO2 and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described below. Alternate methods may be used, if approved by the CA beforehand. All test instruments shall have had a certified calibration within the last 12 months. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.
2. All procedures used shall be fully documented on the construction checklists or other approved forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.
3. Sensor Calibration Methods:
 - a. All Sensors: Verify that all sensor locations are appropriate and away from causes of erratic operation. Verify that sensors with shielded cable are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.2°F of each other for temperature and within a tolerance equal to 2% of the reading, of each other, for pressure. Tolerances for critical applications may be tighter.
 - b. Sensors Without Transmitters - Standard Application: Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building management system (BMS)) is within the tolerances in the table below of the instrumentmeasured value. If not, install offset in BMS, calibrate or replace sensor.
 - c. Sensors With Transmitters - Standard Application: Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and BMS control panel. Using manufacturer’s resistancetemperature data simulate minimum desired temperature. Adjust transmitter potentiometer zero until the ammeter reads 4 mA. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the BMS. Record all values and recalibrate controller as necessary to conform to specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction. Reconnect sensor. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building management system (BMS)) is within the tolerances in the table below of the instrument measured value. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.
 - d. Critical Applications. For critical applications, more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.
4. Tolerances, Standard Applications:

Sensor	Required Tolerance (+/-)	Sensor	Required Tolerance (+/-)
Cooling coil, chilled water temps	0.4F	Flow rates, water Relative humidity	4% of design 4% of design
AHU wet bulb or dew point	2.0F	Combustion flue temps	5.0F
Hot water coil and boiler water temp	1.5F	Oxygen or CO2 monitor	0.1 % pts
Outside air, space air, duct air temps	0.4F	CO monitor	0.01 % pts
Wattour, voltage & amperage	1% of design	Natural gas flow rate	1% of design
Pressures, air, water and gas	3% of design		3% of design
Flow rates, air	10% of design	Barometric pressure	0.1 in. of Hg

5. Valve and Damper Stroke Setup and Check:
 - a. BMS Readout. For all valve and damper actuator positions checked, verify the actual position against the BMS readout.
 - b. Set pumps or fans to normal operating mode. Command valve or damper closed, visually verify that valve or damper is closed and adjust output zero signal as required. Command valve or damper open, verify position is full open and adjust output signal as required. Command valve or damper to a few intermediate positions. If actual valve or damper position doesn't reasonably correspond, replace actuator or add pilot position indicator (for pneumatics).
 - c. Closure for heating coil valves (NO): Set heating setpoint 20°F above room temperature. Observe valve open. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set heating setpoint to 20°F below room temperature. Observe the valve close. For pneumatics, by override in the BMS, increase pressure to valve by 3 psi (do not exceed actuator pressure rating) and verify valve stem and actuator position does not change. Restore to normal.
 - d. Closure for cooling coil valves (NC): Set cooling setpoint 20°F above room temperature. Observe the valve close. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set cooling setpoint to 20°F below room temperature. Observe valve open. For pneumatics, by override in the BMS, increase pressure to valve by 3 psi (do not exceed actuator pressure rating) and verify valve stem and actuator position does not change. Restore to normal.
- E. Execution of Construction Checklists and Startup:
 1. Four weeks prior to startup, the Contractor shall schedule startup and checkout with the CA and other pertinent entities. Performance of construction checklists, startup and checkout are directed and executed by the Contractor or vendor. When checking off construction checklists, signatures may be required of other Contractors for verification of completion of their work.
 2. The CA will, at its discretion, observe, at minimum, the procedures for each piece of primary equipment, unless there are multiple units. 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 identical or very similar units.
 3. For lower-level components of equipment (e.g.: sensors, controllers), the CA will observe a sampling of the construction and start-up procedures. The sampling procedures will be identified in the Commissioning Plan.
 4. The Contractors shall execute startup and provide the CA with a signed and dated copy of the completed start-up and construction tests and checklists.
 5. Only installing individuals that have direct knowledge that a line item task on the construction checklist was actually performed shall initial or check that item off.
- F. Deficiencies, Non-Conformance and Approval in Checklists and Startup:
 1. The Contractor shall clearly list any outstanding items of the initial start-up and construction procedures that were not completed successfully, at the bottom of each procedures form or on an attached sheet. Each procedures form and any outstanding deficiencies shall be submitted to the CA within two days of test completion.

2. The CA reviews each report and submits either a non-compliance report or an approval form to the Contractor. The CA shall work with the Contractor to correct and retest deficiencies or uncompleted items. The CA will involve the Contractor and others as necessary. The installing Contractors shall correct all items that are deficient or incomplete in the checklists and tests in a timely manner, notify the CA as soon as outstanding items have been corrected, and resubmit an updated startup report and Statement of Correction on each original noncompliance report.
3. Items left incomplete, which later cause deficiencies or delays during functional testing may result in backcharges to the responsible party.

3.3 PHASED COMMISSIONING

- A. If the project is a phased project it requires startup and initial checkout to be executed in phases, phasing will be planned and scheduled in a coordination meeting of the CA, Contractors, TAB Agency and ATCC. Results shall be added to the master Project Construction Schedule and the CA's commissioning schedule.

3.4 FUNCTIONAL PERFORMANCE TESTING

- A. This article applies to all commissioning functional testing.
- B. The general list of equipment and systems to be commissioned is found in this Section.
- C. The parties responsible to execute each test are listed with each test in Sections 230800, 260800 and other sections.
- D. Objectives and Scope: The objective of functional performance testing is to demonstrate that each system is operating according to the 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 such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested. Specific modes required in this project are given in Sections 230801, 260801 and other sections.
- E. Development of Test Procedures: Before test procedures are written, the CA shall obtain 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 in Sections 230800, 260800 and other sections, the CA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each Contractor or vendor responsible to execute a test shall provide limited assistance to the CA in developing the procedures review (answering questions about equipment, operation, sequences, etc.). Prior to execution, the CA shall provide a copy of the test procedures to the Contractors who shall review the tests for feasibility, safety, equipment and warranty protection.

1. The CA shall review selective Owner-contracted factory testing or required Owner acceptance tests which the CA 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.
2. The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.
3. The test procedure forms developed by the CA 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. Unique test ID number, and reference to unique construction checklist and start-up documentation ID numbers for the piece of equipment
 - d. Date
 - e. Project name
 - f. Participating parties
 - g. A copy of the specific sequence of operations or other specified parameters being verified
 - h. Formulas used in any calculations
 - i. Required pre-test field measurements
 - j. Instructions for setting up the test.
 - k. Special cautions, alarm limits, etc.
 - l. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format
 - m. 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.
 - n. A section for comments
 - o. Signatures and date block for the CA

F. 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 stand-alone data loggers. Division 23, 26, 27 and 28 Sections and other sections specify which methods shall be used for each test. The CA may substitute specified methods or require an additional method to be executed, other than what was specified. The CA will determine which method is most appropriate for tests that do not have a method specified.
2. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.
3. 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 it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a 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 set point to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.

4. 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.
 5. Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the AC compressor lockout work at an outside air temperature below 55F, when the outside air temperature is above 55F, temporarily change the lockout setpoint to be 2F above the current outside air temperature.
Indirect Indicators: Relying on indirect indicators for responses or performance shall
 6. 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 startup and initial checkout testing.
 7. Setup: Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. The Contractor 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 Contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.
 8. 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. Specific recommended sampling rates are specified with each type of equipment in Sections 230800, 260800. No sampling by Contractors is allowed in executing Construction Checklists for startup and initial checkout.
 - a. A common sampling strategy referenced in the Specifications as the “xx% Sampling—yy% Failure Rule” is defined by the following example.
 - i. xx = the percent of the group of identical equipment to be included in each sample.
 - ii. yy = the percent of the sample that if failing, will require another sample to be tested.
 - b. The example below describes a 20% Sampling—10% Failure Rule.
 - i. Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the “first sample.”
 - ii. If 10% (yy) of the units in the first sample fail the functional performance tests, test another 20% of the group (the second sample).
 - iii. If 10% of the units in the second sample fail, test all remaining units in the whole group.
 - iv. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CA may stop the testing and require the Contractor to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.
- G. Coordination and Scheduling: The Contractors shall provide sufficient notice to the CA regarding their completion schedule for the Construction Checklists and startup of all equipment and systems. The CA will schedule functional tests with the Contractors and inform the A/E when they will occur. The CA

shall direct, witness and document all functional testing of equipment and systems. The Contractors shall execute the tests.

1. In general, functional testing shall be conducted after construction and startup has been satisfactorily completed. The control system shall be sufficiently tested and approved by the CA before it is used for TAB or to verify performance of other components or systems. The air balancing and water balancing shall be completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.

- H. Test Equipment: Refer to Section 019113, Part 2 for test equipment requirements.
- I. Problem Solving: The CA will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the Contractors and A/E.

3.5 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

- A. Documentation. The CA 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 are provided to the Contractors for review. The CA shall provide written report of all issues and action plan for resolving any items.
- B. Non-Conformance:
 1. The CA will 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 A/E on a standard non-compliance form.
 2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CA. In such cases the deficiency and resolution will 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 CA will 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 Owner.
 4. As tests progress and a deficiency is identified, the CA discusses the issue with the executing Contractor.
 - a. When there is no dispute on the deficiency and the Contractor accepts responsibility to correct it:
 - i. The CA documents the deficiency and the Contractor's response and intentions, and they go on to another test or sequence. After the day's work, the CA submits the non-compliance reports to the A/E for signature, if required. A copy is provided to the Contractor and CA. The Contractor corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be retested and sends it back to the CA.
 - ii. The Contractor reschedules the test and coordinates with CA to establish a time and date that the test is to be repeated.
 - b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:

- i. The deficiency shall be documented on the non-compliance form with the Contractor's response and a copy given to the A/E and to the Contractor representative assumed to be responsible.
 - ii. Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the A/E.
 - iii. The CA documents the resolution process.
 - iv. Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CA. The Contractor reschedules the test and notifies the CA of the date and time the test is to be repeated. This will occur until satisfactory performance is achieved.
 5. Cost of Retesting:
 - a. The cost for the Contractor to retest a startup/checkout 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 responsible parties.
 - b. For a deficiency identified, not related to any construction checklist or start-up fault, the following shall apply: The CA will direct the retesting of the equipment once at no "charge" to the Contractor for the CA's time. However, the CA's time for a second retest will be charged to the Contractor, who may choose to recover costs from the responsible Sub.
 - c. The time for the CA to direct any retesting required because a specific construction checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be backcharged to the Contractor, who may choose to recover costs from the party responsible for executing the faulty construction test.
 - d. Refer to "sampling" subparagraph 3.4-F.8 of this Section for requirements for testing and retesting identical equipment.
 6. The Contractor shall respond in writing to the CA 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.
 7. The CA retains the original non-conformance forms until the end of the project.
 8. Any required retesting by any Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- C. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the Owner. In such case, the Contractor shall provide the Owner with the following:
1. Within one week of notification from the A/E, the Contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the A/E within two weeks of the original notice.
 2. Within two weeks of the original notification, the Contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions, which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
 3. The A/E will determine whether a replacement of all identical units or a repair is acceptable.

4. Two examples of the proposed solution will be installed by the Contractor and the CA will be allowed to test the installations for up to one week, upon which the CA will decide whether to accept the solution.
 5. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.
- D. Approval: The CA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CA. The CA recommends acceptance of each test to the Owner and A/E using a standard form. The A/E gives final approval on each test using the same form, providing a signed copy to the CA and the Contractor.

3.6 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

O&M Manuals: Specific content and format requirements for the O&M manuals are detailed in Section 017700 and Sections of Divisions 23, 26, 27 and 28. This Section 019113 also specifies some of the O&M manual contents. Special requirements for the ATCC and TAB Agency are found in Section 230800.

- A. Each Contractor shall submit operational and maintenance manuals to the Commissioning Agent, prior to training. The Commissioning Agent shall review the O&M manuals, documentation and As-builts for systems that are commissioned to verify compliance with the Specifications. The Commissioning Agent shall provide written feedback on O&M manuals to the Architect for distribution. Upon successful review of the corrections, the Commissioning Agent shall recommend approval and acceptance of these sections. The Commissioning Agent shall review each equipment warranty and verify that all requirements to keep the warranty valid are clearly stated. This work does not supersede the Architect's and Design Engineer's responsibilities according to their contracts.
- B. The O&M manuals shall be project specific and include all wiring diagrams and interconnections between trades. O&M manuals must meet at minimum the following checklist before acceptance for each component:
 1. Present manual in a three-ring binder, with table of contents and tabbed sections.
 2. Indicate building name, project title, contractor name and contractor project number must appear on both the front cover and the spine of the binder.
 3. Provide a copy of the valve tag schedule at the front of the O&M manual.
 4. Except for minor equipment, provide complete nameplate information at the front of the O&M. Include all data: serial numbers as well as complete motor nameplate data of corresponding equipment.
 5. Provide a sheet at the beginning of the O&M listing equipment and the local supplier (with address and phone number) of that specific equipment.
 6. For all equipment with warranties in excess of one-year include extended warranty information in the front of the binder.
 7. Include project specific information to not provide generic vendor O&M manuals that cover multiple model numbers of equipment. Edit vendor O&M manuals to reflect exact equipment supplied. Cross out extraneous information not applicable to the specific equipment provided. Highlight applicable information for each piece of equipment installed.

8. For each piece of equipment, provide complete data relative to the make/model number, size, capacity data, manufacturer name and address and accessories included. (i.e., provide complete information that would allow ordering the exact piece of equipment supplied). To accomplish this, include portions of the approve submittal for the piece of the equipment submitted. Do not include extraneous submittal information that does not facilitate actually ordering that piece of equipment.
9. If a piece of equipment contains multiple sub-assemblies provided by different manufacturers, include make/model number, size, capacity data to allow the ordering of the exact replacement. For example, for an air-handling unit, provide information on each coil, filter, damper and fan.
10. Provide job specific, as-built, wiring diagrams, piping diagrams for all equipment. All external connections must be shown on these diagrams. Example: A piece of equipment is supplied with controls that interface with the DDC system. Wiring diagram must be project specific and indicate interface with the DDC system.
11. For all pumps and fans, include performance curves, accessories and motor manufacturer information.
12. For all flow elements (pitot tubes, triple duty valves, circuit setters, etc.) provide all flow curves.
13. For all air-handling systems, include sound power data.
14. For all filters provide clean and dirty filter drops.
15. For all electrical equipment provide sensor calibration and setup requirements.
16. Provide a list of all manufacturer spare parts for major equipment installed.
17. Provide an approved copy of the air and water balancing reports.
18. Provide an as-built copy of the project control drawings along with the installation and maintenance information on individual control components.
19. Provide a copy of the equipment vibration test report.
20. For equipment requiring a factory start-up provide a copy of the start-up report.

3.7 TRAINING OF OWNER PERSONNEL

- A. The Contractor shall be responsible for coordinating and scheduling training of Owner's personnel through the Architect for the equipment and systems installed by the Contractor, and ultimately for ensuring that training is completed. The training must be verified by the Architect.
- B. The CA shall be responsible for overseeing and reviewing the content and adequacy of the training of Owner personnel for commissioned equipment.
 1. The CA shall interview the facility manager and lead engineer to determine the special needs and areas where training will be most valuable. The Owner and CA shall decide how rigorous the training should be for each piece of commissioned equipment. The CA shall communicate the results to the Contractor and vendors who have training responsibilities.
 2. In addition to these general requirements, the specific training requirements of Owner personnel by Contractor and vendors is specified in Divisions 23, 26, 27 and 28.
 3. Each Contractor and vendor responsible for training will submit a written training plan to the CA for review and approval prior to training. The plan will cover the following elements:
 - a. Equipment (included in training)
 - b. Intended audience
 - c. Location of training
 - d. Objectives

- e. Subjects covered (description, duration of discussion, special methods, etc.)
 - f. Duration of training on each subject
 - g. Instructor for each subject
 - h. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
 - i. Instructor and qualifications
4. For the primary HVAC equipment, the ATCC shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.
 5. The CA develops an overall training plan and coordinates and schedules, with the Owner and Contractor, the overall training for the commissioned systems. The CA develops criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The CA recommends approval of the training to the A/E using a standard form. The A/E also signs the approval form.
 6. At one of the training sessions, the CA will discuss the use of the blank functional test forms for re-commissioning equipment.
 7. The Contractor shall provide digital video-recording with audio of his training sessions for Owner’s personnel and submit three copies on a common format disk media, appropriately cataloged and added to the O&M manuals.
 8. Subject to Owner’s authorization for additional A/E services, the design engineers will at the first training session present the overall system design concepts and the design concepts of each equipment section. This presentation will review all systems, using simplified system schematics (one-line drawings), including chilled water systems, heat rejection systems, heating systems, fuel oil and gas supply systems, supply air systems, exhaust system and outside air strategies.

3.8 DEFERRED TESTING

- A. Unforeseen Deferred Tests: If any check or test cannot be completed due to a deficiency in the building structure or other required occupancy condition, execution of checklists and functional testing may be delayed upon approval of the A/E.
 1. These tests will be conducted in the same manner as the seasonal tests as soon as possible. Services of necessary parties will be negotiated.
- B. Seasonal Testing: During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system’s design) specified in Section 230800 shall be completed as part of this Contract. The CA shall coordinate this activity. Tests shall be executed, documented and deficiencies corrected by the appropriate Contractor, with Owner’s facilities staff and the CA witnessing. Any final adjustments to the O&M manuals and as-builts due to the testing shall be made.

3.9 WRITTEN WORK PRODUCTS

- A. The commissioning process generates a number of written work products described in various parts of the Specifications. The Commissioning Plan lists all the formal written work products, describes briefly their contents, who is responsible to create them, their due dates, who receives and approves them and the location of the specification to create them. In summary, the written products are:

Product	Developed By
Commissioning plan	CA
Commissioning meeting minutes	CA

Commissioning schedules	CA with Contractors; GC incorporates in Project Construction Schedule
Equipment documentation submittals	Contractors through CA
Sequence clarifications	Contractors and A/E as needed
Construction checklists	CA with assistance from Contractors
Startup and initial checkout plan	Contractors and CA (Compilation of existing documents)
Startup and initial checkout forms filled out	Contractors
Final TAB report	TAB Agency
Issues log (deficiencies)	CA with responses provided by Contractors
Commissioning Progress Record	CA
Deficiency reports	CA
Functional test forms	CA with assistance from Contractors
Filled out functional tests	CA
O&M manuals	Contractors; review by CA
Commissioning record books & Compact Disks	CA
Overall training plan	CA and Contractors
Specific training agendas	CA and Contractors
Final commissioning report	CA
Misc. approvals	CA
Verification of commissioning	CA

END OF SECTION 01.9113