

## SECTION 01 11 00

### SUMMARY OF WORK

#### PART 1 GENERAL

##### 1.01 SPECIAL CONDITIONS

- A. The purpose of this section is to define special protection, sequence restrictions or scheduling restrictions which restrict the Contractor's operations during the prosecution of the work. Other sections may also provide for restrictions. A/E shall coordinate drawings, specifications and these restrictions.
- B. A/E shall review the need for special conditions at construction sites, especially where buildings will be partially occupied.
- C. A/E shall coordinate through DPS and advise Principals, Facility Managers, etc. of arrangements and get their agreement as to disruptions which are unavoidable.
- D. Review exiting, noise isolation, dust control and other issues with DPS. Include requirements in specifications.
- E. Construction Schedules Coordination:
  - 1. The Architect shall review conditions with DPS and shall coordinate schedules by specifying completion dates for "phases" of the work where applicable.
  - 2. The Architect shall review with DPS to establish critical sequences. Critical sequences will be where one portion of the project must be completed prior to another portion being started. A delay between completion of one activity and start of another may be necessary for such reasons as moving of furniture or equipment.
  - 3. Definitive "earliest start" and "latest finish" dates may be required for Projects and/or portions of Projects.
  - 4. The Architect shall clearly document these conditions and restrictions in the Contract Documents. The scheduling of Work by Others, Abatement Coordination, etc. may need to be defined with landmark dates. A/E shall coordinate with DPS Project Manager.

##### 1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work for this project includes demolition, materials, labor, transportation, security, temporary construction and other items identified in, or reasonably inferable from the Construction Drawings and Project Manual.

##### 1.03 WORK SEQUENCE

- A. Sequence and schedule shall be established by the Contractor to achieve completion dates as specified elsewhere. Critical work sequences and related scheduling requirements are detailed in Section 01 32 00 – Construction Progress Schedules. The Contractor's work plan and schedule shall include the activities and restrictions specified in Section 01 32 00 and other specification sections.

##### 1.04 USE OF PREMISES & SECURITY

- A. Areas in the vicinity of the building will be designated by DPS for the purposes of Contractor staging, stockpiling, and vehicle access.
- B. No portion of the site may be used by the Contractor without prior approval by DPS.
- C. Contractor personnel are prohibited from building interiors except as required to execute specific work indicated on the drawings. Remove this paragraph if project is entirely new construction.
- D. The Contractor is prohibited from utilizing the building's computers, phones and/or internet access.
- E. Toilet facilities and service sinks in the buildings are not to be used by the Contractor, Subcontractors or their personnel, or for cleaning tools, or for disposing of construction waste materials.
- F. Building keys will not be made available to the Contractor. Access into and throughout the building will be arranged through DPS.
- G. Protect existing property from unauthorized access to building interiors, roofs, etc. No temporary work or storage of materials shall compromise building security.

- H. No temporary work shall compromise structural integrity.
- I. No construction waste materials may be disposed of in DPS dumpsters or other DPS containers.

### **1.05 WORK UNDER OTHER CONTRACTS**

- A. Certain elements, materials, and tasks for the project have been identified as being "Not in Contract" (N.I.C.), "By Others", or "By DPS Project Manager". Such materials and labor will be provided by others in a manner and schedule which is not intended to impede the progress of the work in this contract.
- B. The Contractor shall coordinate the construction schedule with DPS and Architect and shall give adequate notice as to when other work should be undertaken. The Contractor shall review with DPS and Architect the time required for various work requiring coordination. Work under other contracts shall be included in the Contractor's Project Schedule.
- C. Bid Packages have been designed to minimize overlapping requirements and/or coordination between separate Contractors. Should separate Contracts be awarded for various portions of a single project, the affected Contractors shall meet with DPS and Architect prior to construction in order to develop a coordinated schedule agreeable to all parties.

### **1.06 OWNER'S CONTINUED OCCUPANCY**

- A. The building will be occupied during construction. Construction operations shall minimize interference with normal functioning of building and occupants.
- B. Noise shall be limited. Radios are not permitted. If construction activities produce noise which is detrimental to the operation of the facility, the Contractor shall schedule these activities during non-occupied hours.
- C. Construction, equipment, materials, and procedures at the building entrances shall not impede emergency building evacuation.
- D. Entrances/Exits, walkways, and other areas in the vicinity of the construction subject to use by the public shall be protected from falling objects or appropriately barricaded according to governing regulations.
- E. Except as specifically indicated in the construction drawings and specifications, interruption of mechanical or electrical services, or the shut down of building systems, services or utilities shall be prohibited except with prior approval of DPS.

### **1.07 REGULATORY REQUIREMENTS**

- A. Pollution Control
  - 1. Conduct all cleaning operations in compliance with governing authority regulations. Comply with all local ordinances, State and Federal Laws and statutes. Prohibitions include, but are not necessarily limited to:
    - a) Burning or burying of waste materials on the project site.
    - b) Disposal of flammable liquids, acids, caustics or other hazardous materials by dumping on site or into sanitary sewers, storm sewers, streets or gutters.

### **1.08 PROJECT/SITE CONDITIONS**

- A. Temporary site storage of construction waste shall be in suitable containers. All waste storage shall be housed within the construction fencing.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Materials used to clean manufactured products shall be acceptable to and recommended by the product manufacturer.
- B. Equipment
  - 1. Equipment used to clean surfaces shall be appropriate to the surface being cleaned.

## **PART 3 EXECUTION**

### **3.01 PROTECTION (SURROUNDING AREAS OR SURFACES)**

- A. Protect all surrounding surfaces which could be damaged by cleaning operations. Remove all protective coverings when cleaning is complete.

**3.02 CLEANING**

- A. Clean all construction areas of waste materials at the end of each work day. Completed areas shall be broom cleaned immediately after completion (while awaiting final cleaning).

**3.03 REMOVAL**

- A. Remove from site and properly dispose of all waste concrete, mortar, or other debris no less frequently than once per week.

**END OF SECTION 01 11 00**

**SECTION 01 20 00**

**ALTERNATES, ALLOWANCES, AND UNIT PRICES**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. Coordinate Alternates, Unit Prices and Allowances with bid forms.

**PART 2 PRODUCTS – No Requirements**

**PART 3 EXECUTION**

**3.01 ALTERNATES**

- A. Schedule of Alternates (Example Format)
  - 1. ALTERNATE NO. «alt number»
    - a) Work included in Base Bid:
      - i) «A/E to describe base bid work»
    - b) Work include in Alternate Bid:
      - i) «A/E to fully describe alternate bid work»
  - 2. ALTERNATE NO «next alt number»

**3.02 ALLOWANCES**

- A. Allowances shall be avoided except where reasonable specific products or scope of work cannot be determined at the time of bidding.
- B. Where Allowances are necessary, scope shall be limited to the work covered under the allowance to only those portions of the work which cannot be determined.
  - 1. Example: An allowance for a floor covering should be limited to the material only if the installation costs are independent of the material selected.
  - 2. All Contractor overhead and profit and other mark-ups shall be excluded from the Allowance where possible.
- C. Schedule of Allowances (Example Format)
  - 1. ALLOWANCE NO. «alt no» - «allowance amount»
    - a) Allowance number «allowance number» includes all «A/E to describe scope, product, etc. included in allowance number».
    - b) Allowance number «allowance number» shall NOT incude «A/E to describe work, products, etc. NOT included in the allowance figure.»
      - «A/E edit note: review and edit or expand the below listing.»
      - i) Contractor’s overhead and profit.
      - ii) Sub-Contractor’s overhead and profit.
      - iii) All labor associated with the installation, procurement, or management of the product.
      - iv) Accessory materials required for the installation of the product.
  - 2. ALLOWANCE NO. «next allowance number»

**3.03 UNIT PRICES**

- A. Schedule of Unit Prices (Example Format)
  - 1. UNIT PRICE NO. «unit price number»

- a) Unit Price Number «unit price number» shall be for each «A/E to clearly describe the product or scope of work to be covered under the unit price».
  - b) The Unit Price shall NOT include: «A/E to edit below for each specific unit price»
2. UNIT PRICE NO. «next unit price number»

**END OF SECTION 01 20 00**

## SECTION 01 25 00

### SUBSTITUTIONS AND PRODUCT OPTIONS

#### PART 1 - GENERAL

##### 1.01 PROCEDURE

- A. Contractors and/or suppliers may submit requests for approval of substitute products or materials. Requests shall be submitted within the specified time before the bid.
- B. No substitutions will be considered after the substitute deadline.
- C. Documentation may need to be sent to DPS for some products such as paint and finish hardware, floor finishes, etc.

##### 1.02 PRODUCT SUBSTITUTIONS REQUIRING PRE-BID SUBMITTALS

- A. Whenever a material or article is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, the specific item mentioned shall be understood as establishing type, function, dimension, appearance, and quality desired. Other manufacturer's products will be considered provided sufficient information is submitted to allow the Architect to determine whether products proposed are acceptable for use in project.
  - 1. Requests for substitutions must clearly state what is offered and be complete with full data, including illustrations, specifications, capacities, operational data and samples.
  - 2. Requests for Architect's acceptance of substitute products for those specified shall be according to the following:
    - (a.) Requests in writing shall be received by the Architect at least seven (7) working days prior to the bid opening.
    - (b.) Detailed, complete information for a specific product must be provided with each request in order to permit accurate evaluation. Submissions consisting only of general catalogues or vague, incomplete data will not be considered.
- B. It is the duty of the party making the request to provide sufficient information with the request. The Contractor shall identify each individual specified item and proposed substitute.
- C. The burden of proof of acceptability rests with the Contractor.
- D. Requests for approval of substitute items shall be categorically rejected if received after specified deadlines or if non-compliant with any conditions of this section or specification section of the product for which substitution approval is being requested.
- E. Acceptance of substitutions shall in no way be interpreted as a waiver from full compliance with other specification requirements, unless requests for approval of substitute items specifically request relief from specified requirements and the requested relief is specifically granted in the approving addendum.
- F. Rejection of a Request for Substitution may be for any reason including: product incompatibility, past record of performance for DPS, parts availability, manufacturer's representative's service performance, available colors or finishes or any other factor which impacts the aesthetics, maintainability, durability or serviceability of the product. Acceptability of proposed substitutions is at the sole discretion of the Owner.

**1.03 SAMPLES**

- A. Samples shall be provided for substitution requests of:
  - 1. Casework
  - 2. Carpet
  - 3. Chalkboard, Tackboard, Markerboard (trim only).
  - 4. Windows
  - 5. Samples may be requested for any other items if in the judgement of the Architect and/or Owner, such samples are needed to adequately judge acceptability.

**1.04 UTILITY REQUIREMENTS:**

- A. Any differences in utility requirements, hook up, fabrication, or construction between specified items and proposed substitutions shall be clearly identified in writing by the party making the request for approval of equals.
- B. When the Architect accepts a product proposed by a supplier as being "equal" to a product specified in the Contract Documents and such proposed product requires a different quantity and/or arrangement of any other part of the work from that specified, detailed, stated in the Approval, or indicated on the Contract Documents, the Contractor shall provide the same at his own cost and expense.

**1.05 NOTIFICATIONS**

- A. Materials and equipment accepted as substitutes for specified products will be listed in Addenda and distributed to all Construction Document holders of record. No other notification of the Architect's approvals will be issued. The Architect will not list products that are not accepted as substitutions.

**1.06 APPROVED MANUFACTURERS**

- A. Where various sections of these specifications list manufacturers as acceptable to provide products specified, the naming of a manufacturer herein:
  - 1. Indicates that said manufacturer is approved to provide a product that meets the detailed specified requirements. Acceptance of the manufacturer does not suspend any requirements of the specification unless specifically indicated in the authorizing addendum.
  - 2. Approval does not indicate any judgment on the capacity of the manufacturer to produce the quantity of product required for any specific project. The Contractor shall be responsible for determining the ability of any particular manufacturer to fulfill contractors delivery schedules, etc. as needed to complete the contract within the given contract time.

**END OF SECTION 01 25 00**

## SECTION 01 31 00

### PROJECT MANAGEMENT AND COORDINATION

#### PART 1 GENERAL

##### 1.01 COORDINATION

###### A. Contractor Coordination:

1. The Contractor may be responsible to the Owner for the costs of extraordinary services of the Architect, Engineers and Testing Companies due to inaccurate notifications which result in inaccurate, untimely or unnecessary visitations to the site.
2. The Contractor shall bear full responsibility for delays caused by improper compliance with this Section. Failure to provide prior notification shall be grounds for rejection of identified work, requiring removal and reconstruction at the Contractor's expense.
3. All work required to be reviewed or tested by Architect or Engineer shall not be covered until such reviews/tests are completed. The Contractor shall uncover all enclosed work which has not had required reviews/testing and restore areas at his own cost.

###### B. Special Notifications:

1. The Contractor shall notify the Architect and DPS 72 hours prior to the commencement of the following activities:
  - a. Any construction activity which will produce inordinate noise or dust during normal school operating hours.
  - b. The interruption of any utility service to existing buildings including fire alarm and security systems.
  - c. The Contractor shall allow for rescheduling of any activities which may cause disruption of normal school activities.

###### C. Submittal Coordination:

1. Under the terms and conditions of this Contract, the Contractor shall submit information to DPS through the Architect prior to commencing identified portions of the work.
2. The Contractor shall be responsible for understanding requirements of this Contract and for the coordination of Architect involvement so as to have no adverse impact upon the schedule for the work.
3. Minimum coordination requirements include the following:
  - a. Section 01 33 23 - Shop Drawings, Product Data and Samples.
  - b. Section 01 45 00 – Quality Control.
  - c. Section 01 31 00 – Project Management and Coordination.
  - d. Section 01 45 29 - Testing & Laboratory Services.
  - e. Section 01 78 23 - Operation and Maintenance Data.
  - f. Section 01 78 36 - Warranties.
4. Refer to other sections of these Division 1 Specifications and specific requirements of individual technical specifications Divisions 2 through 28 for more detailed requirements.



D. Architectural Coordination

1. A/E to coordinate definitions for providing, setting and connecting of all equipment indicated on the Drawings whether provided by Contractor or Others.
2. A/E to provide the coordination schedule listed in part 2 below to his electrical and mechanical consultants for review and approval. Any proposed changes to the coordination schedule are to be approved by DPS.
3. Mechanical and Electrical Specifications shall refer to this section rather than including their own schedules.

E. Mechanical/Electrical Coordination

1. Equipment Furnish/Connect

- a. Refer to Equipment Schedule(s) for definition(s) of responsibilities pertaining to assembly, setting, and connection of equipment items. Unless otherwise noted in the coordination schedule below or herein, final setting and connection of equipment items shall be performed by the Trade Contractor supplying the equipment item.
- b. Unless otherwise specified, all line and disconnect switches, safety cut outs, control panels, fuse boxes, or other electrical controls, fittings, and connections not a part of the fixture as furnished standard by the manufacturer, shall be furnished loose by the Equipment Manufacturer (other than special fabricated items), and shall be mounted and wired complete by the Electrical Contractor.
- c. Any sleeves or conduit required for refrigeration lines furnished and installed under the mechanical contract shall be furnished by the Mechanical Contractor and installed by other Trade Contractors in their portions of the work.
- d. Necessary flues and/or vents and fans of size and capacity required to operate fixtures specified, together with final connection between roughed-in vent openings and fixtures, will be furnished and installed by the Mechanical Contractor unless specifically indicated otherwise.
- e. All plumbing, steam, electrical, and ventilation work, both material and labor required to connect this equipment shall be furnished by the Supplying Contractor unless specifically identified otherwise. The work shall include roughing-in to points indicated on mechanical plans, and final connecting from rough-in point to various pieces of equipment requiring such connections and the supplying of all necessary materials and labor for this work, except as hereinafter noted.

2. Walk-In Coolers

- a. Refrigeration is to be performed by others. Electrical and plumbing connections to compressors, blower coils, lights, controls, etc. shall be performed by the Contractor, including interior wiring in walk-in cooling equipment and drain extensions from fixtures to floor drains and floor sinks.
- b. All traps, drains, tail pieces, valves, stops, shutoffs, and fittings necessary are to be furnished and installed by the Trade Contractor, unless specifically identified otherwise.

3. Mechanical Accessories

- a. All steam traps, valves, shutoffs, condensate pumps, and fittings necessary are to be furnished and installed by the Trade Contractor supplying components.
- b. If, because of jurisdictional trade agreements or other conditions, any work specified to be performed under this contract must be done by others, the Contractor shall sublet such work to those who are qualified to do such work or make other arrangements at Contractor's own expense as approved by the Owner.

**1.02 COORDINATION SCHEDULE**

A. Mechanical Contractor, Temperature Control Contractor, and Electrical Contractor shall coordinate the supply and installation of mechanical equipment requiring electrical connections for power and control. Unless otherwise indicated, all mechanical equipment and controls shall be furnished, mounted, and wired in accordance with the following schedule:

**COORDINATION SCHEDULE**

	FURNISHED UNDER	SET IN PLACE OR MOUNTED	POWER WIRED & CONNECTED	CONTROL WIRED & CONNECTED
Mechanical equipment motors	MC	MC	EC	TC
Mechanical magnetic motor starters	MC	MC	EC	TC
Other equipment motors/starters	I	I	EC	I
Fused and unfused disconnect switches & thermal overload switches	EC	EC	EC	-
Pushbutton stations and pilot lights	MC	MC	EC	TC (Note 2)
Manual operating switches	MC	MC	EC	(Note 3)
Control wiring – regardless of voltage	TC	TC	TC (Note 1)	TC
Control components: control relays, thermostats, control transformers, switches, transmitters	TC	TC	TC (Note 1)	TC
Temperature control panels, time clocks, controllers	TC	TC	TC (Note 1)	TC
Valve and damper motors and actuators	TC	TC	TC (Note 1)	TC
Control valves, solenoid valves	TC	MC	EC / TC	TC
Control dampers integral with a fan unit	MC	MC	TC	TC
Control dampers (duct mounted)	TC	MC	TC	TC
Thermowells in piping	TC	MC	-	-
Duct detectors	EC	EC	EC	TC
Thermostats	MC	MC	EC / TC	TC
Temporary heating or cooling services	MC	MC	EC	TC

EC = Electrical Contractor

I = Installer of Equipment Requiring Electrical Service (Trade Contractor Supplying the Equipment Item)

MC = Mechanical Contractor

TC = Temperature Control Contractor

Note 1: It is the intent of this specification for all conduit and wiring, which connects to control equipment or provides controls to mechanical equipment, to be provided by the Temperature Control Contractor. Other portions of this specification, which may be in conflict with this concept, shall be brought to the attention of the engineer for clarification prior to bidding the project. The electrical division (Division 26) shall provide line voltage wiring in conduit and junction boxes for the express purpose of temperature controls. It shall be the responsibility of the Temperature Control Contractor to coordinate the location of the junction boxes (if not otherwise shown on the electrical drawings) and to utilize these junction boxes for temperature control wiring. The Temperature Control Contractor shall extend line and/or low voltage wiring from junction boxes to all mechanical and control components, which required control wiring.

Note 2: Connection of auxiliary contacts, if required.

Note 3: Device is used in power wiring circuit to the equipment. Control functions are not required.

- B. All temperature control conduit and wiring will be furnished and installed under the Temperature Control contract.
- C. Division 26 Contractor shall furnish and install all wiring and conduit required for power wiring to carrying equipment full load amperage to all mechanical equipment, unless shown otherwise.
- D. All Contractors shall confirm their scope of supply prior to ordering equipment. DPS shall not be responsible for delays due to missing equipment, charges for expediting equipment, or charges for restocking equipment overages.

### **1.03 SUBMITTALS**

- A. Submit coordination drawings for locations where several elements of equipment, mechanical or combined mechanical and electrical work must be sequenced and positioned with precision in order to fit into available space.
- B. Lay out the mechanical and electrical work in conformity with the contract drawings, coordination drawings, and other shop drawings, product data, and similar requirements, so that the entire mechanical system will perform as an integrated system properly interfaced with electrical work and other systems.
- C. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination of mechanical and electrical work. Include such items as required notices, reports, and attendance at meetings. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.

## **PART 2 PRODUCTS No standards**

### **PART 3 EXECUTION**

#### **3.01 SITE UTILIZATION**

- A. Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials.
- B. The Contractor shall note that concurrent with their work, other contractors, suppliers, and DPS personnel may be working in relatively close proximity. The Contractor will be solely responsible for coordinating their work with that of other contractors and will make no claims for failure to do so.

#### **3.02 SALVAGE OF MATERIALS**

- A. Salvage materials and equipment involved in performance of, but not actually incorporated in the work. Refer to other sections for disposition of salvaged materials that are designated to be returned to DPS. DPS wants first right of refusal on all demolished equipment.

#### **3.03 LAYOUT**

- A. It is recognized that the contract documents are diagrammatic in showing certain physical relationships of the various elements and systems and their interfacing with other elements and systems. Establishment and coordination of these relationships is the exclusive responsibility of the Contractor. Do not scale the drawings. Lay out and arrange all elements to contribute to safety, efficiency and to carry the harmony of design throughout the work. In case of conflict or undimensioned locations, verify required positioning with the architect.

#### **3.04 LARGE AND HEAVY EQUIPMENT**

- A. The Contractor shall coordinate the requirements to be maintained for subsequent entry of large equipment units. Coordinate the movement of heavy items with shoring and bracing so that the building structure will not be overloaded during the movement and installations.

- B. Where equipment or products to be installed on the roof are too heavy to be hand-carried, do not transport across roof deck; position by crane or other device so as to avoid overloading the roof deck.

### **3.05 INSTALLATION**

- A. Comply with manufacturer's installation instruction and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in the contract documents.
- B. Coordinate the installation of materials and equipment above and below ceilings with suspension systems, light fixtures and other building components. Where mounting heights are not detailed or dimensioned, install services and overhead equipment to provide the maximum headroom possible.
- C. Coordinate ceiling and joist cavity space carefully with all trades. In the event of conflict, install mechanical and electrical systems within the cavity space allocation in the following order of priority:
  - 1. Plumbing waste and vent piping, roof drain mains and leaders.
  - 2. Supply, return and exhaust ductwork.
  - 3. Steam and condensate piping and traps.
  - 4. Fire sprinkler mains and leaders.
  - 5. Electrical conduit.
  - 6. Domestic hot and cold water, lab gas piping.
  - 7. Heating and cooling water supply and return piping.
  - 8. Fire sprinkler branch piping and sprinkler runouts.
  - 9. Pneumatic control piping and tubing.
- D. Coordinate the installation of equipment and piping support, sleeves, and other structural components that penetrate walls, floors, ceilings, or roofs.

**END OF SECTION 01 31 00**

## SECTION 01 31 19

### PROJECT MEETINGS

#### PART 1 GENERAL

##### 1.01 CONSTRUCTION MEETING REPORTS

- A. The Architect is responsible for conducting and keeping the minutes of the meetings. The Architect shall transmit minutes of the meetings to the Contractor, Owner, and other parties affected by the issues raised and/or resolved at each meeting. Distribute minutes as soon as possible after meeting. Delivery of meeting minutes shall be no later than 24 hours prior to the next meeting.

##### 1.02 CONSTRUCTION PROGRESS MEETINGS

- A. The Contractor shall meet at the project site with the Architect and Owner for regularly scheduled construction progress meetings. For this project, these meetings will be held once each week during periods of construction activity.
- B. Weekly construction meetings shall include:
1. Construction meeting:
    - a) General progress and status of the Project.
    - b) Review and discussion of Weekly Progress Report as defined in Section 01 32 00.
    - c) Comparison of weekly progress with the project master schedule.
  2. Construction Schedule status:
    - a) Portions of the work ahead of schedule.
    - b) Portions of the work behind of schedule.
    - c) Critical materials delivery problems.
  3. Change Order status:
    - a) Items pending pricing.
    - b) Items pending approval.
    - c) Items pending definition and request for proposal.
  4. Submittals Status:
    - a) Critical items pending submittal.
    - b) Critical items pending review.
    - c) Critical resubmittal items.
  5. Construction Problems
    - a) discussion of construction problems arising from:
      - i) Unknown conditions discovered.
      - ii) Sequencing problems.
      - iii) Others.
      - iv) Resolution of undefined construction details and/or procedures.
  6. Review of unresolved problem from previous meetings.
  7. Observation of construction to identify and resolve construction issues.

**1.03 PRE-PHASE MEETINGS**

- A. At various times during the progress of the work, the Contractor shall conduct pre-phase meetings for the trade(s) involved in the next portion of the work.
- B. The pre-phase meeting shall include:
  - 1. Documentation of parties present.
  - 2. Review of permits required and status of each.
  - 3. Review of submittals required and status of each, and verification that submittals comply with specified requirements.
  - 4. Review of materials delivery status.
  - 5. Verification that materials comply with specified requirements.
  - 6. Materials storage requirements and provisions made for meeting requirements
  - 7. Review of maintenance requirements for stored materials and provisions made for compliance with manufacturer's requirements.
  - 8. Review of all Specification requirements for the work considered.
  - 9. Review of the status of required preceding work.
  - 10. Review of testing and inspection requirements and coordination of same.
  - 11. Review of Record Drawing and Operation and Maintenance documentation and methodology for recording variations from plans and the methodology for accumulation of Project Record Documents.

**END OF SECTION 01 31 19**

## SECTION 01 32 00

### CONSTRUCTION PROGRESS SCHEDULE

#### PART 1 GENERAL

##### 1.01 SUBMITTALS

- A. Refer to the General Conditions for Construction for Progress Schedule format and reporting requirements.
- B. The Contractor(s) shall submit a complete, written schedule to the Owner and Architect covering all portions of the work in this Contract. No pay applications will be processed until an acceptable construction schedule is on file with the District. An acceptable schedule shall show accurate construction sequences and activity durations separated into logical components and clearly indicating the relationships between preceding and succeeding activities. The Schedule shall include time allotments for:
  - 1. Permit application, review and permit issue time
  - 2. Submittal preparation time
  - 3. Submittal review time (Include 1-2 business days per submittal.)
  - 4. Resubmittal time and review.
  - 5. Product production and delivery time
  - 6. Temporary protection
  - 7. Systems testing
  - 8. Inspections by permitting authorities
  - 9. Substantial completion inspection
  - 10. Completion of punchlist work
  - 11. Verification inspection
  - 12. Systems operational training
  - 13. Final closeout processes including submittal of O&M Manuals and Record Drawings.
- C. Critical Schedule Items:
  - 1. The schedule shall commence with the issue of NOTICE TO PROCEED and shall terminate with the Final Acceptance for the project. The Date of Substantial Completion shall be such as to allow the Owner to occupy the building and accept the work by the date specified in the advertisement for bids.
- D. Construction schedule shall be critical path or other format acceptable to the Architect and Owner.

#### PART 2 PRODUCTS

##### 2.01 WEEKLY PROGRESS REPORTS

- A. At each weekly Construction Progress Meeting, the Contractor shall present a three week schedule of current construction activities. The schedule shall contain planned and actual activities and dates for the previous week, the current week and the next week. The three week schedule shall be presented in a consistent format to enable easy comparisons of current activities to the previous period and the overall schedule.
- B. On the request of the Owner and/or Architect, the Contractor shall provide detailed information on early and late start dates, early and late finish dates, float and the activities which precede and succeed each activity.

##### 2.02 MONTHLY PROGRESS REPORTS

- A. The Contractor shall submit monthly progress reports to the Architect indicating the actual progress of the work. The format for the monthly progress reports shall be the same as that of the approved Construction Schedule.

- B. The monthly progress schedule update shall clearly mark or highlight all changes in construction sequence, planned durations, benchmark dates or other changes to the approved schedule.
- C. All applications for payment must be accompanied by the monthly progress report. No applications for payment will be processed if current progress reports have not been submitted, the report not accurate or is inconsistent with the Application for Payment.

**2.03 PROGRESS MEETING REPORTING**

- A. Contractor shall provide a list of newly received products and manufacturer's storage requirements and present same at regular project progress meetings.
- B. Contractor will be responsible for manufacturer's warranty if storage and pre-acceptance maintenance requirements have not been met and/or cannot be documented.

**PART 3 EXECUTION**

**3.01 COORDINATION**

- A. The Contractor shall carefully coordinate demolition and new construction to prevent excessive exposure of unprotected building components.
- B. The Owner reserves the right to request reasonable modifications to construction schedules to accommodate special circumstances.

**3.02 ARCHITECT NOTIFICATION**

- A. Within 21 calendar days of the Notice to Proceed, the Contractor shall identify in writing to the Architect all specified materials, products, and components which cannot be delivered and installed within the Contract Schedule. Formal changes for items and/or schedule will be considered to accommodate those items which are beyond the control of the Contractor.
- B. Material, Product and Component delays not previously identified according to this Section of the Specifications shall be the exclusive responsibility of the Contractor and subject to the penalties defined in the Supplemental General Conditions.
- C. In the interest of Project Scheduling, within 14 calendar days after the Notice to Proceed, the General Contractor shall submit all Division 08 sections.

**END OF SECTION 01 32 00**



**SECTION 01 32 23**

**SURVEY AND LAYOUT DATA**

**PART 1 GENERAL**

**1.01 CONTROL LINES AND POINTS**

- A. The Contractor shall employ the services of a registered Registered Land Surveyor to establish the base lines, grade elevations, and to locate all columns in exact accordance with the Contract Documents. Provide all stakes, templates, platforms, ranges and labor required in the setting of control points and the laying out of the work. The Contractor shall preserve and maintain all control lines and points until the project is accepted.

**1.02 LAYOUT**

- A. Working from lines and levels established by the property survey, as indicated in relation to the Work, establish and maintain bench marks, batter boards and other dependable markers to set the lines and levels for the work at each story of construction and elsewhere on the site as needed to properly locate every element of the work for the entire project.
- B. Calculate and measure required dimensions as shown within recognized or specified tolerances. Do not scale the Drawings. If any dimension cannot be determined by written dimensions or by the calculation of dimensioned components, contact the Architect for additional instructions and directions.
- C. Document any supplemental instructions from the A/E and distribute documents to Architect and Owner.

**1.03 COORDINATION**

- A. Coordinate all trades and provide additional benchmarks, levels, etc. as may be needed for proper execution of the work.

**1.04 RECORDS AND SUBMITTALS**

- A. Contractor shall maintain a copy of all survey notes.
- B. Upon request, the Contractor shall deliver a copy of all survey notes to the Architect and/or Owner.

**PART 2 PRODUCTS – No Requirements**

**PART 3 EXECUTION No Requirements**

**END OF SECTION 01 32 23**

## SECTION 01 33 00

### SUBMITTALS

#### PART 1 - GENERAL

##### 1.01 SUBMITTAL REVIEW PROTOCOL

- A. Submittal of Products and Materials not specified nor "approved as equal" prior to the bid shall be summarily rejected unless significant extenuating circumstances exist such as the closure of a manufacturer, or extended delivery period restrictions.
- B. A/E to transmit each submittal to DPS for review by the District prior to submitting final comments to the Contractor.
  - 1. If submittal has been rejected or if a corrected copy is required, DPS shall receive a final copy of the submittal at the time it is approved by the A/E.
  - 2. Certain submittals shall be submitted to DPS prior to (or concurrently with) Architect's review. These submittals will be identified by DPS.
- C. Owner's comments, when returned to the A/E after completion of his submittal review, shall be forwarded to the General Contractor with appropriate request for change, etc.
- D. Final Submittals:
  - 1. Final approved and signed submittals shall be submitted to DPS at the time of their approval.
  - 2. A/E shall maintain a log of submittals to be turned over to the Owner along with the project record documents. The submittal log shall include: spec section number and name, item submitted, manufacturer and/or supplier and approval date. For multiple product submittals, provide single line for each basic product.

#### PART 2 - REQUIRED SUBMITTALS

##### 2.01 ROUGH-IN DRAWINGS

- A. For all equipment requiring mechanical and/or electrical connections, rough-in drawings shall be provided which show size and location required for all utilities. Where flexible or quick-connects are to be provided, submittals shall clearly show the size, type, and location of rough-in piping/electrical etc.

##### 2.02 COORDINATION DRAWINGS

- A. Submit coordination drawing when required by the Contract Documents. Coordination Drawings shall consist of clear representations of various project components which are drawn to scale for the purpose of verifying the relationships and/or clearances required for the various components.
- B. The Contractor shall prepare Coordination Drawings wherever the complexity or difficulty of construction require close coordination of various project parts.

##### 2.03 PRODUCT DATA

- A. Product Data, including manufacturer's literature, specimens, guarantees/warranties, and test data.

##### 2.04 SAMPLES

- A. Provide samples identical to conditions and materials proposed in the work. Where the Architect's selection is required, provide a complete set of optional samples. Where required, prepare samples to conform to the Architect's specifications.
- B. Adequately label each sample for distinguishing and precise future duplication in the work.

##### 2.05 REGULATORY SUBMITTALS

- A. Submittals to regulatory agencies shall be provided in the quantities and formats as specified by the regulatory agencies. Submit two copies of all such submittals to the Architect. Submit the required number of documents directly to the regulatory agency.

**2.06 MANUFACTURER QUALIFICATION/CERTIFICATION**

- A. Submit 4 copies of required manufacturer certifications.

**2.07 QUALIFICATION/CERTIFICATION**

- A. Applicator/Installer Qualification/Certification:

- 1. Applicator/Installer qualification documentation shall consist of a certificate, letter, or other appropriate document issued by a product manufacturer or regulatory agency which states that the company or individual who is applying or installing the product has been trained and is currently certified by the certificate issuer and that product guarantees/warranties will be honored.
  - a. Submit 3 copies of each qualification/certification document.
  - b. All such certifications shall have been issued no less than 3 months prior to the bid opening date.
  - c. Failure to submit certification data within a designated time period or failure to satisfy minimum standards shall be grounds for rejection of the candidate contractor or trade contractor under the terms of the General Conditions for Construction.
  - d. Work which is executed without required certification shall be subject to rejection and complete replacement at the expense of the Contractor. No contract extension shall be granted for rejection of an unqualified or uncertified contractor.

- B. Trade Qualification:

- 1. Where identified in other portions of the contract documents, Contractors performing certain portions of the work shall provide written certification of experience and/or other unique qualifications.
  - a. Submit to the Architect 3 copies of a written statement summarizing the contractor's ability to meet requirements specified in the relevant specification sections.
  - b. Where a listing of completed projects is required, include associated contact names and telephone numbers.
  - c. Where manufacturer's certifications are required, submit 3 copies of manufacturer's certification to the Architect for review and approval. Such certificates shall have been issued a minimum of three months prior to the bid opening date.
- 2. Do not proceed with related work until submitted Qualifications and/or Certifications have been reviewed and approved by the Architect. Work executed without prior approval of Qualifications and/or Certifications shall be subject to rejection. No time extensions will be permitted due to the rejection of proposed trade contractors because of failure to meet Certification or Qualification requirements.
- 3. Work executed without approval of required Qualification or Certification submittals will be subject to rejection at the discretion of Architect.

**2.08 TEST REPORTS**

- A. The results of test reports prepared by the DPS testing consultants or the Contractor or Sub-contractor shall be forwarded to DPS, Architect & Contractor by the testing company as soon as results are available. All test reports shall be signed by an officer of the company.

**2.09 SUBMITTAL LIST**

- A. Provide a submittal list for specification divisions 2-14 on the project. Inconsistencies or omissions from the list do not relieve the contractor from required submittals delineated in each specification section. See example below:

SPEC SECTION	COMPLETED	DATE COMPLETE	SHOP	PRODUCT	SAMPLES	QUALIFICATION /	NOTIFICATION	SPARE MATERIALS	GUARANTEE / WARRANTY	O & M DATA	TESTING	OTHER	NOTE
SAMPLE			X	X	X				3 YR	X			
SECTION 03300 - CONCRETE				1			2						1. MIX DESIGN 2. TESTING AGENCY NOTIFICATION – 2 DAYS PRIOR TO POUR
SAMPLE						3	1,2						1. ARCHITECT (3 DAYS) 2. TESTING (5 DAYS) 3. WELDING CERTIFICATION

**PART 3 - EXECUTION**

**3.01 SUBMITTAL PROCESSES**

- A. Identify each submittal with the following information permanently affixed to or noted for each submittal and noted on the submittal transmittal form: name of the project, DPS Project Number, name, address and telephone number of subcontractor, supplier, manufacture and any other second tier contractor associated with the submittal date, General Contractor, submittal name and number, and Specification Section number governing the submittal. If submittal pertains to more than one spec section, identify each section to which the submittal pertains.

**3.02 CONTRACTOR RESPONSIBILITY**

- A. Under no circumstances shall reviewed submittals be permitted to be used in conjunction with the work. Work executed without required review and approval by the Architect/ Engineer shall be subject to rejections. Removal and reconstruction of this rejected work shall be at the Contractor’s expense.

**3.03 SUBMITTAL SCHEDULE:**

- A. The Contractor shall prepare a schedule of anticipated submittal dates which shall include the date of delivery to the Architect and the date the submittal is to be returned to the Contractor. The schedule shall be approved by DPS, Architect, and Contractor. No adjustments for project delays due to rejection of submittals will be considered.
- B. Refer to Section 01 32 00 for detail requirements regarding scheduling. Incorporation of the submittal schedule into the overall project schedule is required.

**3.04 DELIVERY**

- A. Unless otherwise noted in writing upon submission to the Architect, Submittals shall constitute an implied statement by the Contractor that submitted items can be fabricated and delivered to the project site without delay to the project schedule.

**END OF SECTION 01 33 00**

## SECTION 01 35 10

### MOVING AND STORAGE

#### PART 1 GENERAL

- A. This standard pertains to moving, staging, packing, and protecting building contents as necessary in order to accommodate construction and remodeling activities. Items discussed in this standard include, but are not limited to, the following:
  - 1. Furniture & Equipment
  - 2. Shelving Units, Books, Files, & Cabinets
  - 3. Technology Equipment
  - 4. Personal Items
  - 5. Hallways, Lockers, & Bulletin Boards
  - 6. Loose Floor Rugs, Pets, & Plants
  - 7. Libraries
  - 8. Kitchens
  - 9. Boxes
- B. It is the responsibility of the District to coordinate timelines, deadlines, and project-specific requirements with principals, site-based managers, and building staff.
- C. Building staff may not employ the Contractor for moving/staging purposes without permission from DPS. The Contractor will assume any risk and liability by performing work in this manner.

#### PART 2 PRODUCTS – No Requirements

#### PART 3 EXECUTION

- A. Furniture & Equipment:
  - 1. All contents shall be removed from desks/drawers and either packed into boxes or taken home by staff.
  - 2. Desks or other equipment may have to be moved; Contractor to coordinate moving and staging activities with custodial staff.
    - a) Both building staff and Contractor shall document and note any damage to furniture/equipment prior to construction.
  - 3. Contractor shall label, with appropriate room number, any furniture or equipment staged outside of classroom.
    - a) If Contractor removes items from any room, Contractor shall return items to their appropriate location upon completion of work.
    - b) Contractor shall take care so as to not label items in such a manner that damages the items.
  - 4. Contractor is not responsible for loose items left in or on desks.
  - 5. Copy machines: The DPS shall coordinate with RICOH
  - 6. Phones: Staff to label and leave plugged in.
- B. Shelving Units, Books, Files, & Cabinets:
  - 1. Building staff to lock/secure any items left inside built-in cabinets, except in cases when cabinet interiors are to be refinished or reconstructed.
    - a) Items/books left inside built-in cabinets (non-lockable) shall be inventoried and protected with plastic by building staff.

2. Portable file cabinets: May remain full.
  3. Portable standing supply cabinets: Need to be emptied by building staff.
  4. Portable shelving units: Building staff shall empty, box contents, and protect units with plastic.
  5. Building staff shall remove and box all items from tops of cabinets, and any/all other work surfaces.
  6. Confidential Files: Building staff shall box and label these files and place in pre-designated storage area determined by DPS.
- C. Technology Equipment:
1. Building staff shall label computers and peripheral equipment with room number & teacher/staff name; as items will likely be separated.
    - a) Label each device: CPU, monitor, etc.
    - b) Building staff shall place peripheral equipment (keyboard, mouse, cords, etc.) into labeled plastic bag.
      - i) Building staff must furnish plastic bags.
  2. Building staff shall dismantle equipment and move to pre-designated, securable storage area. Custodial staff and Contractors are not to move this equipment.
- D. Personal Items:
1. As a general rule, items that are not securely stored or placed in boxes should be taken home by building staff. There is no guarantee that building contents will remain secure. It is not normally possible to negotiate replacement of items that may have been lost or damaged during construction.
- E. Hallways, Lockers, and Bulletin Boards:
1. Building staff need to remove everything from hallway/classroom walls, bulletin boards, and anything hanging from/attached to ceilings.
  2. Building staff must ensure that all lockers are completely empty and clear of books, supplies, labels, stickers, etc.
- F. Loose Floor Rugs, Pets, and Plants:
1. Without question, building staff must remove all pets from the premises.
  2. Plants shall be removed from the building.
  3. Floor rugs may be left in place; the Contractor shall move/protect rugs as necessary.
- G. Libraries:
1. The preference of DPS Library Services is for books to be left in place and covered with plastic by the Contractor.
  2. If books must be moved, the Contractor shall:
    - a) Create a map of original book locations.
    - b) Provide large mobile wooden book carts.
    - c) Remove books from shelves.
    - d) Place on carts in the same order taken from shelves.
  3. Contractor shall wrap book carts completely in plastic.
  4. Book carts shall be placed in a secure location.
  5. Contractor shall return books to shelves in the correct order.
  6. Under no circumstances shall librarians be asked to box up or re-shelve library book collections.

7. If ANY metal shelving needs to be moved, Contractor shall contract with a qualified metal library shelving subcontractor to have the shelving dismantled, moved, and re-constructed. Books should be handled per item B.
8. Library circulation desks often need special care. Qualified movers may be needed to handle circulation desk moves.

H. Kitchens:

1. Food Services staff generally ends the school year later, and starts the year sooner than rest of building staff. DPS to coordinate/communicate these dates to the Contractor.
2. Food Services staff to remove all perishables from kitchen area.
3. Food Services staff and Contractor, together, are to document the working condition and appearance of kitchen equipment prior to construction.
4. Kitchen equipment is to be dismantled and moved only by appropriately-licensed contractors.

I. Boxes:

1. Building staff must box everything that will not be safe from flooring work (off of floor) painting (off of walls and ceilings, exposed work surfaces, and tops of furniture), and other areas of remodeling indicated by the DPS.
2. If the Contractor is under contract for a sufficient period of time before building staff are required to pack, then the Contractor shall provide moving boxes, labels, and tape in sufficient quantity. DPS will assist with coordinating timeline.
3. If the Contractor is not under contract before building staff are required to pack, then the DPS will arrange for a sufficient quantity of boxes, labels, and tape to be delivered to the building.
4. Boxes shall be closed and taped shut. Nothing may protrude from closed boxes.
5. Boxes should be labeled with room number, staff name, and contents of box.
6. Building staff should place boxes in center of room, unless instructed otherwise.

J. Building staff must dispose of trash resulting from packing.

K. Custodial staff must be allowed to perform their normal cleaning activities during moving, staging, and construction.

L. Custodial staff shall not perform Contractor's required cleaning, trash disposal, moving, and/or staging activities.

1. Contractor shall not use DPS equipment/supplies for their required cleaning, trash disposal, moving, and/or staging activities.

M. Emergency egress shall not be blocked in any way.

N. Construction zones are dangerous and, therefore, off limits during construction periods.

1. Contractor is responsible for security of construction area.

O. Storage containers may be required, and shall be provided by Contractor.

1. Contractor is responsible for protecting asphalt from damage if storage containers are needed.

P. Each project and school may require supplemental instructions to this standard. These instructions, when applicable, are to be incorporated into the contract documents by the project architect.

**END OF SECTION 01 35 10**

## SECTION 01 35 43

### HAZARDOUS MATERIALS PROCEDURES

#### PART 1 GENERAL

##### 1.01 SUMMARY

- A. Section 3.01 of this DPS Design and Construction Section may be deleted only where the project is new construction; unless the site falls under Section 02 82 00 and DPS Site Guidelines 00 90 00 for asbestos containing materials and existing buried structures. No other changes to the contents of this section are to be made.
- B. Hazardous Materials:
  - 1. Harardous material storage, transport and disposal must be handled in accordance with all Local, State, and Federal regulations and manufactures guidelines.
- C. OSHA Compliance:
  - 1. All contractors and their sub-contractors shall comply with all applicable worker protection standards, including but not limited to:
    - a) OSHA 1910.1200 Hazard Communication
    - b) OSHA 1910.134 Respiratory Protection
    - c) OSHA 1910.1001 Asbestos in General Industry
    - d) OSHA 1926.1101 Asbestos in Construction
    - e) OSHA 1926.62 Lead in Construction
    - f) OSHA 1926.1153 Respirable Crystalline Silica
    - g) OSHA 1926.55 Gases, Vapors, Fumes, Dusts and Mists

##### 1.02 WORK BY OTHERS

- A. Asbestos Remediation:
  - 1. The School District has completed a survey of all school buildings to identify asbestos containing materials (ACM). Where asbestos materials were known to exist in locations affected by this project, abatement measures have been (or will be) taken by the Owner under separate contract. The Contractor shall coordinate their sequence and schedule with that of asbestos abatement work as defined in Section 02 82 00.

##### 1.03 ASBESTOS AWARENESS

- A. Asbestos containing materials may exist within the general project area where such materials are not expected to be disturbed during the work. The Contractor shall review the A.H.E.R.A. report at the project site and become familiar with known asbestos containing materials in the work areas. If information is unclear as to the type of material that may be disturbed, it is the contractor's responsibility to consult with DPS Environmental Services for clarification.
- B. Denver Public Schools requires that all contractors working on District property possess at a minimum 2-hour asbestos awareness training to ensure that asbestos material is not accidentally disturbed during the construction process.

##### 1.04 SPECIAL NOTICE OF SUPERFUND DESIGNATION

- A. General Note: When the contractor doing work on any DPS property detects free liquid products in the ground or when a solvent or petroleum odor is detected, the Contractor shall cease all operations in the area of concern and immediately notify the DPS Environmental Services.



- B. Note to Contractors doing earthwork at Swansea, Harrington, Bruce Randolph, Pioneer, Wyatt, Mitchell, and Cole: These schools are located within the Vasquez/I-70 Superfund site. The potential health concern for working at this site is exposure to metals by breathing in soil particles once they become airborne. Although the soil at these schools has been tested and found to be below EPA's action levels of 400 parts per million (ppm) for lead and 70 ppm for arsenic, contractors at these sites should take precautions to not allow excessive fugitive dust on the property and no off-property transfer of fugitive dust. Workers that are concerned about exposure can wear a dust mask to prevent inhalation of any dust. If you want specific sampling results for these sites, contact the DPS Environmental Services.
- C. Note to Contractors doing earthwork at Garden Place: This school is located within the boundary of the proposed ASARCO Globe Superfund site. The potential health concern for working at this site is exposure to metals by breathing in soil particles once they become airborne. The soil at this school has been tested and areas that contained greater than 73 parts per million (ppm) cadmium, 500 ppm lead or 70 ppm arsenic has been removed from the site. Although the soil has been tested and removed if necessary, contractors should take precautions to not allow excessive fugitive dust on the property and no off-property transfer of fugitive dust. Workers that are concerned about exposure can wear a dust mask to prevent inhalation of any dust.
- D. Note to Contractors doing earthwork/excavation at Ashgrove/RMSEL: This school is located within the Redfield Rifle Scope clean-up project. The concern at this school is groundwater contamination and not a health issue for workers at the site or for the school. If a contractor is doing excavation work at the site and detects a solvent odor, they should stop work and immediately contact DPS or the DPS Hazardous Materials Specialist.

**1.05 EXISTING AND BURIED STRUCTURES**

- A. Prior to any earthwork, drilling, or excavation at DPS sites, the work must be coordinated with DPS Environmental Services.
- B. Several DPS sites have buried original buildings that were demolished and buried prior to current and applicable, regulations that require remediation for the removal of soil contaminants per Section 02 82 00 Part 3.
- C. If suspected materials are discovered during any earthwork, the contractor is to stop work and contact DPS Environmental Services immediately.

**1.06 SUBMITTALS**

- A. Import and Export of Fill Dirt
  - 1. No materials may be removed from the project site nor imported to the project site without proper analysis and documentation of the contents of the soils.
  - 2. DPS will provide evidence of the testing of soils on DPS property and the analysis thereof. Soils containing hazardous materials that are removed from the site shall be disposed of in a manner approved by the EPA. Any contractor removing such material shall provide certification that the material was properly handled.
  - 3. Before any fill dirt is imported to the site, the contractor shall provide evidence that the material is free of hazardous materials.
    - a) For all import fill materials, provide Environmental analysis including test results for **RCRA8**, **TPH** and **BTEX** analyses provided by a certified independent testing agency.
    - b) Submit test results to DPS for review by DPS Environmental Services.
  - 4. The Asbestos Certification Letter for New Installed Building Materials for is required for all new materials installed in DPS buildings.

**1.07 PROJECT/SITE CONDITIONS**

- A. All existing vector deterrents and installations must be returned to their original state if the project is to impact these materials. Bird deterrent netting must be reinstalled on new unit installations if deterrents were present prior to the start of work.

**1.08 ASBESTOS CONTAINING MATERIALS**

- A. DPS Environmental Services maintains material and inventory information for asbestos-containing and non-asbestos-containing materials that are available by hard copy at the school or facility and electronically by request.
- B. Materials not detailed in DPS reports should be considered to be asbestos-containing until proven otherwise by a certified inspector.
- C. DPS Environmental Services maintains records and information regarding the presence of asbestos contaminated crawlspaces and attics. Records of known buried structures or soils with the potential of asbestos contamination are also available through DPS Environmental Services.
- D. All asbestos abatement projects shall be coordinated with DPS Environmental Services per Sections 02 82 00.

**1.09 LEAD CONTAINING MATERIALS AND PAINT**

- A. The School District has surveyed elementary schools built pre-1978 for lead based paint (LBP) as defined by the EPA RRP rule.
  - 1. Middle Schools and High Schools do not fall under this regulation and have not been surveyed for lead based paint. LBP in these schools is the contractors responsibility and must follow 29 CFE 1926.62 Lead in Construction Standard and disposal requirements.
  - 2. DPS shall provide LBP results in the Environmental Assessment Report.

**PART 2 PRODUCTS**

**2.01 NEW BUILDING MATERIALS**

- A. Any new building material installed in DPS buildings is to be free of asbestos and certified by a signed letter from the architect or project engineer as defined in Section 02 82 00.

**PART 3 EXECUTION**

**3.01 ASBESTOS DISCOVERY**

- A. The Contractor is cautioned to be alert to the possibility that his work may uncover asbestos containing materials. If suspected materials are found, the Contractor shall notify the District and stop all work in the area immediately. If the suspected materials prove to contain asbestos, the Owner will arrange to have the materials abated in a timely manner.

**3.02 IMPORT FILL MATERIALS**

- A. Before any fill materials are imported onto the project site, the Contractor shall provide all required information as to the suitability of the materials for the intended use and shall provide certification that materials are free of hazardous materials as outlined in section 1.06 of this section.

**END OF SECTION 01 35 43**

## SECTION 01 35 91

### HISTORICAL TREATMENT PROCEDURES

#### PART 1 GENERAL

##### 1.01 SPECIAL CONDITIONS

- A. A list of DPS properties which have received historic designation or that qualify for historic designation is available upon request. Confirm the status of the project with DPS prior to the start of design work. This list is updated infrequently, so it is advisable to also verify with the City.
- B. Refer to The Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties, as managed by the National Park Service (NPS). Additional information may be obtained online at: <http://nps.gov/history/hps/tps/standguide/>.
- C. Historic Properties may include, but are not limited to:
  - 1. Districts or Entire Campuses
  - 2. Buildings
  - 3. Sites and Site Elements
  - 4. Natural Features
  - 5. Archaeological Components
- D. Considerations when choosing an appropriate treatment:
  - 1. Relative importance in history
  - 2. Physical condition, or material integrity of the building
  - 3. Extent to which previous work has altered the original building
  - 4. Proposed use of the building
  - 5. Code requirements
- E. Verify with DPS that the intended approach to the treatment of the historic property is appropriate for the project as a whole, and for specific materials and/or features of the project. Any or all four approaches may be applicable within a single project:
  - 1. Preservation focuses on the maintenance and repair of existing historic materials and retention of a property's form as it has evolved over time. (Protection and Stabilization have been consolidated under this treatment).
  - 2. Rehabilitation acknowledges the need to alter or add to a historic property to meet continuing or changing uses while retaining the property's historic character.
  - 3. Restoration depicts a property at a particular period of time in its history, while removing evidence of other periods.
  - 4. Reconstruction re-creates vanished or non-surviving portions of a property.
- F. Assessment and documentation of existing materials and conditions shall be done as early as possible in the design process.
  - 1. Provide hardcopy and electronic copies of all photographs to DPS prior to the completion of Design Development Documents.
  - 2. Provide recommendations for best practices to stabilize, preserve, repair or consolidate character defining materials or features.

## 1.02 QUALITY ASSURANCE

- A. Preservation Briefs, which provide guidance on preserving, rehabilitating and restoring historic buildings, are available online at: <http://www.nps.gov/history/hps/tps/briefs/presbhom.htm>

## 1.03 WARRANTY

- A. The warranty period for all materials and work performed on an historic property shall be same as for non-historic work and in accordance with the contract documents.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Masonry and Mortar
  - 1. Masonry, mortar and terracotta vary considerably in quality and durability. The material's softness must be taken into consideration when determining the best cleaning method. Use the gentlest means available. New mortar must match the color, texture and hardness of the original mortar. Mortar testing should be performed to determine these characteristics.
- B. Wood
  - 1. Many decorative elements and interior finishes may be wood. Consolidation techniques should be performed to repair rather than replace wood elements whenever feasible. Consult the appropriate NPS Technical Preservation Brief.
- C. Metals
  - 1. Architectural metals typically found in historical buildings may include lead, tin, zinc, copper, bronze, brass, iron, steel, or others. Appropriate treatments, such as paint removal, will vary with the type of metal. Consult the appropriate NPS Technical Preservation Brief.

## PART 3 EXECUTION

### 3.01 MATERIALS

- A. Masonry and Mortar:
  - 1. When determined that cleaning is appropriate, use the gentlest means available.
  - 2. Remove deteriorated mortar by hand; do not use power tools.
  - 3. Use mortar similar in strength, color, composition and texture to the existing mortar to remain. Do not change the joint profile when repointing.
- B. Paint:
  - 1. Where the original paint color is known, use the same color. If the original color is unknown, use colors appropriate to the historic building. Coordinate colors with DPS, and where possible, choose from DPS's standard colors.
- C. Wood:
  - 1. Replace, or do not remove, existing protective coatings such as paint. Use the gentlest means available to remove deteriorated paint.
  - 2. Apply consolidants where appropriate to extend the life of wood elements.
- D. Metals:
  - 1. Remove any corrosion prior to reapplying protective coatings. Do not leave previously coated metals exposed.
  - 2. Use the gentlest means available to clean metal components.

E. Roofs:

1. Do not alter the roof forms, materials or colors if possible. If the materials must be replaced due to code or other requirements, new materials should be selected which are in keeping with the textures, patterns and colors of the existing.
2. Repairs or replacements of existing flashing, gutters and downspouts is critical to the long-term preservation of existing roofs.

F. Windows:

1. When retaining the existing windows, preserve the functional and decorative features of the windows. Do not obscure the historic trim with new materials.
  2. To the extent practicable, do not change the sash, depth of reveal, muntin configuration, reflectivity, color of glazing or appearance of the frame when replacing existing windows.
- G. If the use of the building or areas within the building change, consider installing protective coverings to prevent new traffic patterns and new building uses from deteriorating historic materials.

**END OF SECTION 01 35 91**

**SECTION 01 45 16**  
**QUALITY CONTROL**

**PART 1 GENERAL**

**1.01 QUALITY ASSURANCE**

- A. The Contractor is responsible for complying with the requirements of the Contract Documents. Testing performed by the Owner's Agents shall not be relied upon by the Contractor as sufficient to assure compliance with the Contract Documents. The Contractor shall procure and pay for testing necessary to assure that the construction is in compliance with the Contract Documents.

**1.02 TESTING**

- A. Testing Laboratory and/or Engineering services are required for quality control in portions of the work identified in other sections of these specifications. The Contractor shall provide all materials required for testing at no additional cost.
- B. Tests required by these Specifications shall be performed in strict accordance with referenced testing methods, procedures, and conditions. Pertinent data shall be included in clear, comprehensive written forms according to the Architect's or Engineer's requirements.

**1.03 COST OF TESTING**

- A. Unless indicated otherwise, Owner's testing shall be performed by the Owner's authorized agents, at the Owner's expense.
- B. Costs for re-testing of non-complying work shall be borne by the Contractor.
- C. According to the judgment of the Architect, ANY portion of the work in this contract may be tested at any time for any reason. Costs for such testing shall be borne by the Contractor only if such tests indicate that work does not meet Contract Document requirements.

**1.04 EQUIPMENT TESTING**

- A. Equipment testing shall be as determined appropriate by the Owner to assure proper performance according to the manufacturer's specifications for each equipment item.
- B. After all utility connections to equipment are completed; the Contractor shall conduct final tests of equipment in presence of Architect, Owner, and/or their duly authorized representative(s).
- C. Unless waived in writing by the Owner, the requirements of this section shall apply to all installed equipment items having utility connections.

**1.05 ARCHITECT NOTIFICATION**

- A. The Contractor shall be responsible for notifying the Architect at least three (3) working days prior to commencing work which is identified as requiring testing.

**1.06 SUBMITTALS**

- A. TEST REPORTS
- B. Test reports, whether performed for the Owner or the Contractor, shall be submitted to the Architect, Owner and Contractor as soon as results are available. Reports shall be clear, concise, comprehensive written forms containing required test results.

**END OF SECTION 01 45 16**

## SECTION 01 45 45

### COMMISSIONING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. The purpose of this section is to specify the responsibilities and participation in the commissioning process.
- B. Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and the Owner's operational needs. This is achieved by beginning in the design phase, and documenting design intent, and continuing through construction, acceptance and the warranty period, with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.
- C. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
  1. Verify that applicable equipment and systems are installed according to the vendor's recommendations and to industry accepted minimum standards, and that they receive adequate operational checkout by the installing contractors.
  2. Verify and document proper performance of equipment and systems.
  3. Verify that O&M documentation is complete.
  4. Verify that the Owner's operating personnel are adequately trained.
- D. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.
- E. Work under this contract shall conform to requirements of Division 1, General Requirements, Conditions of the Contract, and Supplementary Conditions. This specification covers commissioning of the systems which are part of this project.
- F. Commissioning work shall be a team effort to ensure that all equipment and systems have been properly installed, function together to meet the design intent, and document system performance parameters for the fine tuning of control sequences and operational procedures.
- G. The commissioning team shall include the Commissioning Authority (CA), representatives of the Owner, vendors, and construction trades. The trades shall include, but not be limited to, piping, plumbing, mechanical, controls, test and balance, electrical, and fire alarm. The lead person for each trade who will actually perform or supervise the work is to be designated as the representative to the commissioning team. Responsibilities for various steps of the commissioning process shall be divided among the commissioning team, as described herein.
- H. Irrigation System installation, start-up, testing, balancing, preparation of O&M Manuals, and operator training are the responsibility of the Division 2 Contractor, including system controls. The commissioning process does not relieve the Division 2 Contractors from the obligations to complete all portions of the work in a satisfactory and fully operational manner.
- I. Elevator System start-up, testing, preparation of O&M Manuals, and operator training are the responsibility of the Division 14 Contractor. The commissioning process does not relieve the Division 14 Contractor from the obligations to complete all portions of the work in a satisfactory and fully operational manner.
- J. Mechanical System installation, start-up, testing, balancing, preparation of O&M Manuals, and operator training are the responsibility of the Division 21-23 Contractor(s), including building automation system controls. The commissioning process does not relieve the Division 21-23 Contractor(s) from the obligations to complete all portions of the work in a satisfactory and fully operational manner.
- K. Electrical System installation, start-up, testing, preparation of O&M Manuals, and operator training are the responsibility of the Division 26 Contractor. The commissioning process does not relieve the Division 26 Contractor from the obligations to complete all portions of the work in a satisfactory and fully operational manner.

- L. Telecommunications and Security Systems installation, start-up, testing, preparation of O&M Manuals, and operator training are the responsibility of the Division 27 Contractor(s). The commissioning process does not relieve the Division 27 Contractor(s) from the obligations to complete all portions of the work in a satisfactory and fully operational manner.

## **1.02 RELATED SECTIONS**

- A. Applicable Sections in Divisions 2, 14, 21-23, 26, and 27.
- B. Section 28 08 00 – Electrical Commissioning.

## **1.03 SUBMITTALS**

- A. The manner in which submittals are processed is outlined in Section 01 33 00 – Submittals.
- B. CA shall submit schedule of equipment and system commissioning and start-up to Contractor, Engineer(s), and Owner.
- C. Contractor shall submit results of vendor’s shop and field tests to CA.
- D. Required documentation as required by Code, the Authority Having Jurisdiction (AHJ), and listed within the Contract Documents and herein.
- E. CA shall submit commissioning plan and procedure as delineated herein to Owner and Contractor.
- F. CA instrumentation calibration records pertaining to test equipment used during commissioning.
- G. At completion of Work, CA shall submit to Owner certification (commissioning report) that equipment and systems have been tested and commissioned, and are in operating condition in accordance with Contract Documents.

## **1.04 DEFINITIONS**

- A. Acceptance Phase: Phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occurs.
- 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 prime consultant (Architect of Record) and sub-consultants who comprise the design team, generally the Mechanical designer/engineer and the Electrical designer/engineer.
- D. Basis of Design: The basis of design is the documentation of the primary thought processes and assumptions behind design decisions that were made to meet the design intent. The basis of design 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): An independent agent, not otherwise associated with the A/E team members or the Contractor, hired by DPS. The CA directs and coordinates the day-to-day commissioning activities. The CA does not take an oversight role like DPS. The CA is part of DPS’s team or shall report directly to DPS.
- F. Commissioning Plan: An overall plan, developed before or after project bidding, that provides the structure, schedule and coordination planning for the commissioning process.
- G. Contract Documents: The documents binding on parties involved in the construction of this project (drawings, specifications, change orders, amendments, contracts, etc.).
- H. Contractor: The General Contractor performing the construction and/or any of the trade contractors performing work under sub-contract with the General Contractor.
- I. Control System: The control system for an individual piece of equipment, the central building energy management control system, or the integrated building automation system, as applicable.
- 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: Functional tests that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the test from being performed.



- 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 or vendor’s printed documentation (that is, does not perform properly or is not complying with the design intent). (Condition may also be described as non-compliance or non-conformance.)
- 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. Design Narrative or Design Documentation: Sections of either the Design Intent or Basis of Design.
- O. Factory Testing: Testing of equipment on-site or at the factory by factory personnel with an Owner’s representative present.
- P. Functional Performance Test (FT): Test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside 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 test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB’s primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The Commissioning Authority develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing contractor or vendor. Functional Performance Tests are performed after pre-functional checklists and startup is complete.
- Q. General Contractor (GC): The prime contractor for this project. Generally refers to all the GC’s Subcontractors as well. Also referred to as the Contractor, in some contexts.
- R. Indirect Indicators: Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.
- S. 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”).
- T. Monitoring: The recording of parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of control systems.
- U. Non-Compliance: See Deficiency.
- V. Non-Conformance: See Deficiency.
- W. 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 50°F to 75°F to verify economizer operation). See also “Simulated Signal.”
- X. Owner-Contracted Tests: Tests paid for by the Owner outside the GC’s contract and for which the CA does not oversee. These tests will not be repeated during functional tests if properly documented.
- Y. 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.

- Z. Pre-Functional Checklist (PC): A list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the CA to the Subcontractors. Pre-functional checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels acceptable, labels affixed, gauges in place, sensors calibrated, etc.). However, some pre-functional checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three phase pump motor of a chiller system). The word pre-functional refers to before functional testing. Pre-functional checklists augment and are combined with the vendor's start-up checklist. Even without a commissioning process, Contractors typically perform some, if not all, of the pre-functional checklist items a Commissioning Authority will recommend. However, few Contractors document in writing the execution of these checklist items. Therefore, for most equipment, the Contractors execute the checklists on their own. The Commissioning Authority only requires that the procedures be documented in writing, and does not witness much of the pre-functional checking, except for larger or more critical pieces of equipment.
- AA. DPS: The contracting and managing authority for the Owner over the design and/or construction of the project.. The Owner's on-site representative in the day-to-day activities of construction. The General Contractor, Commissioning Authority, and Architect/Engineer(s) report to the PM.
- BB. Sampling: Functionally testing only a fraction of the total number of identical or near identical pieces of equipment.
- CC. Seasonal Performance Tests: Functional performance tests that are deferred until the system(s) will experience conditions closer to their seasonal design conditions.
- DD. Simulated Condition: Condition that is created for the purpose of testing the response of a system.
- EE. Simulated Signal: Disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate a sensor value.
- FF. Specifications: The construction specifications of the Contract Documents.
- GG. Startup: The initial starting or activating of dynamic equipment, including executing pre-functional checklists.
- HH. Subcontractors: The Subcontractors to the GC who provide and install building components and systems.
- II. Substantial Completion: The milestone within the construction schedule when a piece of equipment or system is completely installed and ready for startup, commissioning, and operation. It indicates that the item has completed pre-functional testing and is ready for the functional performance tests. It is the start of the warranty period for the equipment included with the system.
- JJ. Test Procedures: The step-by-step process which must be executed to fulfill the test requirements. The test procedures are developed by the CA.
- KK. Test Requirements: Requirements specifying what modes and functions, etc., shall be tested. The test requirements are not the detailed test procedures. The test requirements are specified in the Contract Documents or vendor's printed documentation.
- LL. Trending: Monitoring using the building control system.
- MM. Vendor: Supplier of equipment.
- NN. Warranty Period: Warranty begins at Substantial Completion and extends for at least 24 months, unless specifically noted otherwise in the Contract Documents and accepted submittals.

## **1.05 RESPONSIBILITIES**

- A. The responsibilities of the various parties in the commissioning process are provided in this section as they relate to commissioning. The responsibilities of the Mechanical Contractor, TAB, and Controls Contractor are in Division 21-23, and those of the Electrical Contractor in Divisions 26 and 27.
- B. All Parties:
  1. Follow the Commissioning Plan as prepared by the CA.
  2. Attend commissioning scoping meeting and additional meetings, as necessary.

- C. Architect (or A/E):
  - 1. Construction and Acceptance Phase:
    - a) Perform normal submittal review, construction observation, record drawing preparation, O&M manual preparation, etc., as contracted.
    - b) Provide any design narrative documentation requested by the CA.
    - c) Coordinate resolution of system deficiencies identified during commissioning, according to the Contract Documents.
    - d) Prepare and submit final record drawings for inclusion in the O&M manuals. Review and approve the O&M manuals.
  - 2. Warranty Period:
    - a) Coordinate resolution of design non-conformance and design deficiencies identified during the warranty period.
- D. Mechanical and Electrical Designers/Engineers (of the A/E):
  - 1. Construction and Acceptance Phase:
    - a) Perform normal submittal review, construction observation, record drawing preparation, etc., as contracted. A minimum of one site observation should be completed just prior to system startup.
    - b) Provide any design narrative and sequences documentation requested by the CA. The designers shall assist (along with the Contractor) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
    - c) Participate in the resolution of system deficiencies identified during commissioning, according to the Contract Documents.
    - d) Prepare and submit the final record drawings and operating parameters documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.
    - e) From the Contractor's red-line drawings, edit and update one-line diagrams developed as part of the design narrative documentation, and those drawings provided by the vendor as shop drawings for the chilled and hot water, condenser water, domestic water, steam and condensate systems; supply, return and exhaust air systems, and normal and emergency power systems.
  - 2. Warranty Period:
    - a) Participate in the resolution of non-compliance, non-conformance and design deficiencies identified during commissioning during the warranty period.
- E. Commissioning Authority (CA):
  - 1. The CA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CA may assist with problem-solving, non-conformance or deficiencies, but ultimately that responsibility resides with the General Contractor and the A/E. The primary role of the CA is to develop and coordinate the execution of a testing plan, observe and document performance — that systems are functioning in accordance with the documented design intent and in accordance with the Contract Documents. The Contractor(s) will provide all materials, tools, labor, and measuring and test equipment to start, check-out and functionally test equipment and systems, except for specified testing with portable data-loggers, which shall be supplied and installed by the CA. Note that the CA does not perform the commissioning activities, that responsibility is retained by the Contractor, Subcontractors and equipment vendors, as applicable.

2. Design Phase:
  - a) Coordinate with the Design Team to develop full commissioning specifications for all commissioned equipment and integrate into the project specifications. Verify that bid documents adequately specify building commissioning, including testing requirements by equipment type. The commissioning specification will include a detailed description of the responsibilities of all parties, details of the commissioning process; reporting and documentation requirements, including formats; alerts to coordination issues, deficiency resolution; construction checklist and startup requirements; the functional testing process; specific functional test requirements, including testing conditions and acceptance criteria for each piece of equipment being commissioned.
  - b) Perform focused reviews of the design, construction drawings and specifications and any bid addendums for the following, but not limited to only these issues:
    - i) Clear design documentation, including detailed and complete sequences of operation.
    - ii) HVAC, lighting, fire control, emergency power, security control system, strategies and sequences of operation for adequacy and efficiency.
    - iii) Ensure the design maximizes the functional needs of the occupants.
    - iv) An HVAC fire and emergency power response matrix that lists all equipment and components (air handlers, dampers, valves, etc.) with their status and action during a fire alarm and under emergency power.
    - v) Access for routine maintenance and operation, including reading gauges, entering doors and panels, observing and replacing filters, coils, etc.
    - vi) Provision within the design for the required isolation valves, dampers, interlocks, piping, etc., to allow for manual overrides, simulating failures, seasons and other testing conditions.
    - vii) Provision within the design of sufficient monitoring points in the building automation system (BAS), and adequate trending and reporting features in the BAS.
    - viii) Provision of pressure and temperature (P/T) plugs close to controlling sensors for verifying their calibration, and pressure gauges, thermometers, and flow meters in strategic areas to facilitate verifying system performance and ongoing O&M.
    - ix) Provision of pressure and temperature (P/T) plugs at less critical areas or on smaller equipment where permanent gauges and thermometers are not required.
    - x) Provision of adequate balancing valves, flow metering, and control stations and control system functions to facilitate and verify reliable test and balance.
    - xi) Clear and complete commissioning specifications for the construction phase.
    - xii) Complete O&M documentation requirements in the specifications.
    - xiii) Complete training requirements in the specifications.
  - c) Coordinate a controls integration meeting where the electrical, mechanical, and controls contractors and the CA discuss integration issues between equipment, systems and disciplines to ensure that integration issues and responsibilities are clearly described in the specifications. [Note: If the controls contractor has not yet been selected until project is bid – this task will occur during the construction phase.]
  - d) Develop a draft commissioning plan as described below, including the pre-functional and functional performance test procedures.
3. Construction and Acceptance Phase:
  - a) Revise, as necessary, the construction phase commissioning plan developed during design, including scope and schedule.
  - b) Coordinate and direct the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.

- c) Coordinate the commissioning work and, with the GC and PM, ensure that commissioning activities are being scheduled into the master schedule.
- d) Review coordination drawings to ensure that trades are making a reasonable effort to coordinate the work.
- e) Plan and conduct a commissioning scoping meeting and other commissioning meetings.
- f) Request and review additional information required to perform commissioning tasks, including O&M materials, contractor start-up and checkout procedures.
- g) Before startup, gather and review the current control sequences and interlocks, and work with Contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
- h) Review normal Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the A/E reviews.
- i) Review requests for information and change orders for impact on commissioning and Owner's objectives.
- j) Write and distribute pre-functional tests and checklists.
- k) Develop an enhanced start-up and initial systems checkout plan with Subcontractors.
- l) Perform site visits, as necessary, to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
- m) Witness all of the HVAC piping test and flushing procedure. Document this testing and include the documentation in O&M manuals. Notify DPS Project Manager of any deficiencies in results or procedures.
- n) Witness all of any ductwork testing and cleaning procedures. Document this testing and include the documentation in O&M manuals. Notify DPS Project Manager of any deficiencies in results or procedures.
- o) Approve pre-functional tests and checklist completion by reviewing pre-functional checklist reports and by selected site observation and spot-checking.
- p) Approve systems startup by reviewing start-up reports and by selected site observation.
- q) Review TAB execution plan.
- r) Oversee functional testing of the control system and approve it to be used for TAB, before TAB is executed.
- s) Confirm air and water systems balancing by spot testing, by reviewing completed reports and by selected site observation.
- t) With necessary assistance and review from installing contractors and A/E, write the functional performance test procedures for equipment and systems. This may include energy management control system trending, stand-alone data logger monitoring, integrated building automation system, or manual functional testing. Submit to PM for review, and for approval if required.
- u) Analyze any functional performance trend logs and monitoring data to verify performance.
- v) Coordinate, witness and approve manual functional performance tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved.
- w) Maintain a master deficiency and resolution log and a separate testing record. Provide the PM with written progress reports and test results with recommended actions.
- x) Witness performance testing of smoke control systems by others and all other Owner contracted tests or tests by vendor's personnel over which the CA may not have direct control. Document these tests and include this documentation in Commissioning Record in O&M manuals.
- y) Witness testing and other activities called for in Mechanical Commissioning Section 23 08 00 and Electrical Commissioning Section 26 08 00.

- z) Review equipment warranties to ensure that the Owner’s responsibilities are clearly defined.
  - aa) Oversee and approve the training of the Owner’s operating personnel.
  - bb) Compile and maintain a commissioning record and building systems book(s).
  - cc) Review and approve the preparation of the O&M manuals.
  - dd) Provide a final commissioning report (as described in this specification).
4. Warranty Period:
- a) Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
  - b) Return to the site 3 months prior to end of warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal commissioning. Interview facility staff and identify problems or concerns they have operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.
- F. DPS Project Manager (PM):
1. Construction and Acceptance Phase:
- a) Manage the contract of the A/E and of the GC.
  - b) Manage the CA contract.
  - c) Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions according to the Commissioning Plan—Construction Phase.
  - d) Provide final approval for the completion of the commissioning work.
2. Warranty Period:
- a) Ensure that any seasonal or deferred testing and any deficiency issues are addressed.
- G. General Contractor (GC or Contractor):
1. Construction and Acceptance Phase:
- a) Facilitate the coordination of the commissioning work by the CA to ensure that commissioning activities are being scheduled into the master schedule.
  - b) Include the cost of commissioning and startup support in the total contract price, including services of equipment vendors, if applicable.
  - c) Perform specified services with qualified personnel.
  - d) Furnish a copy of all construction documents, addenda, change orders and approved submittals and shop drawings related to commissioned equipment to the CA.
  - e) In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training.
  - f) Ensure that all Subcontractors execute their commissioning responsibilities according to the Contract Documents and schedule.
  - g) A representative shall attend a commissioning scoping meeting and other necessary meetings scheduled by the CA to facilitate the commissioning process.
  - h) Furnish materials, tools, labor, and measuring and test equipment required to perform start-up of each respective item of equipment, instrument and system.
  - i) Coordinate the startup of equipment and systems with existing operations or facility equipment so that it does not affect Owner’s operations.
  - j) Coordinate the training of Owner’s personnel in conjunction with the CA.
  - k) Provide instruments required for commissioning operations.

- i) Make instruments available to A/E to facilitate spot checks during testing.
    - ii) Retain possession of instruments; remove from Site at completion of services.
    - iii) Instrumentation for the testing, adjusting, and balancing of the HVAC system shall be provided by the TAB contractor.
  - l) Comply strictly with specified vendor's or Engineer's procedures in starting up and commissioning specified systems.
  - m) Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
  - n) Promptly report to CA any deficiencies noted during performance of commissioning and testing services.
2. Warranty Period:
- a) Ensure that Subcontractors execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.
  - b) Ensure that Subcontractors correct deficiencies and make necessary adjustments to O&M manuals and record drawings for applicable issues identified in any seasonal testing.

H. Vendors (Equipment Suppliers):

- 1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
- 2. Assist in equipment testing per agreements with Contractor or Subcontractors.
- 3. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base bid price to the Contractor, except for stand-alone datalogging equipment that may be used by the CA.
- 4. Through the Contractors they supply products to, analyze specified products and verify that the designer has specified the newest most updated equipment reasonable for this project's scope and budget.
- 5. Provide information requested by CA regarding equipment sequence of operation and testing procedures.
- 6. Review test procedures for equipment installed by factory representatives.

**1.06 COMMISSIONING PLAN**

- A. The CA shall prepare and submit for review by Engineer and Owner (or Owner's Representative) a commissioning plan that outlines:
  - 1. Commissioning personnel training and qualifications.
  - 2. List of vendor's services or startup representatives that will complete startup and commissioning of specific equipment.
  - 3. Preliminary format of final report or documentation that will be completed.
  - 4. Preliminary copy of each report form proposed for use.
  - 5. Schedule of startup for each system or individual piece of equipment.
  - 6. Responsibility of each trade affected by the commissioning as required by each section of this specification and the individual specification sections within the Contract Documents.
  - 7. Requirements for documentation as listed within the Contract Documents and herein.
  - 8. Requirements for documentation of tests and inspections required by Owner, Code or the AHJ.
  - 9. Requirements for the commissioning program during specified operating seasonal or climatic conditions, part and full loads, occupancy, and other variable conditions.
- B. The Owner and Engineer shall review the commissioning plan and provide timely comments to the CA. The CA shall incorporate the comments into the commissioning plan and provide copies to the GC, Owner and Engineer so that commissioning activities can be incorporated into the construction and occupancy schedule for the facility.

## **PART 2 PRODUCTS**

### **NOT USED**

## **PART 3 EXECUTION**

### **3.01 TESTING EQUIPMENT**

- A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Division Contractor for the equipment being tested. For example, the Mechanical Contractor of Division 21-23 shall ultimately be responsible for all standard testing equipment for the HVAC system and controls system in Division 21-23, except for equipment specific to and used by TAB in their commissioning responsibilities.
- B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, according to these Contract Documents shall be included in the base bid price to the Contractor and left on site, except for stand-alone datalogging equipment that may be used by the CA.
- C. 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:
  - 1. Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5°F and a resolution of + or - 0.1°F.
  - 2. 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.
  - 3. All equipment shall be calibrated according to the vendor's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

### **3.02 REPORTING**

- A. The CA will provide regular reports to the PM, with increasing frequency as construction and commissioning progresses. Standard forms shall be provided within the Commissioning Plan.
- B. The CA will regularly communicate with all members of the commissioning team, keeping them apprised of commissioning progress and scheduling changes through memos, progress reports, etc.
- C. Testing or review approvals and non-conformance and deficiency reports are made regularly with the review and testing as described in later sections.
- D. A final summary report (including backup documentation) by the CA will be provided to the PM, focusing on evaluating commissioning process issues, and identifying areas where the process could be improved. All acquired documentation, logs, minutes, reports, deficiency lists, communications, findings, unresolved issues, etc., will be compiled in appendices and provided with the summary report. Pre-functional checklists, functional tests and monitoring reports will not be part of the final report, but will be stored in the Commissioning Record in the O&M manuals.

### **3.03 START-UP, PRE-FUNCTIONAL 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, e.g., electrical system power quality, may have simplified pre-functional checklists and startup.
- B. General:
  - 1. Pre-functional checklists are important to ensure that the equipment and systems are connected and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays.
  - 2. Each piece of equipment receives full pre-functional checkout. No sampling strategies shall be used.
  - 3. The pre-functional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.



C. Start-up and Initial Checkout Plan:

1. The CA shall assist the commissioning team members responsible for startup of any 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 vendor-recommended procedures have been completed. Parties responsible for pre-functional checklists and startup are identified in the commissioning scoping meeting and in the checklist forms.
2. The CA develops the representative pre-functional checklists and procedures from the individual 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.
3. These checklists and tests are provided by the CA to the Contractor. The Contractor determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each form will have more than one trade responsible for its execution.
4. The Subcontractor responsible for the purchase of the equipment develops the full start-up plan by combining (or adding to) the CA's checklists with the vendor'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.
5. The full start-up plan could consist of something as simple as:
  - a) The CA's pre-functional checklists.
  - b) The vendor'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.
  - c) The vendor's normally used field checkout sheets.
6. The Subcontractor submits the full startup plan to the CA for review and approval.
7. The CA reviews and approves the procedures and the format for documenting them, noting any procedures that need to be added. If warranted, the Subcontractor will rewrite or revise the procedures to address any concerns noted by the CA. Resolution of any disputes between the Subcontractor and CA will be by the PM.
8. The full start-up procedures and the approval form may be provided to the PM for review and approval.

D. Deficiencies, Non-Conformance and Approval in Checklists and Startup:

1. The Subcontractors shall clearly list any outstanding items of the initial start-up and pre-functional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CA within two days of test completion.
2. The CA reviews the report and submits either a non-compliance report or an approval form to the Subcontractor or PM. The CA shall work with the Subcontractors and vendors to correct and retest deficiencies or uncompleted items. The CA will involve the PM, A/E, and others as necessary. The installing Subcontractors or vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CA as soon as outstanding items have been corrected and resubmit an updated start-up report and a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CA recommends approval of the execution of the checklists and startup of each system to the PM using a standard form.
3. Items left incomplete, which later cause deficiencies or delays during functional testing may result in backcharges to the responsible party.

**3.04 PHASED COMMISSIONING**

- A. The project may require startup and initial checkout to be executed in phases. This phasing will be planned and scheduled in a coordination meeting of the CA, PM, A/E, and the GC. Results will be added to the master and commissioning schedule.

### 3.05 FUNCTIONAL PERFORMANCE TESTING

- A. Objectives and Scope:
1. The objective of functional performance testing is to demonstrate that each system is operating according to the documented design intent and Contract Documents and vendor's printed documentation.
  2. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation.
  3. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.
- B. Each system shall be operated through all modes of operation (e.g. 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.
- C. Development of Test Procedures:
1. 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.
  2. Using the testing parameters and requirements in Specification Sections, the CA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system.
  3. Each Subcontractor or vendor responsible to execute a test, shall provide limited assistance to the CA in developing the procedures (answering questions about equipment, operation, sequences, etc.).
  4. Prior to execution, the CA shall provide a copy of the test procedures to the Subcontractor(s) who shall review the tests for feasibility, safety, equipment and warranty protection. If warranted, the CA will rewrite or revise the procedures to address any concerns noted by the Subcontractor. Resolution of any disputes between the Subcontractor and CA will be by the PM.
  5. The CA may submit the test procedures to the A/E for review, if requested.
- D. The CA shall review Owner-contracted, factory testing or required Owner acceptance tests for 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. Redundant testing shall be minimized.
- E. The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.
- F. The test procedure forms developed by the CA shall include (but not be limited to) the following information:
1. System and equipment or component name(s).
  2. Equipment location and ID number.
  3. Unique test ID number, and reference to unique pre-functional checklist and start-up documentation ID numbers for the piece of equipment.
  4. Date.
  5. Project name.
  6. Participating parties.
  7. A copy of the specification section describing the test requirements.
  8. A copy of the specific sequence of operations or other specified parameters being verified.
  9. List of test equipment that will be used.
  10. Copy of test equipment and instrumentation calibration certification or documentation.
  11. Formulas used in any calculations.
  12. Required pre-test field measurements.

13. Instructions for setting up the test.
  14. Special cautions, alarm limits, etc.
  15. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format.
  16. 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.
  17. A section for comments.
  18. Signatures and date block for the CA.
- G. 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 dataloggers. Specification 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, with the approval of the PM. This may require a change order and adjustment in charge to the Owner. The CA will determine which method is most appropriate for tests that do not have a method specified.
- H. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.
- I. Overwritten Values:
1. Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system, shall be allowed, but shall be used with caution and avoided when possible.
  2. 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.
  3. Simulating a condition is preferable, rather than overwriting the value or by altering the appropriate setpoint to see the desired response.
  4. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.
- J. 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.
- K. 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 55°F, when the outside air temperature is above 55°F, temporarily change the lockout setpoint to be 2°F above the current outside air temperature.
- L. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses.
- M. Setup: Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. The Subcontractor 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 Subcontractor shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.
- N. Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy, e.g., VAV boxes. 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. All major equipment and systems, including boilers, chillers, pumps, air handling units, etc., shall be functionally tested and a sampling strategy shall not be used.
- O. Coordination and Scheduling: The Subcontractors shall provide sufficient notice to the CA regarding their completion schedule for the pre-functional checklists and startup of all equipment and systems. The CA will schedule functional tests through the PM, GC and affected Subcontractors. The CA shall direct, witness and document the functional testing of all equipment and systems. The Subcontractors shall execute the tests.

- P. In general, functional testing is conducted after pre-functional testing and startup has been satisfactorily completed. The control system is 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 is completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from individual components to subsystems to complete systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.
- Q. Problem Solving: The CA will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the GC, Subcontractors and A/E.

### **3.06 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS**

- A. Documentation: The CA shall witness and document the results of all pre-functional and functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the PM for review and approval and to the Subcontractors for review. The CA will include the completed testing forms in the O&M manuals.
- 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 PM 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 will 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 PM.
  - 4. As tests progress and a deficiency are identified, the CA discusses the issue with the executing Subcontractor.
    - a) When there is no dispute on the deficiency and the Subcontractor accepts responsibility to correct it:
      - i) The CA documents the deficiency and the Subcontractor’s response and intentions and they go on to another test or sequence. After the discussion, the CA submits the non-compliance reports to the PM for signature, if required. A copy is provided to the Subcontractor and GC. The Subcontractor 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 CA reschedules the test and the test is 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 Subcontractor’s response and a copy given to the PM and to the Subcontractor 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 DPS.
      - 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 CA reschedules the test and the test is repeated until satisfactory performance is achieved.
  - 5. Cost of Retesting:
    - a) The cost for the Subcontractor to retest a pre-functional or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the GC.
    - b) For a deficiency identified, not related to any pre-functional checklist or start-up fault, the following shall apply:

- i) The CA and PM will direct the retesting of the equipment once at no “charge” to the GC for their time. However, the CA’s and PM’s time for a second retest will be charged to the GC, who may choose to recover costs from the responsible Subcontractor.
    - c) The time for the CA and CM to direct any retesting required because a specific pre-functional checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back charged to the GC, who may choose to recover costs from the party responsible for executing the faulty pre-functional test.
  - 6. The Contractor shall respond in writing to the CA and PM 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 Subcontractor shall not be considered a justified reason for a claim of delay or for a time extension by the General Contractor.
- C. Failure Due to Manufacturing Defect: If 10%, or three (3), 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 specification, all identical units may be considered unacceptable by the PM. In such case, the Contractor shall provide the Owner with the following:
  - 1. Within one week of notification from the PM, the Contractor or vendor’s representative shall examine all other identical units making a record of the findings. The findings shall be provided to the PM within two weeks of the original notice.
  - 2. Within two weeks of the original notification, the Contractor or vendor 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 PM will determine whether a replacement of all identical units or a repair is acceptable.
  - 4. Two (2) examples of the proposed solution will be installed by the Contractor and the CM will be allowed to test the installations for up to one week, upon which the PM will decide whether to accept the solution.
  - 5. Upon acceptance, the Contractor and/or vendor 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 quickly 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 and by the PM, if necessary. The CA recommends acceptance of each test to the PM using a standard form. The PM gives final approval on each test using the same form, providing a signed copy to the CA and the Contractor.

### **3.07 FINAL COMMISSIONING RECORD (REPORT)**

- A. The final commissioning report shall include an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope, and a general description of testing and verification methods.
- B. Form of Final Reports:
  - 1. Each individual final reporting form must bear the signature of the person who recorded data and that of the supervisor of reporting organization.
  - 2. When more than one (1) certified organization performs testing and commissioning services, the firm having managerial responsibility shall make submittals.
  - 3. Identify type of instruments, and last date of calibration of each.
  - 4. Record and submit all data measured including airflow, liquid flows, pressure drops, motor amps, voltage at driven equipment, and all other data requested in the individual Specification Sections.
  - 5. Identify discrepancies that were noted from the Contract Document requirements for each system or equipment.

6. Acceptance results (performance) with a Yes / No check box to allow for clearly marked whether or not proper performance of each part of the test was achieved.
  7. A section for comments.
  8. Signatures and date block for the CA.
- C. For each piece of commissioned equipment, the report should contain the disposition of the Commissioning Authority regarding the adequacy of the equipment, documentation and training meeting the contract documents in the following areas:
1. Equipment meeting the equipment specifications.
  2. Equipment installation.
  3. Functional performance and efficiency.
  4. Equipment documentation and design intent.
  5. Operator training.
- D. All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc., shall also be listed. Each non-compliance issue shall be referenced to the specific functional test, inspection, trend log, etc. where the deficiency is documented. The functional performance and efficiency section for each piece of equipment shall include a brief description of the verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from the testing.
- E. The final, signed commissioning report shall be included with the O&M Manuals, with a separate copies provided to the DPS Project Manager, Engineer, and General Contractor.

**END OF SECTION 01 45 45**

## SECTION 01 50 00

### TEMPORARY FACILITIES

#### PART 1 GENERAL

**1.01** The Contractor shall arrange for all temporary utilities needed for construction and shall pay all fees and charges related to such utilities.

**1.02** Utilities Available To The Contractor: The following utilities in the existing building will be made available for the Contractor's use in the performance of work in this Contract:

- A. A/E to list utilities available for Contractor use.
- B. The Contractor may use indicated utilities, provided the Contractor supplies all materials, equipment, and labor required to extend the utility to the work area, and provided the Contractor removes such extensions at the end of each work day (unless otherwise arranged).
- C. Any modification of existing utilities to meet the Contractor's needs is not permitted without the written consent of DPS.
- D. The Contractor shall protect any and all existing utilities which may be utilized by him in the performance of his work.
- E. No utility shall be overloaded or subjected to usage in excess of the normal usage expected for such utility. The Contractor shall perform such tests as are necessary to determine existing loads and spare capacities so that construction usage can be appropriately sized.

#### **1.03 QUALITY ASSURANCE**

- A. Onsite, locate a high traffic and visible location to maximize public awareness of the project. If there are any questions on where to locate a sign, please see the Community Relations Manager.
- B. Stake two black painted posts into the ground, spaced to accommodate the width of the sign.
- C. Using the grommet holes, mount the sign to the face of the posts.
- D. Recommend bottom of sign be 36" above grade.

#### **1.04 USE OF EXISTING TOILETS FORBIDDEN**

- A. The use of new and/or existing sinks, toilets, lavatories, etc. by construction personnel is strictly prohibited. The Contractor shall provide temporary toilets as required for health and sanitation.
- B. DPS may permit use of existing toilet facilities for minor remodel projects. The Architect shall consult with DPS on such projects and shall include restrictions, etc. in this section.

#### **1.05 USE OF OTHER BUILDING SYSTEMS:**

- A. The Contractor may not use any other building systems for construction assistance unless specifically approved in writing by DPS. Use of elevators, phones, fax machines, etc. are included in this area.

#### **1.06 TEMPORARY HEAT**

- A. The Contractor shall provide temporary heat during construction as required by the various sections of the specifications or as needed to assure that work is performed under environmental conditions which are appropriate. Protect the work from damage during cold weather by the judicious application of acceptable temporary heating methods.
- B. Use Of Permanent Heating Equipment
  - 1. Permanent heating units may be used for temporary heating purposes provided:
    - (a.) The Contractor makes request and receives approval from the Architect and Owner.

- (b.) The building is completely enclosed.
- (c.) Heating unit has sufficient vents, ducts, etc. to make it safe to operate.
- 2. Units and ductwork used for temporary heat shall be cleaned and placed in first-class working order prior to final acceptance of the project.
- 3. Use of the units for temporary heat shall not reduce the mandatory warranty period of twenty-four (24) months from the date of substantial completion.
- C. Utility Costs
  - 1. The Contractor shall obtain all utilities and shall pay all utility charges except as otherwise specified.
  - 2. Use of permanent metering for temporary utilities shall not be allowed unless approved by the Architect.

**1.07 TEMPORARY DOORS AND CLOSURES**

- A. Closures shall be capable of achieving a sound transmission coefficient (STC) of 35 and shall have a 25 (maximum) flame spread rating.
- B. The occupied side of the closure shall be painted and finished.

**1.08 ROOF ACCESS BARRIERS**

- A. Roof access ladders and scaffolding shall be removed at the end of each work day, unless suitable barriers are provided to prevent access.

**1.09 EXITING**

- A. The Contractor shall submit to the Architect and DPS his plans for the safe exiting of building occupants during various construction activities.
- B. The Contractor shall construct safe egress passages as required where any required exit is made unsafe or unusable due to construction activities.
- C. In lieu of constructing alternate means of egress and circulation, the Architect may permit coordination of construction into phases to permit partial use of construction areas at all times.
- D. The Contractor shall submit to the Architect and DPS, his plans for the safe exiting of building occupants during various construction activities.

**1.10 MAINTENANCE OF BARRIERS**

- A. Barriers shall be maintained by the Contractor so that their functions are not compromised at any time.
- B. Contractor shall obtain approval in writing from DPS prior to removal of any temporary barriers.

**1.11 SECURITY**

- A. Work areas shall be secured at the end of each working day and at other times when construction areas are not manned. The Contractor shall install temporary doors, windows, or other closures as needed to prevent the entry of unauthorized personnel. Provide adequate locking mechanisms for security closures.
- B. Existing security provisions may be used provided those provisions are adequate to prevent the entry of unauthorized personnel.
- C. The security of connecting or adjacent existing structures shall not be compromised by the Construction. The Contractor shall provide adequate fencing, barriers, barricades, etc. necessary to maintain building security.

**1.12 SECURITY CLOSURES AND BARRIERS**

- A. Security closures and other barriers shall be coordinated with other barrier (wind, dust, noise, etc.) .
- B. Security closures shall be of substantial construction and shall be constructed so as to provide the same security level as the remainder of the building.
- C. Security closures and barriers shall not interfere with building exiting requirements.



**1.13 NIGHT WATCHMAN**

- A. If the Contractor desires to place a night watchman on the premises, the person shall be approved by DPS Security and shall be bonded as required by DPS.

**1.14 CONTRACTOR'S SECURITY**

- A. Security requirements for Contractor's property is the exclusive responsibility of the Contractor and his means are not subject to this specification unless Contractor's requirements affect DPS property.

**1.15 FIELD OFFICES**

- A. The Contractor's Field Office will not be permitted to occupy space within any existing school structures or within incomplete portions of building(s) under construction unless authorized in writing by DPS.

**1.16 ARCHITECT'S/OWNER'S OFFICE (Projects over \$3,000,000 in construction value).**

- A. The Contractor shall provide, at his expense, an office facility at the site for the use of the Architect, DPS and their authorized representatives.
- B. The office shall have a secure door with locking mechanism, lighting, heating, electric power, and separate telephone service.
- C. The Office shall be equipped with two chairs and a plan table of 3' x 7' minimum dimensions.
- D. The Architect/Owner Office shall be near the Contractor's field office.

**1.17 RECORDS RETENTION**

- A. Contractor shall prepare and maintain a matrix of manufacturer's recommended storage and maintenance requirements including storage temp, shelf life, and frequency of scheduled maintenance for stored products.
- B. Contractor shall provide copies of the matrix to the Owner upon request.

**PART 2 MATERIALS**

**2.01 CONSTRUCTION FENCING**

- A. The Construction Fence shall be 6'-0" in height (minimum).
- B. Fence construction and materials shall be adequate to prevent unauthorized entry into the contract area.
- C. Plastic snow fencing or warning tape are not acceptable materials.

**2.02 PRODUCTS**

- A. Use of permanent metering for temporary utilities shall not be allowed.
- B. Temporary heating units shall be in good repair and shall be maintained in good operating condition during their use. All temporary heating units must be tested and labeled by U.L., F.M., F.I.A. or other recognized organization related to the fuel being consumed.
- C. Salamander or open burning temporary heating units shall not be used.

**PART 3 EXECUTION**

- 3.01** Contractor shall erect and maintain barriers to provide continuous effective hazard protection. Minimum standards of governing agencies shall be followed.

**3.02 MAINTENANCE**

- A. Maintain all temporary heating equipment for safe and efficient operation. Provide adequate ventilation to prevent condensation and to provide adequate combustion air.
- B. Comply with all requirements of governmental agencies having jurisdiction.
- C. Maintain all temporary utilities in safe condition.

**3.03 PROTECTION**

- A. Maintenance of stored and installed equipment shall continue until the date of substantial completion.
- B. Document all interim maintenance performed and provide this documentation to the Architect and Owner at Substantial Completion.

**3.04 PROGRESS MEETING REPORTING**

- A. Contractor shall provide a list of newly received products and manufacturer's storage requirements and present same at regular project progress meetings.
- B. Contractor will be responsible for manufacturer's warranty if storage and pre-acceptance maintenance requirements have not been met and/or cannot be documented.

**END OF SECTION 01 50 00**

## SECTION 01 73 29

### CUTTING AND PATCHING

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. Execute cutting, fitting or patching of Work, required to:
  - 1. Make several parts fit properly.
  - 2. Uncover Work to provide for installation of ill-timed Work.
  - 3. Remove and replace defective Work.
  - 4. Remove and replace Work not conforming to requirements of Contract Documents.
  - 5. Install specified Work in existing construction.
  - 6. Provide finished surfaces (to match adjacent existing surfaces) to fill in voids caused by removal or replacement of materials.
- B. Pay for costs caused by ill-timed or defective Work, or Work not conforming to Contract Documents, including costs for additional services of Architect/Engineer.

##### 1.02 EXISTING CONSTRUCTION

- A. Cutting and patching and dismantling shall be performed in segments judged by the Contractor to be complete at the end of each work day so as not to leave any unstable or unsafe conditions overnight.
- B. Repair all cutting of walks, curbs, paving, etc.. Repairs of walks, curbs, paving, etc. on public rights-of-way shall be made in accordance with City requirements. Cutting and repairs to walks shall be in full panel sections. Repairs on school property shall be as indicated in the Contract Documents.
- C. Interruption of mechanical or electrical services shall be coordinated with DPS.

##### 1.03 NOTIFICATIONS TO THE ARCHITECT

- A. Except as otherwise detailed or indicated, the Contractor shall notify the Architect 72 hours prior to any cutting activity and acquire his approval before any of the following:
  - 1. Penetration of structural building components.
  - 2. Planned penetrations larger than one square foot which are not shown on the drawings.
  - 3. Penetration of work provided by Owner or "Others" outside of this contract.
  - 4. Penetrations affecting the operational life, maintenance or safety of operational elements.
  - 5. Penetrations or cutting of weather-exposed or moisture-resistant elements or systems.
  - 6. Penetrations affecting the visual qualities of exposed elements.
  - 7. Any element where the existence of a penetration or the process of cutting may render the element unsuitable to receive subsequent work.

##### 1.04 UTILITY AND BUILDING SYSTEM INTERRUPTIONS

- A. Except as specifically indicated otherwise in the Contract Documents, interruption of mechanical and electrical services or building system operation shall be prohibited without the prior approval of DPS.
- B. A minimum of three days (72 hours) notice must be given prior to any utility or building system shutdown.
- C. Where interruption of the building fire alarm system is required for construction work, the Contractor shall coordinate requirements with DPS and the Denver Fire Department. The Contractor shall coordinate activities and pay for any fire watches required by the Denver Fire Department.

**END OF SECTION 01 73 29**

## SECTION 01 74 00

### FINAL CLEANING

#### PART 1 GENERAL – No Requirements

#### PART 2 PRODUCTS

##### 2.01 MATERIALS

- A. All materials used in final cleaning shall be manufactured for the specific purpose for which they are used or shall be recommended by the manufacturer of the product or material being cleaned.

#### PART 3 EXECUTION

##### 3.01 SEQUENCING/SCHEDULING

- A. Final cleaning shall occur prior to the Substantial Completion Inspection. The Contractor shall maintain cleaned areas in a spotless condition until final acceptance.
- B. If school schedule requires delivery of Owner's materials or furniture, Contractor shall obtain written acceptance of conditions and/or agreement regarding the Contractor's responsibilities for final cleaning.

##### 3.02 ADJUSTING AND CLEANING

- A. Pre-Cleaning Inspection:
  - 1. Prior to final cleaning, Contractor shall inspect all finish work and repair or replace all damages due to scratched, cracked, broken, dented, stained, or otherwise unacceptable conditions prior to final cleaning.
  - 2. Contractor shall make all final adjustments for proper appearance and functionality.
- B. Restoration of damaged materials
  - 1. Remove and replace all items which cannot be completely cleaned. Replace all broken, scratched or cracked glass and plastics. Repairs must result in no noticeable difference in appearance or quality of the product.
- C. Final Cleaning
  - 1. At the completion of the work, the Contractor shall remove all spots, dust, grease, fingerprints and films from floors, walls, ceilings, windows, doors, glass, cabinetry, hardware, fixtures and equipment. Wipe clean all mechanical, electrical and elevator equipment.
  - 2. Clean all plumbing fixtures to sanitary conditions.
    - a) Remove all water stains from fixture surfaces.
    - b) Leave fixtures free of dust, dirt, scratches, etc.
  - 3. Vacuum carpets. Shampoo carpets if necessary to remove stains.
    - a) Carpets shall be free of dust, debris, pressure marks, ripples, etc.
  - 4. Markerboards shall be free of dust, marks, scratches or other marks.
  - 5. Walls shall be cleaned and left free of dust, paint runs, drips or spatters. There shall be no noticeable differences in sheen observed.
  - 6. Glass surfaces shall be left free of dust, scratches, streaks and smears.
  - 7. Clean surfaces in non-occupied areas.
    - a) Broom clean concrete floors.
    - b) Wipe down and remove spots from unpainted walls and ceilings.
  - 8. Power scrub and buff all hard surface flooring.

END OF SECTION 01 74 00

## SECTION 01 77 00

### CLOSEOUT PROCEDURES

#### PART 1 GENERAL

##### 1.01 FINAL INSPECTION

- A. When the Contractor believes that all work is complete, the Contractor shall personally inspect the work to certify completion of all contract requirements. The Contractor shall then notify the Architect, in writing, of project completion, and list outstanding or incomplete items required by the contract. Such written notification shall constitute the Contractor's certification of inspection, acceptance, and suitability of the work for the Architect's review. Before requesting an inspection, the Contractor shall have submitted to the Architect:
1. All shop drawings, submittals and product data as required by the Contract Documents.
  2. All reports and test results as required by the Contract Documents (i.e. air balance reports, concrete test reports, etc.)
  3. Inspection reports and certificates of agencies having jurisdiction.
  4. Price quotations for any outstanding change orders, bulletins, or claims.
  5. Schedule and perform all training required by the Contract Documents.
- B. The Contractor shall notify all applicable regulatory agencies that the project is complete and ready for final inspection, etc. Notifications shall include:
1. State of Colorado, Division of Oil & Public Safety.
  2. Denver Building Department.
  3. State of Colorado Plumbing Board.
  4. State of Colorado Electrical Board.
  5. Denver Health and Hospitals.
  6. Denver Wastewater Management.
  7. City and County of Denver Zoning Department.
  8. Any other agencies having jurisdiction.
- C. Within five (5) days of receipt of a request for inspection (and all required submittals and report(s)), the Architect will schedule a final inspection. The inspection will be attended by the Architect, the Architect's Consultants, DPS, DPS QA-QC, the General Contractor and major Sub-Contractors. A punch-list of work to be accomplished before acceptance of the project will be prepared by the Architect and distributed to all concerned parties.
1. The punch list of incomplete and unacceptable work shall be assigned a dollar value for each incomplete item. 5% retainage will be withheld from the general contractor's final payment.
  2. Unless otherwise arranged, at the time of final inspection the Contractor shall provide all keys at the project site. A full inspection of all locks and keying will be conducted by the Contractor and Owner at that time. At the completion of the Keying Inspection, all keys will be turned over to the Owner's Project Manager.
- D. At the time of final inspection, the Contractor shall turn over all mechanical systems and utility responsibilities to the Owner. If the building has been occupied prior to final inspection, the Contractor will turn over systems at that time.

##### 1.02 CLOSEOUT SUBMITTAL TO ARCHITECT

- A. Within 30 calendar days of the issuance of the final punch list, the Contractor shall have completed all punch list items. At that time, the Contractor shall advise the Architect in writing that the work has been thoroughly

inspected and is ready for final acceptance. Before a final acceptance review is conducted, the following shall be submitted to the Architect:

1. A set of drawings marked to reflect variations between original drawings and as-built conditions.
  2. A log of all subcontractors, and a log of all materials and product suppliers. Include addresses and phone numbers of each party.
- B. Within ten (10) days of receipt of above notification and submittals, the Architect will schedule an acceptance review.
- C. If all punch-list items have been completed to the satisfaction of the Architect and Owner, the Architect will recommend acceptance of the project. The Architect shall submit to DPS, a letter of recommendation for acceptance of the project stating that "to best of his/her knowledge" all work on the project has been completed according to the contract documents.
- D. If the Owner elects to accept the project without completion of all punch-list items, an amount equal to three (3) times the value of incomplete work will be held from subsequent pay requests until items have been completed.

### **1.03 CLOSEOUT SUBMITTAL TO OWNER.**

- A. Architect to submit to the District Project Manager (1) thumb drive or CD with electronic AutoCAD and PDF files of the record drawings and the Operation and Maintenance Manuals (PDF or Word Format).
- B. Submit (1) complete set of Operation and Maintenance Manuals in a 3-ring binder. If multiple buildings are within a project; provide individual manuals for each building. All manuals (electronic and printed) should include the following:
1. Product Warranty for not less than 24 months.
  2. Manufacturer's complete maintenance instructions including routine and preventive maintenance schedule for each component.
  3. Wiring diagrams and schematics where applicable.
  4. Manufacturer's printed operating instructions.
- C. Format for the record drawings will be as follows:
1. Submit record drawings in .dwg AutoCad Format (Verify the latest format that the District is using).
    - a) One drawing per CAD file. (No multi-layout files will be accepted). All external references, images, and special fonts should be bound in to the file.
    - b) Use paper space for the title block provided by DPS and model space for the project elements.
  2. One As-Printed electronic .PDF of each Record Drawing in addition to the AutoCAD file.
  3. General Format:
    - a) All electronic file(s) shall be required to be named the same as the DPS title block label standards (see Drawing Standards).
    - b) Drawing size and format – sheet size shall be no larger than 30x42” (ARCHE1) and no smaller than 24x36” (ARCHD).
    - c) Official Building Name, Building ID, Address and DPS parent project number shall appear in every title block (\*NOTE- program/school or construction names and program/school ID's cannot be used in record document title blocks).
    - d) “Record Drawing” shall be noted on each drawing.
- D. If applicable, also provide one official, electronic copy (AutoCAD and PDF) of each of the following additional Record drawings per the drawing standards described above.
1. Fire Suppression drawing.
  2. Building Automation drawing.
  3. Clock Systems drawing.

4. Security Access Control drawing.
5. Surveillance drawing.
6. Security and Fire Alarm Detection drawings.
7. Irrigation Record Drawings.
8. The Contractor shall provide additional data as requested where such information is needed to verify compliance of materials, processes or workmanship with Contract Documents.

**1.04 FINAL ADJUSTMENT OF ACCOUNTS**

- A. If all punch-list items have been completed to the satisfaction of the Architect and Owner, the Contractor shall then submit to the Architect:
  1. All Guarantees and Warranties required by the Contract Documents. All Guarantees and Warranties shall bear the final completion date.
  2. Final Application for Payment.
  3. No additional payments will be made if certificate of occupancy (or certificate of compliance) has not been provided.
  4. Consent of surety to final payment.
  5. Certificate of Occupancy.
  6. Operating and maintenance manuals for all equipment and products as required by the Contract Documents.
  7. Documentation of Training required by the Contract. Documentation shall consist of copies of written material, video tapes, etc. which indicate the scope and detail of the various training sessions. Contractor to include names of all personnel trained.
- B. Following acceptance, the School District will issue a Notice of Final Settlement to the Contractor, setting the date for Final Settlement. Notice of Final Settlement will be published no less than twice during this period.
- C. Upon receipt of the preceding items, the Architect will recommend final payment including retainages.
- D. All closeout related documents, submittals, and required paperwork shall be delivered to the Architect AT ONE TIME for each phase of closeout.
- E. Architect's final payment will not be released until all project record documents including as-built drawings have been delivered to DPS and have been accepted as complete.

**1.05 PHASED PROJECT CLOSEOUT**

- A. Where construction occurs in various buildings or separated sites, the Contractor may request a phased closeout. Such phased closeout shall follow the procedures outlined above.

**END OF SECTION 01 77 00**



## SECTION 01 78 23

### OPERATION, MAINTENANCE, AND WARRANTY DATA

#### PART 1 - GENERAL

##### 1.01 PROCESS AND SEQUENCE

- A. At the completion of the project, the Contractor shall submit to the Architect informational literature on the proper operation, maintenance, manufacturer's adjustment and repair of all equipment installed under this Contract which may require routine adjustment and/or maintenance.
- B. Literature for each equipment item shall be identified with product manufacturer, item name, item number, serial number, general location, electrical circuit number (if applicable), and name, address, and telephone number of the nearest manufacturer's representative for product service.
- C. Roofing maintenance insurance and repair instructions.
  - 1. At the completion of the project, submit copies of manufacturer's standard literature describing the care, maintenance, and repair of the installed roofing system.
  - 2. Include guidelines to assure validity of warranty coverage.
  - 3. Include names, addresses, and telephone numbers of the Contractor, Manufacturer, Regional Distributor, and Manufacturer "hotline".
- D. Refer to Division 23 - Mechanical and Division 26 - Electrical for supplemental requirements for Operation and Maintenance Data.

##### 1.02 SUBMITTALS

- A. Where projects include work at multiple properties/buildings, O&M manuals shall be required to be produced for each property including only those documents that relate to the specific properties.
- B. Provide (1) complete set of printed operations and maintenance instructions in a 3-ring binder or comparable delivery method as well as (1) complete electronic set in PDF format on CD or flash drive for all identified components of the work. (One set for school building and one set for Space Management)
- C. Instruction manuals shall be delivered to the Architect at one time for review and approval.

##### 1.03 FORM OF SUBMITTAL

- A. Format:
  - 1. Operation and Maintenance Data shall be 8 1/2 x 11 inches or proportional increment.
  - 2. AutoCAD (.DWG) format submittals (AutoCAD current compatible version per DPS Space Management Office. See section 01 78 39 – Project Records Documents)
    - (a.) Irrigation plans
    - (b.) Fire Alarm shop drawings corrected to reflect actual installation.
    - (c.) Mechanical Control Drawings
    - (d.) Fire Sprinkler Shop Drawings.
  - 3. All files shall be submitted in PDF format in addition to all CAD files.
  - 4. Materials shall be bound at the full length of the left edge.

5. Include covers and backs with identification data.
  - (a.) Official BUILDING name shall be used if changed during original working title. (\*Note: DO NOT use program/school name or construction name
- B. General Contractor Guarantee:
  1. Submit original executed copies to the architect with project closeout materials.
- C. Manufacturer Guarantee/Warranty:
  1. Submit sample copies to the architect prior to ordering warranted products.
  2. Submit original executed copies to the architect with project closeout materials.
- D. Extended Warranties:
  1. Submit sample copies to the architect prior to ordering warranted products.
  2. Submit original executed copies to the architect with project closeout materials.

#### **1.04 CONTENT OF MANUAL**

- A. Product Data-refer to individual specification sections for additional requirements.
- B. General Warranty:
  1. General contractor twenty-four (24) month guarantee of materials and workmanship.
  2. The Contractor shall guarantee in writing to the Owner that all work performed and all materials and equipment furnished under this contract are new and in accordance with the Contract Documents, are free from defects in equipment, materials or design furnished, or workmanship performed by the Contractor or any of his subcontractors or suppliers at any tier. Such guarantee shall continue for a period of twenty-four (24) months from the date of Final Completion of the work.
  3. Under this guarantee, the Contractor shall agree to remedy at his own expense any inferior or defective equipment, materials, workmanship, or design that should develop during the guarantee period, or in restoring any other work damaged in fulfilling the terms of the guarantee.
  4. The Contractor shall not perform any work that shall void any Manufacturer Guarantee and Warranty.
- C. Manufacturer Guarantee And Warranty:
  1. As identified in other Sections of these Specifications, the Contractor shall provide written manufacturer's guarantees and/or warranties for specific materials, products, and equipment furnished under this contract.
  2. Such guarantees and warranties shall be valid for the period of time stated in each applicable specification from the date of Final Completion of the work but not less than twenty-four (24) months.
- D. Extended Warranties:
  1. As identified in other Sections of these Specifications, the Contractor shall provide written manufacturer's guarantees and/or warranties for specific materials, products, and equipment furnished and installed under this Contract.
  2. Such guarantees/warranties shall be valid for the stated extended period beyond twenty-four (24) months from the date of Final Completion of the work.
- E. Warranty Exclusions:
  1. Warranty requirements contained in these Specifications take precedence. Exclusion clauses shall be superseded by warranty coverage requirements of the Specifications.

2. The Contractor shall notify the Architect of design conditions which cannot be fully warranted. Such notice shall be in writing prior to purchase of the affected product or system.
3. Failure to provide such notice shall not be grounds for waiver of warranty requirements contained in the Specifications.
4. Upon receipt of such notice, the Architect will consider modifications necessary to assure that final construction is warrantable to the full extent of Contract requirements.

**END OF SECTION 01 78 23**

## SECTION 01 78 39

### PROJECT RECORD DOCUMENTS

#### PART 1 GENERAL

##### 1.01 PROJECT RECORD DOCUMENTS

- A. The Contractor shall maintain at the job site one record copy of Contract Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders, and any other modifications to the Contract, field test records and other approved documents submitted by the Contractor in compliance with specification requirements.
- B. These Documents shall be accurately marked with all changes made during construction. As-built notes shall be marked with pencil (or ink) of contrasting color.
- C. Project record documents shall be stored apart from as-built documents used for construction. Do not use record documents for construction purposes. Maintain documents in clean, legible condition. Project record documents shall be available at all times for review of the Architect or Owner.
- D. Project Record Drawings shall be corrected to reflect the true site number and building name (where these items have changed since the issue of bid documents).

##### 1.02 RECORDING

- A. Label each document "PROJECT RECORD COPY" in 2" print. Keep record documents current. Do not permanently conceal any work until required information has been recorded.
- B. Contract Drawings: legibly record the following:
  - 1. Field changes of dimension and detail made during construction process.
  - 2. Change made by Change Order or Field Order.
  - 3. Details not on original Contract Drawings.
  - 4. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
  - 5. Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
  - 6. Depths of various elements of foundation in relation to first floor level.
  - 7. Location of all valves and cleanouts.
- C. Closeout Survey Information:
  - 1. Contractor shall obtain the services of a certified land surveyor to provide verified locations of all major buried utilities measured from property corners. Surveyor shall record depth of utility at definitive points such as building entry and connection to primary utility service to the site.
  - 2. Provide buried utility information in AutoCAD format prepared by the surveyor.
  - 3. Deliver Closeout Survey information with other closeout documents.

##### 1.03 SHOP DRAWINGS:

- A. Maintain as record drawings:
  - 1. Legibly annotate shop drawings to record changes made after review.
  - 2. At completion of the project, the as-built noted set of documents shall be turned over to the Architect. The Architect will utilize this information along with other available data in preparing the "Record Drawings" for the project.
- B. Refer to Divisions 23 - Mechanical, and Division 27 - Electrical for supplemental requirements for Project Record Documents.

**1.04 SUBMITTALS**

- A. Where projects include multiple properties, the Contractor shall separate all Record Document by property for submittal.
- B. Upon completion of the Project, submit one (1) copy of Project Record Documents to the Architect for review. Record Documents should include:
  - 1. Warranties (dated the date of project acceptance).
  - 2. Operating and Maintenance Manuals (see Section 01 78 23)
  - 3. “As-Built” Drawings marked to reflect changes made during construction.
  - 4. List of Suppliers/Manufacturers
- C. Upon approval of the submitted documents, the Contractor shall submit (1) complete sets of project record documents: separate set per building if multiple buildings to the Architect for delivery to DPS.
  - 1. Separate sets per building for architect to be delivered to DPS.
  - 2. See section 01 33 00 - Submittals
- D. The Architect shall provide complete Record Drawing sets and deliver drawings and other record documents to DPS at the end of the project. (See 01 77 00 Closeout Procedures)

**END OF SECTION 01 78 39**

## SECTION 01 79 00

### DEMONSTRATION AND TRAINING

#### PART 1: GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

##### 1.02 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.
  - 3. Recording of training sessions.
- B. Related Sections:
  - 1. Division 1-14 – Individual sections with training requirements.
  - 2. Divisions 21-25 – Mechanical sections with training requirements.
  - 3. Divisions 26-28 – Electrical sections with training requirements.

##### 1.03 SUBMITTALS

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. At completion of training, submit one complete training manual 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. Demonstration and Training DVD: Submit one copy at end of each training module.

##### 1.04 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

## 1.05 COORDINATION

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

## PART 2 – PRODUCTS

### 2.01 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable:
  - 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**

### **3.01 PREPARATION**

- A. Assemble educational materials necessary for instruction, including documentation and training module.  
Assemble training modules into a combined training manual.
- B. Set up instructional equipment at instruction location.



### **3.02 INSTRUCTION**

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Schedule training through Architect with at least seven days' advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- E. Demonstration and Training Recording: Record each training module separately on digital, window's compatible DVD media. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
  - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

### **3.03 REQUIRED DEMONSTRATION AND TRAINING**

- A. Provide a list of demonstration and training requirements listed in individual specification sections. Inconsistencies or omissions from the list do not relieve the Contractor from providing required demonstration and training delineated in each specification section.

### **3.04 DEMONSTRATION**

- A. Manufacturer's onsite field technician shall demonstrate the operation of the doors to the Owner. A video outlining the operation of the item or system, scheduled maintenance, basic troubleshooting and care of the item or system shall be provided to the Owner by the door manufacturer.

**END OF SECTION 01 79 00**