

DIVISION 1

GENERAL REQUIREMENTS

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SECTION 01 20 00 - PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

1.2 SCHEDULE OF VALUES

- A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Construction Project Manager (C.P.M) for approval.
- B. Forms filled out by hand will not be accepted.
- C. Submit a printed schedule on AIA Form G703/CMa -Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.
- D. Submit Schedule of Values in duplicate, or electronically, within 14 days after date of Owner-Contractor Agreement.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section.
 - 1. Identify site mobilization and bonds and insurance.
 - 2. Include additional line items identified by subsection titles, for Work exceeding \$15,000.
- F. Revise schedule to list approved Change Orders, with each Application For Payment.

1.3 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Present required information in typewritten form.
- E. Form: AIA G702/CMa Application and Certificate for Payment and AIA G703/CMa -Continuation Sheet including continuation sheets when required.
- F. Execute certification by signature of authorized officer.

- G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed.
- H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.
- I. Submit four (4) copies of each Application for Payment.
- J. Include the following with the application:
 - 1. Transmittal letter as specified for Submittals in Section 01 30 00.
 - 2. Construction progress schedule, revised and current as specified in Section 01 32 16.
 - 3. Partial release of liens from major Subcontractors and vendors.
- K. When Construction Project Manager or Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.
- L. Clearly indicate on the Application for Payment those line items which include materials or equipment, purchased or fabricated and stored, but not yet installed.
 - 1. Differentiate between items stored on-site and items stored off-site.
 - 2. Payments for material and equipment stored off-site will be at the sole discretion of the Owner. If required, Contractor will be responsible for all costs of travel and lodging for Architect, Engineers, and Owner to off-site storage locations to examine these items and the conditions of storage.
 - 3. For items stored off-site, provide a bill of sale from supplier/Trade Contractors and certificates of insurance for the full value of stored materials with the Owner named as the insured.
 - 4. For items stored off-site show a separate line item for the value of delivering and unloading the items at the Project site.
 - 5. For items stored on or off-site, provide in a separate line item for the value of the installation of these items.
- M. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 - 1. List of subcontractors.
 - 2. Staff names and assignments.
 - 3. Schedule of Values.
 - 4. Contractor's Construction Schedule (preliminary if not final).
 - 5. Products list.
 - 6. Schedule of unit prices.
 - 7. Submittals Schedule (preliminary if not final).
 - 8. Copies of building permits.
 - 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 - 10. Initial progress report.
 - 11. Certificates of insurance and insurance policies.
 - 12. Performance and payment bonds.
 - 13. Data needed to acquire Owner's insurance.

- N. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
 - 1. Include documentation supporting that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

1.4 MODIFICATION PROCEDURES

- A. For minor changes not involving an adjustment to the Contract Price or Contract Time, the Architect, in consultation with the Project Manager/Construction Project Manager, will issue instructions directly to Contractor.
- B. The Architect, in consultation with the Construction Project Manager, will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions.
- C. For other required changes, the Architect will consult the Construction Project Manager. If the Construction Project Manager approves the change, he will issue a Force Account Work order instructing the Contractor to proceed with the change, for subsequent inclusion in a Change Order.
 - 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
 - 2. Promptly execute the change.
- D. For changes for which advance pricing is desired, General Contractor will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change. Contractor shall submit all documentation and substantiation to Construction Project Manager for review and determination.
- E. Contractor may propose a change by submitting a request for change to Construction Project Manager, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
 - 1. For change requested by Construction Project Manager for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
 - 2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
 - 3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
 - 4. For change ordered by Construction Project Manager without a quotation from Contractor, the amount will be determined by Construction Project Manager

based on the Contractor's substantiation of costs as specified for Time and Material work.

- G. Substantiation of Costs: Provide full information required for evaluation.
 - 1. On request, provide following data:
 - a. Quantities of materials, labor, and equipment.
 - b. Taxes, insurance, and bonds.
 - c. Overhead and profit.
 - d. Credit for deletions from Contract, similarly documented.
 - 2. Support each proposal for additional costs with additional information:
 - a. Origin and date of proposal.
 - b. Actual labor and materials paid to workers, similarly documented.
 - c. Invoices and receipts for materials, equipment, and subcontracts, of actual cost, similarly documented.
- H. Execution of Change Orders: Construction Project Manager will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- J. Promptly enter changes in Project Record Documents.

1.5 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
 - 1. All closeout procedures specified in Section 01 70 00, Section 01 77 00 and Section 01 7800.
 - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 - 3. Updated final statement, accounting for final changes to the Contract Sum.
 - 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 - 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 - 6. AIA Document G707, "Consent of Surety to Final Payment."
 - 7. Evidence that claims have been settled.
 - 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 - 9. Final, liquidated damages settlement

statement. PART 2 PRODUCTS -NOT USED

PART 3 EXECUTION- NOT USED

END OF SECTION

SECTION 01 21 00 -ALLOWANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cash allowances.
- B. Payment and modification procedures relating to allowances.

1.2 RELATED REQUIREMENTS

- A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.3 CASH ALLOWANCES

- A. Refer to schedule for description of Work included.
- B. Differences in costs will be adjusted by Change Order.

1.4 QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner, in the specified quantity.
- B. Costs Included in Quantity Allowances: Cost of components or equipment to Contractor or subcontractor, less applicable trade discounts, including cost of delivery to site and applicable taxes.
- C. Where specifically indicated, include in the allowance the labor required to install products, materials, and equipment provided under the allowance. Note: By definition, statements requiring the Contractor to 'provide' a quantity of work includes labor.
 - 1. Allowances including labor to also include Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, uncrating and storage, protection from the elements and damage, and similar costs related to products and materials.
 - 2. Differences in quantities used will be adjusted by Change Order on an unit cost basis.

1.5 ALLOWANCES SCHEDULE

- A. Allowance No. 1: \$164,340.
 - 1. Building & Onsite SOW Permits, WSSC Fees/Tap Fees, PEPCO, Washington Gas, Verizon, Comcast (CATV) Allowance

- Allowance No. 2: \$82,170.
 - 1. WSSC Bonds,

- Allowance No. 3: \$410, 850.
 - 1. M-NCPPC's Design & Regulatory Requirements Contingency Allowance

Allowance No. 4: \$410,000.

1. Furniture, Fixtures, Equipment & Audio/Video Allowance.

Includes but not limited to the following:

- a. IT infrastructure
- b. Wireless access within building
- c. Intercom / Telephone.
- d. Audio/Video Equipment – Head end Hardware/Software

Allowance No. 5: \$282, 900.

2. Security System Equipment.

- a. Card access security system
- b. Video surveillance system and monitoring
- c. M-NCPPC Park Police Equipment & Specifications – To be issued in Addendum.

Allowance No. 6: \$123,255.

1. Gym Equipment Allowance.

- a. Exercise equipment
- b. Portable Basketball goals
- c. Misc. Equipment & Specifications – To be issued in Addendum.

Allowance No. 7: \$6,573.60

1. Printing Allowance.

PART 2 PRODUCTS- NOT USED

PART 3 EXECUTION- NOT USED

END OF SECTION

SECTION 01 30 00- ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Project coordination.
- B. Requests for interpretation (RFI).
- C. Subcontract list.
- D. Staff names and assignments.
- E. Preconstruction meeting.
- F. Progress meetings.
- G. Progress photographs.
- H. Submittals for review, information, and project closeout.
- I. Number of copies of submittals.
- J. Submittal procedures.
- K. Contractor's use of Architect's CAD files.
- L. Delegated design
- M. Contractor's review
- N. Architect's action
- O. Daily Construction reports
- P. Management Administration Plan (MAP).

1.2 PROJECT COORDINATION

- A. Project Coordinator: The GC shall appoint a Project Coordinator who can be the Field Supervisor if he/ she so chooses.
- B. The Project Coordinator supervise allocation of mobilization areas of site; for field offices and sheds, for vehicle and truck access, traffic, and parking facilities.
- C. During construction, the Project Coordinator shall coordinate use of site and facilities.
- D. The Project Coordinator shall oversee procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. The Project Coordinator shall oversee the use of temporary utilities and construction facilities.
- F. The Project Coordinator shall oversee field engineering and layout work.

- G. Make the following types of submittals to Architect through the Project Coordinator:
1. Requests for interpretation.
 2. Requests for substitution.
 3. Shop drawings, product data, and samples.
 4. Test and inspection reports.
 5. Design data.
 6. Manufacturer's instructions and field reports.
 7. Applications for payment and change order requests.
 8. Progress schedules.
 9. Coordination drawings.
 10. Closeout submittals.

1.3 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
 3. Frivolous RFIs: The Contractor will compensate the Owner for the Architect's time and expenses to process RFIs resulting from the Contractor's lack of studying and comparing the Contract Documents, coordinating their own Work, or repeating previous RFIs.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Project name.
 2. Date.
 3. Name of Contractor.
 4. Name of Architect.
 5. RFI number, numbered sequentially.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Format of RFIs: Content provided in Section I of Division 0.
1. Software-Generated RFIs:
 - a. Preferred format.
 - b. Software-generated form with substantially the same content as indicated above.

- c. Photographs shall be electronic files in JPG format.
 - d. Attachments shall be electronic files in Adobe Acrobat PDF format.
 - 2. Hard-Copy RFIs:
 - a. Permitted under conditions where electronic RFI is not feasible.
 - b. Identify each page of attachments with the RFI number and sequential page number.
- D. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
 - 1. The following RFIs may be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
 - 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 - 3. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, submit Change Order Request within 10 days of receipt of the RFI response as provided by General Conditions of the Contract.
- E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect.
 - 4. RFI number including RFIs that were dropped and not submitted.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's response was received.
 - 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.4 SUBCONTRACT LIST

- A. Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use forms I.6 and I.7 in Section I of Division 0.

1.5 STAFF NAMES AND ASSIGNMENTS

- A. Submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site, prior to or coinciding with initial Application for Payment.
- B. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers.

- C. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
- D. Post copies of list in Project meeting room, in temporary field office, and by each temporary phone.

PART 2 PRODUCTS -NOT USED

PART3 EXECUTION

3.1 PRECONSTRUCTION MEETING

- A. Architect will schedule a meeting after execution of Contract.
- B. Attendance Required:
 - 1. Owner.
 - 2. Construction Project Manager.
 - 3. Architect.
 - 4. Contractor.
- C. Agenda:
 - 1. Submission of executed bonds and insurance certificates.
 - 2. Distribution of Contract Documents.
 - 3. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
 - 4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 5. Scheduling.
- D. Architect to record minutes and distribute copies within two days after meeting to participants, with two copies to Construction Project Manager, Project Manager, participants, and those affected by decisions made.

3.2 PROGRESS MEETINGS

- A. Architect to schedule and administer meetings throughout progress of the Work at maximum bi-weekly intervals.
- B. Architect will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Contractor's project manager and job superintendent, major Subcontractors and suppliers, Construction Project Manager, Architect, as appropriate to agenda topics for each meeting.
- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems that impede, or will impede, planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.

10. Maintenance of quality and workstandards.
 11. Effect of proposed changes on progress schedule and coordination.
 12. Other business relating to Work.
 13. Contract time, days expired and days remaining
 14. Site Superintendent's 2-week look ahead to include TPIP Inspections for that period.
- E. Architect to record minutes and distribute copies within two days after meeting to participants, with two copies to Construction Project Manager, Project Manager, participants, and those affected by decisions made.

3.3 PROGRESS PHOTOGRAPHS

- A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- B. Photography Type: Digital; electronic files.
- C. Provide photographs of site and construction throughout progress of Work produced by an experienced photographer, acceptable to Architect.
- D. In addition to periodic, recurring views, take photographs of each of the following events:
 1. Excavations in progress.
 2. Foundations in progress and upon completion.
 3. Structural framing in progress and upon completion.
 4. Enclosure of building, upon completion.
 5. Final completion, minimum of ten (10) photos.
- E. Views:
 1. Provide non-aerial photographs from four cardinal views at each specified time, until Date of Substantial Completion.
 2. Consult with Architect for instructions on views required.
 3. Provide factual presentation.
 4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- F. Digital Photographs: 24 bit color, minimum resolution of 1600 by 1200 ("2 megapixel"), in JPG format; provide files unaltered by photo editing software.
 1. Delivery Medium: Via email.
 2. File Naming: Include project identification, date and time of view, and view identification.
 3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
 4. Hard Copy: Printed hardcopy (grayscale) of PDF file and point of view sketch.

3.4 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.

- B. Package these submittals by specification section, except closeout submittals or Work performed by separate trades, in a single delivery to the Architect; failure of the Contractor to package these submittals in a single delivery may cause the Architect to withhold action on submittal until associated submittals required by the particular specification section are received.
- C. Submit to Architect review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents. Copy Construction Project Manager.
- D. Samples will be reviewed only for aesthetic, color, or finish selection.
- E. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - CLOSEOUT SUBMITTALS.

3.5 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. LEED submittals and reports, if applicable.
 - 3. Certificates.
 - 4. Test reports.
 - 5. Inspection reports.
 - 6. Manufacturer's instructions.
 - 7. Manufacturer's field reports.
 - 8. Daily construction reports.
 - 9. Other types indicated.
- B. Submit to Architect and copy Construction Project Manager. No action will be taken.

3.6 SUBMITTALS FOR PROJECT CLOSEOUT

- A. When the following are specified in individual sections, submit them at project closeout:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Bonds.
 - 5. Other types as indicated.
- B. Submit for Owner's benefit during and after project completion.

3.7 NUMBER OF COPIES OF SUBMITTALS

- A. Documents to be submitted for review electronically in PDF format whenever possible. When electronic submission is not possible - Documents for Review:
 - 1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies that Contractor requires, plus three copies that will be retained by Architect.
 - 2. Larger Sheets, Not Larger Than 36 x 48 inches: Submit the number of opaque reproductions that Contractor requires, plus three copies that will be retained by Architect.

- B. Documents for Information: Submit three copies plus the number of copies required by Contractor.
- C. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.
- D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 - 1. After review, produce duplicates.
 - 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.8 SUBMITTAL PROCEDURES

- A. Submittals not requested will not be recognized or processed.
- B. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 21 days for initial review of each submittal; duration of time is defined by date received in Architect's office until the day sent from the Architect's office. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 15 days for review of each resubmittal; duration of time is defined by date received in Architect's office until the day sent from the Architect's office.
 - 4. Concurrent Review: Where concurrent review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal; duration of time is defined by date received in consultant's office until the day sent to the Contractor. Submittals required within the following divisions to be sent directly to the Architect's consultants:
 - a. All required submittals indicated in Division 3 section.
 - b. The following required submittals indicated in Division 4:
 - 1) Product data, shop drawings, material certificates, mix designs, and cold-weather procedures.
 - c. All required submittals indicated in the following Division 5 Sections:
 - 1) Structural Steel
 - 2) Steel Joists
 - 3) Steel Decking
 - 4) Cold-Formed Metal Framing
 - 5) Metal Stairs
 - 6) Railings and Handrails
 - 7) Metal Fabrications
 - d. All required submittals indicated in the following Division 8 Section:
 - 1) Door Hardware

- 2) Curtain Wall
- e. All required submittals indicated in Mechanical Divisions 21 through 23 sections.
- f. All required submittals indicated in Division 26 sections.
- g. All required submittals indicated in Divisions 31 through 33 sections.
5. Color Selection: Architect will select colors within 60 days (to allow time for presentation to Owner and for Owner comments) after all color samples have been submitted including, but not limited to items listed below. The submittal data shall be complete, including shop drawings, product data, and color samples, and all required submittals and materials shall be in compliance with the specifications and be subsequently approved by the Architect. Color samples shall be actual samples of the material and not photographs. If there is a variation in color, shade, texture, or pattern, submit multiple samples to show full range of variation.
 - a. Interior Items (including but not limited to):
 - 1) Plastic laminate, solid surface material and millwork.
 - 2) Wood door veneer.
 - 3) Ceramic and porcelain tile.
 - 4) Epoxy terrazzo.
 - 5) Precast terrazzo.
 - 6) Resilient floor tile.
 - 7) Resilient wall base and accessories.
 - 8) Resinous flooring.
 - 9) Carpet tile.
 - 10) Acoustical wall panels.
 - 11) Paint.
 - 12) High-performance coatings.
 - 13) Toilet compartments.
 - 14) Signs and cast letters.
 - 15) Casework veneer.
 - 16) Blinds and shades.
 - 17) Lockers.
 - b. Prefinished Exterior Items (including but not limited to):
 - 1) High density veneer concrete masonry units.
 - 2) Metal panels.
 - 3) Copings, perimeter edge systems.
 - 4) Site furnishings and equipment.
 - 5) Brick.
 - 6) Storefront.
 - 7) Curtain wall, storefront and glass.
- D. Submittal Identification: Place a permanent label or title block on each submittal for identification.
 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.

- f. Name and address of supplier. g.
Name of manufacturer.
- h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 10 00.01.A).
 - 2) Number and title of appropriate Specification Section.
 - 3) Drawing number and detail references, as appropriate.
 - 4) Location(s) where product is to be installed, as appropriate.
 - 5) Other necessary identification.
- E. Deviations: Encircle or otherwise specifically identify deviations from the Contract Documents on submittals.
- F. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 - 1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
 - 2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.
 - 1. Transmittal Form: To be agreed upon between Contractor, Construction Project Manager and Architect.
 - 2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked "No Exception Taken" or "Note Markings".
 - 3. Resubmission of items rejected or marked "Revise and Resubmit" will be reviewed one time by the Architect at no cost to the Contractor. Should there-submittal be rejected or marked "Revise and Resubmit", the Contractor will reimburse the Owner by credit Change Order for all costs to the Owner for additional time spent by the Architect and the Architect's consultants to review the second (and subsequent) resubmission.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals with mark indicating "No Exceptions Taken" or "Note Markings" taken by Architect.

3.9 CONTRACTOR'S USE OF CIVIL ENGINEER'S / ARCHITECT'S CAD FILES

- A. At Contractor's written request, copies of Civil Engineer's / Architect's CAD Drawing files will be provided to Contractor for Contractor's use in connection with Project; Contractor must sign and return the release form.
- B. Allow one week for processing, shipping and handling after Architect receives the signed form.
- C. Only the Civil / Architectural Plans indicated on Agreement included at the end of this Section shall be made available for use as backgrounds for preparation of shop drawings and coordination drawings. No other CAD Drawing files will be made available.

3.10 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

3.11 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Verify:
 - 1. Field Measurements.
 - 2. Field Construction Criteria.
 - 3. Catalog Numbers and Similar Data.
 - 4. Quantities.
- C. Contractor's responsibility regarding errors and omissions in submittals is not relieved by Architect's review of submittals.
- D. Contractor's responsibility regarding deviations in submittals from requirements of Contract Documents is not relieved by Architect's review of submittals, unless Architect gives written acceptance of specific deviations as approved by Owner.
- E. When work is directly related and involves more than one trade, coordinate submittal with other trades and submit under one cover.
- F. After a submittal has been submitted for review, no changes may be made to that Submittal other than changes resulting from review notes made by the Architect unless such changes are clearly identified and circled before being resubmitted.

Any failure to comply with this requirement shall nullify and invalidate the Architect's review.

- G. Approval Stamp: Stamp each submittal. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents as indicated below:

THIS IS TO CERTIFY THAT THE SPECIFICATION REQUIREMENTS HAVE BEEN MET AND ALL DIMENSIONS, CONDITIONS, AND QUANTITIES ARE VERIFIED AS SHOWN AND/OR CORRECTED ON THESE DRAWINGS.

SIGNED-----

3.12 ARCHITECT'S/ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it; except where indicated otherwise. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. NO EXCEPTION TAKEN: The Work covered by the submittal is accepted as specified and the Work may proceed provided it complies with requirements of the Contract Documents.
 - 2. NOTE MARKINGS: The Work covered by the submittal is accepted as noted and the Work may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents.
 - 3. REVISE AND RESUBMIT: Do not proceed with the Work covered by the submittal. Revise or prepare a new submittal according to the notations and requirements of the Contract Documents, and resubmit without delay. Unmarked items may be fabricated if indicated.
 - 4. REJECTED: Architect will list reasons for rejection on the submittal or in the transmittal letter accompanying the submittal. Do not proceed with the Work covered by the submittal. Prepare new submittal according to the notations and requirements of the Contract Documents, and resubmit without delay.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

3.13 DAILY CONSTRUCTION REPORTS

- A. Prepare a daily construction report, recording the following information concerning events at the site.
 - 1. List of Trade Contractors at the site.
 - 2. List of major items of equipment on site.

3. List of construction activities performed (for each trade).
 4. Approximate count of personnel at the site for each trade.
 5. High and low temperatures, general weather conditions.
 6. Accidents and unusual events.
 7. Meetings and significant decisions.
 8. Stoppages, delays, shortages, losses.
 9. Meter readings and similar recordings.
 10. Emergency procedures.
 11. Orders and requests of governing authorities.
 12. Change Orders received, implemented.
 13. Services connected, disconnected.
 14. Equipment or system tests and start-ups.
 15. Partial Completions, occupancies.
- B. Duplicate copies of the daily construction reports shall accompany the progress report and be turned over to the Construction Project Manager at the job conference.

3.14 MANAGEMENT ADMINISTRATION PLAN (MAP)

- A. The Project Manager has developed a Management Administration Plan (MAP). This Management Administrative Plan (MAP) outlines the responsibilities, lines of communications and standard procedures which will be followed throughout the design and construction phases. This document serves as a "working manual" to be used in conjunction with the Contract and the Contract Documents. *Any portion of this document which conflicts with the Contract or the Contract Documents will be superseded by the Contract or the Contract Documents.*
- B. A Management Administration Plan is included in this RFP.

END OF SECTION

SECTION 013113 PROJECT BULLETIN BOARD

PART 1- GENERAL

1.1 DESCRIPTION

A. General:

1. Furnish all labor, Materials, tools, equipment and services for a bulletin board.
2. Coordinate with the work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

PART 2- PRODUCTS

2.1 PROJECT BULLETIN BOARD

- A. The contractor shall furnish, install and maintain during the contract period a weather-tight bulletin board approximately 3 feet high by 5 feet wide having not less than two hinges or sliding glass doors with provisions for locking. The bulletin board shall be mounted in a prominent place accessible to employees of the contractor and subcontractors, and to applicants for employment. The bulletin board shall remain the property of the contractor and shall be removed by the contractor upon completion of the contract work. The contractor shall post all information required by law or by the owner on this enclosed bulletin board.

END OF SECTION

SECTION 01 32 16 CONSTRUCTION PROGRESS SCHEDULE

1.1 GENERAL

A. This section specifies requirements and procedures in preparing and updating construction schedules and reports for planning, coordinating, executing, and monitoring the progress of the work. The construction work shall be scheduled using the Critical Path Method (CPM) of network analysis using Primavera Project Management Scheduling Software P6. CPM Scheduling will be in two phases – Design Phase and Post-Bid Phase.

1. Design Phase: A Critical Path Method schedule for the Design Phase Schedule is as follows:
 - a. Design/Build General Contractor using the Critical Path Method shall provide a proposed coordinated program for completion of the design phase of the project including major milestones, design reviews, permits, Owner related activities, etc. and construction phase major milestones.
 - b. To facilitate the Owner's financial planning and his planning for potential occupancy.
2. Post Bid: After receipt and opening of Bids and Notice to Proceed is given to the Contractor, the Contractor shall develop a post-bid CPM schedule to coincide with his intended plan of action as described herein. The Contractor's Post-Bid CPM Schedule must include major milestones and Owner related activities as shown in the Design Phase Schedule and specified in the related portions of the Contract Documents.

1.2 SCHEDULING RESPONSIBILITIES

A. The Critical Path Method type construction schedule will be used to monitor job progress. The Contractor will be responsible for providing all information concerning the sequencing, logic and duration's of all activities as well as providing the initial CPM logic network diagram and tabular report data. Once the initial logic network diagram is accepted by the Construction Project Manager and Owner's Consultant, the Contractor will be responsible for providing monthly update information on logic, % complete, actual start and finish dates and duration changes. The Contractor will be required to produce the computerized printout of the schedule updates. Copies of the schedule updates will be distributed at the progress meetings.

B. From the Contractor's initial schedule submittal and from information received at the monthly schedule update meetings, the Contractor will produce computerized and dated tabular schedule reports with updated network diagrams and bar charts for review by the Construction Project Manager and Owner's Consultant. The Contractor shall sign the report certifying its accuracy and that the schedule represents the Contractor's plan to complete the work within the Contractual completion date. It shall at all times remain the Contractor's responsibility to schedule and direct his forces in a manner that will allow for the completion of the Work within the contractual period.

C. It should be clearly understood that the initial schedule and all update information must be provided by the Contractor and that this information is a representation of the best efforts of

the Contractor and his subcontractors as to how they envision the work to be accomplished. Similarly, all progress information to be provided by and through the Contractor must be an accurate representation of his or his subcontractor's or supplier's actual performance. The schedule shall at all times remain an accurate reflection of the Contractor's actual or projected sequencing of work. Once accepted by the Construction Project Manager and Owner's Consultant, adherence to the established CPM schedule shall be obligatory upon the Contractor and his subcontractors for the Work under this Contract. The Construction Project Manager, or Owner's Consultant (third party), shall have the right to require the Contractor to revise the schedule if, in his judgment, the schedule does not accurately reflect the actual execution of the Work, or is in violation of any provision on this CPM scheduling specification, and the Contractor shall revise the schedule as often as is necessary during the course of performance of the work without additional cost to the Owner.

- D. At the appropriate time after the Owner contracts with a TPIP Consultant, the General Contractor (GC) will incorporate the TPIP schedule in the GC's schedule. This update will show the number of visits agreed upon among all parties (Owner, GC, and TPIP consultant). For example, the number of times Concrete or Steel work will need inspection. Once these times are agreed upon, the GC will pay for any additional visits by the TPIP consultant, not the Owner, making inspection coordination critical.

1.3 CONSTRUCTION HOURS

- A. No work shall be done between 6:00 p.m. and 7:00 a.m. nor on Saturdays, Sundays, or legal holidays without the prior written permission of the Owner or the Construction Project Manager. However, emergency work may be done without written permission.
- B. If the Contractor, for his convenience and at his own expense, should desire to carry on his work at night or outside the regular hours, he shall submit a written request to the Construction Project Manager and shall allow seventy-two (72) hours for satisfactory arrangements to be made for inspecting the work in progress. If permission is granted, the Contractor shall light the different parts of the Project as required to comply with all applicable Federal, State and local regulations.

1.4 PROGRESS OF THE WORK

- A. The work shall be started on the date indicated in the "Notice to Proceed with Construction" and shall be executed with such progress as may be required to prevent delay to the general completion of the project. The work shall be executed at such times and in or on such parts of the project, and with such forces, material and equipment, as to assure completion of the work in the time established by the Contract. Additionally, the Contractor shall, at all times, schedule and direct his work so that it provides an orderly progression of the work to completion within the specified time for completion.
- B. The Contractor agrees that whenever it becomes apparent from the current CPM Schedule update that delays to the critical path have resulted and these delays are through no fault of the Owner, the Construction Project Manager, or the Architect, and hence, the Contract completion date will not be met, or when so directed by the Owner he will take some or all of the following actions at no additional cost to the owner.
 - 1. Increase construction manpower in such quantities and crafts and crafts as will substantially eliminate the backlog of work.

2. Increase the number of working hours per shift; shifts per working day, or days per week; the amount of construction equipment; the forms for concrete work; etc, or any combination of the foregoing to substantially eliminate the backlog of work.
 3. Reschedule activities to achieve maximum practical concurrence of accomplishment of activities, and comply with the revised schedule.
 4. The Contractor shall submit to the Construction Project Manager, for review, a written statement of the steps he intends to take, to remove or arrest the delay to the schedule and shall prepare a Recovery Schedule to the same level of detail as the post-bid CPM Schedule showing how the Contractor intends to return to the approved post-bid CPM Schedule. If the Contractor fails to submit a written statement and Recovery Schedule of the steps he intends to take or fails to take such steps as required by the Contract, the Owner or the Construction Project Manager may direct the level of effort in manpower (trades) equipment, and work schedule (overtime, weekend and holiday work, etc.) to be employed by the Contractor in order to remove or arrest the delay to the critical path in the accepted schedule, and the Contractor shall promptly provide such level of effort at no additional cost to the Owner. In addition, should schedule delays persist; the Contractor's bond agent will be asked to attend meetings to update the schedule.
- C. Failure of the Contractor to comply with the requirements of this provision shall subject him to, at the Owner's sole discretion, withholding, in partial or in total, payments otherwise due the Contractor for work performed under this Contract. The Contractor agrees that any withholding of monies is not a penalty for noncompliance, but is an assurance for the Owner that funds will be available to implement these requirements should the Contractor fail to do so, since failure of the Contractor to comply with these requirements shall mean that the Contractor failed to execute the work with such diligence as to ensure its completion within the time for completion.

1.5 INITIAL LOGIC NETWORK DIAGRAM REQUIREMENTS

- A. The initial Logic Network Diagram shall show the order and interdependence of activities and the sequence in which the work is to be accomplished as planned by the Contractor. The basic concept of the network analysis diagram is to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of succeeding activities. A time scaled precedence format will be followed. The detailed network diagram will be time scaled showing a continuous flow from left to right.
- B. The Schedule Activities shall be developed into three major groups:

1. Procurement Activities

Procurement Activities shall include at a minimum:

- a. Permits
- b. Submittal Items
- c. Approval of Submittal Items
- d. Fabrication of Submittal Items
- e. Delivery of Submittal Items

Each of the following procurement items should be tied logically to the correct construction activity in the overall CPM construction schedule:

- a. Permits
- b. Delivery of the Submittal Items

2. Construction Activities

Construction activities will be physical work activities that describe how the job will be constructed.

3. TPIP Inspection Activities

TPIP Inspection activities per 1.2.D including but not limited to Re-Inspection, clearly identified. Reason for Re-Inspections to be provided in comments column.

4. Testing, Startup, Training and Close-out

CPM activities for this group shall include all work required to satisfy the appropriate specification sections and meet the requirements of Testing, Final Inspections, Demonstrations, Training, Substantial Completion and Final Completion.

- C. The Contractor shall break the work into activities with duration's of one to ten (1 to 10) working days each, except for non-construction activities (such as procurement of materials and fabrication of equipment) and other activities which may require longer duration's. To the extent feasible, activities related to a specific physical area of the project shall be grouped on the network for ease of understanding and simplification. The selection and number of activities shall be subject to the review of the Construction Project Manager and Owner's Consultant.
- D. Each activity on the network shall have indicated for it the following:
 - 1. A single duration, no longer than 10 working days (i.e., the single best estimate of the expected elapsed time considering the scope of work involved in the activity). One critical path shall be shown for the schedule.
 - 2. An activity I.D. number will be assigned to each activity.
 - 3. A brief description of the activity will be included. If this description is not definitive, a separate listing of each activity and a descriptive narrative may be required.
 - 4. Each activity (except for procurement activities) shall be cost loaded to indicate the total estimated costs of the activity. No activity shall exceed \$40,000 except if an equipment item. Material costs shall be assigned to delivery activities. The Contractor shall assign cost activity numbers to correspond to his schedule values.

5. Each activity shall be man-hour loaded with the estimated man-hours to be expended on each activity. Man-hours can be coded into trades and/or crews.
 6. Each activity shall have codes for work area, specification division, trade/subcontractor, responsibility, and any other items to clearly represent the project in a schedule format.
 7. The schedule calendar shall specify weekends and legal holidays including New Years Day, Martin Luther King's Birthday, George Washington's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the day after Thanksgiving, and Christmas Day as non-work days.
 8. The schedule shall include a weather calendar which contains non-work days in addition to weekend and holidays to account for anticipated inclement weather days. The weather calendar shall be applied to all activities which may be affected by inclement weather.
 - (a) Unusually severe weather is any weather that exceeds the average number of weather days as listed below **AND** affects the major work activities on the critical path of the Project as established by the baseline schedule, as approved by the Construction Project Manager and Owner's Consultant.
 - (b) The number of anticipated weather work days per month per the latest Washington-DC average monthly Rainy days is shown below. The G.C. shall use the latest information available on site for his/ her proposal. See (MAP) document for additional information as it relates to Inclement weather days.
 - (c) Note used.
 - (d) Upon acknowledgement of the Notice to Proceed and continuing throughout the Agreement, the Contractor will record the occurrence of adverse weather **AND** the resultant impact to the normally scheduled work. Actual adverse weather delay days must prevent work on critical path activities for 50% or more of the Private Entity's scheduled workday.
 - (e) The number of actual adverse weather delay days shall be calculated at the end of each month, be calculated chronologically from the first to the last day in each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph C.2 above for the month, the Construction Project Manager will issue a modification to the Agreement time at the end of each month.
 - (f) The Contractor must give the Construction Project Manager written notice on a daily basis using a Weather Delay Request Form to be provided to the Private Entity. The Construction Project Manager, based on information provided by the Contractor and other sources as he/she deems necessary, shall determine whether the claim for weather delay should be allowed or disallowed. The Construction Project Manager shall show concurrence by signing the Weather Delay Request Form.
- E.** Failure to include on a network any element of work required for the performance of this Contract shall not excuse the Contractor from completing all work required within

the applicable completion time, notwithstanding the network review by the Construction Project Manager, the Owner or his consultants.

- F. A CPM schedule which shows a completion of any portion of the construction work (not including testing and start-up) prior to the contractual completion date may be accepted but in no event shall be acceptable as a basis for a claim for delay against the Owner by the Contractor.

1.6 SCHEDULE OF VALUES

- A. Each activity of the construction schedule shall be allocated a dollar value. Each activity's assigned cost shall consist of labor, equipment, material costs, and a pro rata contribution to overhead and profit. The sum of the activities' costs shall be equal to the total contract price. In submitting cost data the Contractor certifies that they are not unbalanced or front end loaded and that the value assigned to each activity represents the Contractor's estimate of actual costs of performing that activity.
- B. The accepted schedule of values, in the best judgment of the Contractor, the Construction Project Manager and Owner's Consultant shall represent a fair, reasonable and equitable dollar cost allocation for each activity of the Contractor's construction schedule.
- C. If, in the opinion of the Construction Project Manager and Owner's Consultant, the cost data does not meet the requirements for a balanced bid breakdown, the Contractor will present documentation to the Construction Project Manager and Owner's Consultant substantiating any cost allocation on the cost data. Cost allocations shall be considered unbalanced if an activity of the construction schedule has been assigned a disproportionate allocation of direct costs, overhead and profit.
- D. Coordinate content with Section 01 20 00 – Price and Payment Procedures.

1.7 CPM SCHEDULE IMPLEMENTATION

- A. The Design Phase Schedule will be used as a guide until the initial (90) day schedule is accepted. The Contractor may not use the Design Phase Schedule in lieu of the initial (90) day schedule. The 90 day Schedule becomes his plan and schedule for his work during the first days of the work and cannot claim damages that may result from its use.
- B. Within 15 calendar days after the Notice to Proceed, the Contractor shall submit to the Construction Project Manager six (6) prints and electronic backup file of his proposed CPM network diagram and tabular reports for the first ninety (90) calendar days of the work. This initial logic diagram shall be drawn as described herein and submitted on sheets 24 inches by 36 inches and shall include both procurement and construction activities. The schedule will be the subject of a schedule review meeting with the Contractor, the Construction Project Manager, and Owner's Consultant within two (2) weeks of its submission. The Contractor will revise and resubmit the ninety (90) day schedule until it is acceptable to the Construction Project Manager and Owner's Consultant.

- C. Within thirty (30) calendar days after the Notice to Proceed, the Contractor shall submit to the Construction Project Manager six (6) sets of his proposed CPM logic diagram, tabular reports, and electronic backup file for the entire Contract duration and shall include both procurement and construction activities. These tabular reports shall be sorted by activity number, and area / early start / total float. They shall also contain a predecessor/successor report, resource loading report, cost loading report, and project calendar. This logic diagram shall be drawn as described herein and will be the subject of a schedule review meeting with the Contractor, the Construction Project Manager, and Owner's Consultant within two (2) weeks of its submission. If a review of the submitted CPM Schedule indicates a work plan which will not complete the work within the time requirements stated in the Contract, it shall be the responsibility of the Contractor to revise the CPM Schedule as required by the Construction Project Manager and Owner's Consultant, and resubmit it until it is acceptable. Failure by the Contractor to submit an acceptable schedule may, at the Owner's sole discretion, be cause for the withholding of any partial payment(s) otherwise due under the Contract.
- D. Acceptance of the schedule by the Construction Project Manager and Owner's Consultant shall not constitute a representation that the work can be completed as shown on the schedule.

1.8 SUBMITTALS SCHEDULE

- A. In addition to the above scheduling requirements, the Contractor will be required to submit a complete and detailed listing of anticipated submittals during the course of the Contract. The Contractor will coordinate the submittals with those of his subcontractors and suppliers and will identify each submittal as specified. It is recommended that the Contractor use the Pre-Bid Schedule as a guideline to expedite the CPM schedule. The anticipated submission due date for each submittal must be indicated along with the date on which its return is anticipated. For planning purposes, the Architect should return shop drawings fifteen (15) working days after receipt. However, longer duration's for review will not be considered a basis for a claim unless the project critical path is delayed thereby. Duration's shown for review shall be shown to share available float for that path. Submissions, the review of which is on the critical path, shall be clearly marked in red with the words, "Critical Path" by the Contractor at the time of submission.
- B. The Submittal Schedule must be submitted within thirty (30) working days from the Notice to Proceed. The Submittal Schedule will then be accepted or revised as required and the Contractor will coordinate the dates and review duration's with his CPM Schedule. The submittal schedule shall also specify the CPM schedule submittal activity associated with each submittal. Allow time for resubmission of submittals which may be disapproved.
- C. Hard and electronic copies of all Submittals shall be sent to the Architect. Electronic copies shall be sent to the Construction Project Manager and Project Manager. The Construction Project Manager may ask for a hard copy during the submittal process.

1.9 SCHEDULE UPDATES

- A. **Monthly Meetings**

A monthly Schedule Update Meeting will be held one (1) week prior to the progress meeting at the construction site to review and update the CPM Schedule. The Schedule Update Meeting will be chaired by the Architect and attended by the Owner and the Contractor. Actual progress of the previous month will be recorded and future activities will be reviewed. The duration of activities and their logical connections may be revised as needed. Decisions made at these meetings and agreed to by all parties are binding with the exception that no contractual completion dates will be modified without formal written requests and acceptance as specified herein. The Contractor must provide the following information for each update at a minimum:

1. Actual start and finish dates for all completed activities.
 2. Actual start dates for all started but uncompleted activities including percent complete.
- B.** Provide a Monthly Progress Status Report which provides a narrative explanation of progress identified in the revised Construction Schedule. The report shall indicate the following items:
1. Summarize revisions made to the Construction Schedule since the previous submittal.
 2. Work completed during the reporting period.
 3. Work anticipated to be started during the next period, including those activities already in progress.
 4. Problem areas, anticipated delays, and the impact on the schedule.
 5. Corrective action recommended, and its effect.
 6. The effect of changes on schedules of other prime contractors. Updated Tabulation of Contract Time.
 7. An evaluation of the overall status of the schedule for the job.

Failure to provide updated information required herein or failure to attend progress meetings may result in the Contractor's not receiving progress payments.

1.10 CAUSES FOR EXTENSIONS OF TIME

- A.** The Contract completion time will be adjusted only for causes specified in this Contract. If the Owner or Construction Project Manager finds that the Contractor is entitled to an extension of the Contract completion date under the provisions of the Contract, the Owner's or Construction Project Manager's determination as to the total number of days extensions shall be based upon the current accepted and updated CPM schedule and on all data relevant to the extension. Such data shall be included in the next monthly updating of the schedule. The Contractor acknowledges and agrees that actual delays in activities which, according to the CPM schedule, do not affect any contract completion date shown by the critical path in the network, do not have any effect on the Contract completion date or dates and therefore will not be the basis for a change in Contract completion time.

- B.** If inclement weather affects the project's Critical Path, the Contractor shall complete a Weather Delay Request Form supplied by the Construction Project Manager and submit the request to the Construction Project Manager on the day the inclement weather event occurred. The form shall include the type of inclement weather, the CPM activities affected by the weather, if the listed activities are on the Critical Path, and the specific work which could not be performed. The Construction Project Manager will either concur or deny the request upon receipt. No time extension for inclement weather will be granted until the number of accepted weather delay requests that affect the Critical Path, exceeds the anticipated average inclement weather days per month listed in 1.5.D.8 above. Weather delays will be evaluated on a monthly basis.

1.11 FLOAT TIME

- A.** Without obligation to extend the overall completion date or any intermediate completion dates set out in the CPM network, the Owner may initiate changes to the Contract work that absorb float time only. Owner-initiated changes that affect the critical path on the CPM network shall be the sole grounds for extending (or shortening) said completion dates. Contractor-initiated changes that encroach on the float time identified in the CPM network may be accomplished with the Owner's concurrence. Such changes, however, shall give way to Owner-initiated changes competing for the same float time.

END OF SECTION 01 32 16

SECTION 01 35 53 - SECURITY MEASURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Security measures including formal security program, entry control, personnel identification, electronic surveillance and miscellaneous restrictions.

1.2 SECURITY PROGRAM

- A. Protect Work, existing premises and Owner's operations from theft, vandalism, and unauthorized entry.
- B. Initiate program at project mobilization.
- C. Maintain program throughout construction period until Owner occupancy.

1.3 ENTRY CONTROL

- A. Restrict entrance of persons and vehicles into Project site and existing facilities.
- B. Allow entrance only to authorized persons with proper identification.
- C. Maintain log of workers and visitors, make available to Owner on request.

1.4 PERSONNEL IDENTIFICATION

- A. Provide identification badge to each person authorized to enter premises.
- B. Badge To Include: Personal photograph, name and employer.
- C. Require return of badges at expiration of their employment on the Work.

1.5 RESTRICTIONS

- A. Do not allow cameras on site or photographs taken except by prior written approval of Owner.
- B.

PART 2 PRODUCTS- NOT USED

PART 3 EXECUTION-

NOT USED

END OF SECTION

SECTION 01 40 00 -QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance submittals.
- B. Mock-ups.
- C. Control of installation.
- D. Tolerances.
- E. Testing and inspection services.
- F. Manufacturers' field services.
- G. Corrective Work.

1.2 REFERENCE STANDARDS

- A. ASTM E 329 - Standard Specification for Agencies Engaged Construction Inspection and/or Testing.
- B. Prince George's County, Maryland, Department of Environmental Resources, Permits & Review Division, Third Party Inspection Program, TPIP, Manual.

1.3 SUBMITTALS

- A. Testing Agency Qualifications:
 - 1. Prior to start of work, submit agency name, address, and telephone number, and names of full time specialist and responsible officer.
 - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- B. Schedule of Tests and Inspections: Prepare in tabular form, within 30 days following mobilization, and include the following:
 - 1. Specification section number and title.
 - 2. Description of test and inspection.
 - 3. Identification of applicable standards.
 - 4. Identification of test and inspection methods.
 - 5. Number of tests and inspections required.
 - 6. Time schedule or time span for tests and inspections.
 - 7. Entity responsible for performing tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- C. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.

- D. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Conformance with Contract Documents.
 - k. When requested by Architect, provide interpretation of results.
- E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
 - 1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- F. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- G. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
 - 1. Submit report in duplicate within 30 days of observation to Architect for information.
 - 2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.4 TESTING AND INSPECTION AGENCIES

- A. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform specified testing.
 - 1. The individual specification section must clearly state that testing is the Owner's responsibility, otherwise the testing to be executed by Contractor.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Contractor Employed Agency:
 - 1. Testing agency: Comply with requirements of ASTM E 329 and Prince George's County TPIP.

PART 2 PRODUCTS- NOT USED

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

- A. Quality Control (QC) responsibilities by the Contractor and its subcontractors, vendors, suppliers, manufacturers, etc.:
1. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
 2. Comply with manufacturers' instructions, including each step in sequence.
 3. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
 4. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
 5. Have Work performed by persons qualified to produce required and specified quality.
 6. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
 7. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.
 8. The General Contractor is required to submit a daily construction report by 10:00 a.m. of the following working day. Reports must indicate the number of people by trade or craft, and the type and location of work. In addition will include all material deliveries and TPIP Inspections. It will include all subcontractors, safety and quality violations observed, corrective measures taken to correct the violations, and other information requested by the Construction Project Manager or Owner's agent.
- B. Quality Assurance (QA) responsibilities by the Construction Project Manager or Owner's agent, Owner, Architect, etc.:
1. The Owner's Quality Inspector will provide on-site observation and inspection of work performed at the job site, and will in conjunction with the G.C's QA/QC representative monitor all materials, equipment, and Work. The GC's QA/QC representative shall ensure the Work is of high quality and in compliance with the Contract Documents.
 2. The Architect will perform bi-monthly field inspections and report findings in a field report issued to the Construction Project Manager or Owner's agent.
 3. Daily Reports will be completed each day and maintained by the General Contractor. In addition to the written reports, the Contractor will maintain a photographic record of construction activities that warrant such documentation.

4. Should inspections or observations by the G.C's QA/QC representative find Work that does not conform to the specified documents, the Construction Project Manager shall be notified immediately.
5. The Owner will engage a testing agency in accordance with the guidelines of Prince George's County Third Party Inspection Program.

3.2 MOCK-UPS

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

3.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.4 TESTING AND INSPECTION

- A. Testing Agency Duties:
 1. Provide qualified personnel at site. Cooperate with Construction Project Manager or Owner's agent and Contractor in performance of services.
 2. Perform specified sampling and testing of products in accordance with specified standards.
 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 4. Promptly notify Construction Project Manager or Owner's agent and Contractor of observed irregularities or non-conformance of Work or products.
 5. Perform additional tests and inspections required by Construction Project Manager or Owner's agent.
 6. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency may not approve or accept any portion of the Work.
 3. Agency may not assume any duties of Contractor.
 4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:

1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 4. Notify Construction Project Manager or Owner's agent 24 hours prior to expected time for operations requiring testing/inspection services.
 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.
- F. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect. Payment for re testing will be charged to the Contractor by deducting testing charges from the Contract Price.

3.5 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.6 CORRECTIVE WORK

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of the Construction Project Manager or Owner's agent, it is not practical to remove and replace the Work, Construction Project Manager or Owner's agent will direct an appropriate remedy or adjust payment.
- C. Upon receipt of Non-Compliance Notice from the Construction Project Manager or Owner's agent, the Contractor shall immediately initiate the corrective action and

provide written notice to the Construction Project Manager or Owner's agent once corrective action is complete.

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary telecommunications services.
- B. Temporary telephone service.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers, enclosures, and fencing.

1.2 RELATED REQUIREMENTS

- A. Section 01 51 00 - Temporary Utilities.
- B. Section 01 52 13 - Field Offices and Sheds.
- C. Section 01 55 00 - Vehicular Access and Parking.
- D. Section 01 35 53 - Security Procedures.
- E. Section 01 58 13 - Temporary Project Signage.

1.3 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
 - 1. All in one color network (or wireless) laser printer with copy, fax and scanner able to scan/print/copy 11x17 size documents.
 - 2. Telephone Land Lines: Minimum of one dedicated line with a minimum of three (3) handsets.
 - 3. Internet Connections: Secure Wireless Connectivity with a minimum 4G wireless service or faster.
 - 4. Email: Account/address reserved for project use.
 - 5. Facsimile Service: Minimum of one dedicated phone line for fax.

1.4 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.

1.5 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to

allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.6 FENCING

- A. Provide 8 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.7 EXTERIOR ENCLOSURES

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

PART 2 PRODUCTS -

NOT USED PART 3

EXECUTION - NOT

USED

END OF SECTION

SECTION 01 51 00 -TEMPORARY UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, and water.

1.2 RELATED REQUIREMENTS

- A. Section 01 50 00- Temporary Facilities and Controls: Telephone service for administrative purposes.

1.3 TEMPORARY ELECTRICITY

- A. Cost: By Contractor.
- B. Provide power service required from utility source.
- C. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.
- D. Provide main service disconnect and over-current protection at convenient location and meter.
- E. Permanent convenience receptacles may be utilized during construction.
- F. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft .
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Maintain lighting and provide routine repairs.

1.5 TEMPORARY HEATING

- A. Cost of Energy: By Contractor.
- B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
- C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.6 TEMPORARY COOLING

- A. Cost of Energy: By Contractor.
- B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
- C. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Prior to operation of permanent equipment for temporary cooling purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.7 TEMPORARY VENTILATION

- A. The Contractor shall provide ventilation as required to maintain clean air and work environment for its construction operations.
- B. Refer to other sections for negative ventilation requirements during construction.

1.8 TEMPORARY WATER SERVICE

- A. Cost of Water Used: By Contractor.
- B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.

PART 2 PRODUCTS -

NOT USED PART 3

EXECUTION- NOT

USED

END OF SECTION

SECTION 01 52 13 - FIELD OFFICES AND SHEDS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary field offices for Owner and Architect/Engineer Office
- B. Temporary field offices for use of Contractor.
- C. Maintenance and removal.

PART 2 PRODUCTS

2.1 MATERIALS, EQUIPMENT, FURNISHINGS

- A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.

2.2 CONSTRUCTION

- A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
- B. Construction: Structurally sound, secure, weather tight enclosures for office. Maintain during progress of Work; remove when no longer needed.
- B. Lighting for Offices: 50 fc at desk top height, exterior lighting at entrance doors.

2.3 ENVIRONMENTAL CONTROL

- A. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions.

2.4 CONTRACTOR AND ARCHITECT/ENGINEER OFFICE AND FACILITIES

- A. Size: For Contractor's needs and to provide space for project meetings.
- B. Furnishings in Meeting Area: Conference table and chairs to seat at least ten persons; racks and files for Contract Documents, submittals, and project record documents.
- C. Other Furnishings: Contractor's option.
- D. Equipment: Six adjustable band protective helmets for visitors, one 10 inch outdoor weather thermometer.

2.5 OWNER, CONSTRUCTION PROJECT MANAGER

- A. Separate space for sole use of Owner, Construction Project Manager, with separate entrance door with new lock and two keys. Or a separate trailer.

- B. Area: Minimum 200 sq ft, minimum dimension 10 ft. (Minimum Williams Scotsman model M04410 or equal)
 - 1. An office with meeting room in the middle and must be separate toilet room with door within the overall office unit.
- C. Minimum four 110 volt duplex convenience outlets, one on each wall.
- D. Telecommunications as specified in Section 01 50 00 Temporary Facilities and Controls.
- E. Furnishings:
 - 1. Two desks 54 x 30 inch, with three drawers.
 - 2. One drafting table 36 x 72 inch, with one equipment drawer.
 - 3. Plan rack to hold working Drawings, shop drawings, and record documents.
 - 4. One standard four-drawer legal size metal filing cabinet with locks and two keys per lock.
 - 5. Four linear feet of metal bookshelves.
 - 6. Two swivel arm chairs.
 - 7. One drafting table stool.
 - 8. One 4 x 8 foot whiteboard.
 - 9. One waste basket per desk and table.
- F. Central HVAC, window with insect screens, security window screens, entry door security bar and locks, skirting, anchors, entry steps and/or ramp. Provide temporary utility service including, but not limited to, water, sewage, trash, electric (generator if needed).

PART 3 EXECUTION

3.1 PREPARATION

- A. Fill and grade sites for temporary structures to provide drainage away from buildings.

3.2 INSTALLATION

- A. Install office spaces ready for occupancy 15 days after date fixed in.
- B. Parking: Two hard surfaced parking spaces for use by Owner and Construction Project Manager, connected to office by hard surfaced walk.

3.3 MAINTENANCE AND CLEANING

- A. Weekly janitorial services for offices; periodic cleaning and maintenance for offices.
- B. Maintain approach walks free of mud, water, and snow.

3.4 REMOVAL

- A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

END OF SECTION

SECTION 01 55 00- VEHICULAR ACCESS AND PARKING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Access roads.
- B. Driveways, entrance and traffic routes.
- C. Parking.
- D. Existing pavements and parking areas.
- E. Permanent pavements and parking facilities.
- F. Construction parking controls.
- G. Flag persons.
- H. Flares and lights.
- I. Haul routes.
- J. Traffic signs and signals.
- K. Maintenance.
- L. Removal, repair.
- M. Mud from site vehicles.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Temporary Construction: Contractor's option.
- B. Materials for Permanent Construction: As specified in product specification sections, including earthwork, paving base, and topping.

2.2 SIGNS, SIGNALS, AND DEVICES

- A. Post Mounted and Wall Mounted Traffic Control and Informational Signs: Specified in Section 015813.
- B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.
- C. Flag Person Equipment: As required by local jurisdictions.

PART 3 EXECUTION

3.1 PREPARATION

- A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

3.2 ACCESS ROADS

- A. Tracked vehicles not allowed on paved areas.

- B. Construct new temporary all-weather access roads from public thoroughfares to serve construction area, of a width and load bearing capacity to provide unimpeded traffic for construction purposes.
- C. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
- D. Extend and relocate as Work progress requires, provide detours as necessary for unimpeded traffic flow.
- E. Location as approved by Architect.
- F. Provide unimpeded access for emergency vehicles. Maintain 20 foot width driveways with turning space between and around combustible materials.
- G. Provide and maintain access to fire hydrants free of obstructions.

3.3 PARKING

- A. Use of new parking facilities by construction personnel is not permitted.
- B. Do not allow heavy vehicles or construction equipment in parking areas.
- C. Arrange for temporary parking areas to accommodate use of construction personnel.
- D. When site space is not adequate, provide additional off-site parking.
- E. Locate as approved by Architect.

3.4 NEW PERMANENT PAVEMENTS

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

3.5 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.
- B. Monitor parking of construction personnel's vehicles. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.
- D. Do not intrude into adjacent community.

3.6 FLAG PERSONS

- A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.7 FLARES AND LIGHTS

- A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.8 HAUL ROUTES

- A. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

3.9 TRAFFIC SIGNS AND SIGNALS

- A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
- B. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.
- C. Relocate as Work progresses, to maintain effective traffic control.

3.10 MAINTENANCE

- A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, Products, mud, snow, and ice.
- B. Maintain new permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.11 REMOVAL, REPAIR

- A. Remove underground work and compacted materials to a depth of 2 feet; fill and grade site as specified.
- B. Repair existing and new permanent facilities damaged by use, to original condition.
- C. Remove equipment and devices when no longer required.
- D. Repair damage caused by installation.

3.12 MUD FROM SITE VEHICLES

- A. Provide means of removing mud from vehicle wheels before entering streets.

END OF SECTION

SECTION 01 58 13 - TEMPORARY PROJECT SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Project identification sign.
- B. Project informational signs.

1.2 QUALITY ASSURANCE

1.3 SUBMITTALS

- A. See Section 01 30 00- Administrative Requirements for submittal procedures.
- B. Shop Drawing: Show content, layout, lettering, color, foundation, structure, sizes and grades of members.

PART 2 PRODUCTS

2.1 PROJECT IDENTIFICATION SIGN

- A. One painted sign of construction, design, and content shown on Drawings, location designated.

2.2 PROJECT INFORMATIONAL SIGNS

- A. Provide signs designating construction access at entrances designated for construction access.
- B. Provide no trespassing and hard hat area signs.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install project identification sign within 30 days after date fixed by Notice to Proceed.
- B. Erect at designated location.
- C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
- D. Install sign surface plumb and level, with butt joints. Anchor securely.

3.2 MAINTENANCE

- A. Maintain signs and supports clean, repair deterioration and damage.

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations and procedures.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.2 SUBMITTALS

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
 - 1. Submit within 45 days after date of Agreement.
 - 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
- E. LEED Submittals: Not Applicable.

2.1 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

- D. Reused Products: Reused products, include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

2.2 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. Regionally-Sourced Products:
 - 1. Overall Project Requirement: Provide materials amounting to a minimum of 10 percent of the total value of all materials (excluding plumbing, HVAC, electrical, elevators, and other equipment) that have been extracted, harvested, or recovered, as well as manufactured, within a radius of 500 miles from the project site.
 - 2. Specific Product Categories: Provide regionally-sourced products as specified elsewhere.
 - 3. LEED Submittals: Not applicable; however, the G.C. shall fill out a LEED Scorecard, typical.
- C. Products with Recycled Content:
 - 1. Overall Project Requirement: Provide products with recycled content such that the sum of post-consumer recycled content plus one-half of the post-industrial recycled content constitutes at least 10 percent (2 points) of the total value of all products installed, except mechanical and electrical components.
 - a. Fill out appropriate section on the LEED Scorecard.
 - 2. Specific Product Categories: Provide recycled content as specified elsewhere.
 - 3. LEED Submittals: Not Applicable.
- D. Sustainably Harvested Wood:
 - 1. Definition: Wood-based materials include but are not limited to structural framing, dimension lumber, flooring, wood doors, finishes, and furnishings that are permanently installed in the project. Wood and wood-based products not permanently installed in the project are not included in the definition.
 - 2. Specific Wood-Based Fabrications: Fabricate of sustainably harvested wood when so specified elsewhere.
 - 3. Fill out appropriate section on the LEED Scorecard.
 - 4. Certification: Not Applicable.
 - 5. LEED Submittals: Not Applicable.
- E. Urea-Formaldehyde Prohibition:
 - 1. Specific Product Categories: Comply with limitations specified elsewhere.
- F. Adhesives and Joint Sealants:
 - 1. Specific Product Categories: Comply with limitations specified elsewhere.
- G. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
- H. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 3. Where products are accompanied by the term "as selected," Architect will make selection.
 4. Where products are accompanied by the term "match sample," sample to be matched Is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- I. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

2.3 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products of Named Manufacturers: Contractor to provide products from named manufacturers; refer to other provisions regarding substitutions.
- C. Or Equal Product: Product that is demonstrated and approved through submittal process, as a product substitution, to have the indicated qualities related to type, function, dimension, in- service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- D. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

2.4 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.1 SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. Timing: Architect will not consider requests for substitution after Award of the Contract, except for extenuating circumstances described below. Requests may be considered or rejected at discretion of Architect.
 1. The specification permits "Or Equal."
 2. The product is no longer manufactured.
 3. The product is not available due to a strike.
 4. The specified product is identified as incompatible or inappropriate for the project.
 5. The specified item fails to comply with building code requirements.

6. The manufacturer or fabricator declares a specified product to be unsuitable for the use intended and refuses to warrant its installation.
 7. Significant cost savings to the Owner.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
1. Statement indicating why specified material or product cannot be provided.
 2. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 3. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 4. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 5. Samples, where applicable or requested.
 6. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 7. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 8. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 9. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 10. Cost information, including a proposal of change, if any, in the Contract Sum.
 11. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 12. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- D. A request for substitution constitutes a representation that the submitter:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 2. Will provide the same warranty for the substitution as for the specified product.
 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

- F. Substitution Submittal Procedure:
1. Substitution Request Form: Form TBD.
 2. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
 3. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 4. Architect will consider Contractor's request for substitution when the following conditions are met. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Substitution requested must meet or exceed specified material, product or equipment items appearance, function and quality level as determined by the Architect and Owner.
 - b. Requests for substitution must include clear identification of the material, product or equipment item and complete description including drawings, cuts, performance and test data, along with any other information necessary for a complete evaluation.
 - c. Requested substitution shall not require extensive revisions to the Contract Documents or changes to any other materials, products or equipment items.
 - d. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - e. Substitution request is fully documented and properly submitted.
 - f. Requested substitution will not adversely affect Contractor's Construction Schedule.
 - g. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - h. Requested substitution is compatible with other portions of the Work.
 - i. Requested substitution provides specified warranty.
 - J. Requested substitution will not delay the Work.
 - k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
 1. The Architect's/Owner's decision to accept or reject the proposed substitution shall be final and will be set forth in writing.
- G. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later. Architect's notification will be in one the following forms:
1. Form of Acceptance:
 - a. After Contract signing: Change Order.
 2. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

3.2 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

- B. Transport and handle products in accordance with manufacturer's instructions.
- C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- E. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.3 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions. C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Prevent contact with material that may cause corrosion, discoloration, or staining.
- I. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- J. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 016116-VOLATILE ORGANIC COMPOUND (VOC)

CONTENT RESTRICTIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. VOC restrictions for product categories listed below under "DEFINITIONS."
- B. All products of each category that are installed in the project must comply; Owner's project goals do not allow for partial compliance.

1.2 DEFINITIONS

- A. VOC-Restricted Products: All products of each of the following categories when installed or applied on-site in the building interior:
 - 1. Adhesives, sealants, and sealer coatings.
 - 2. Carpet.
 - 3. Carpet tile.
 - 4. Resilient floor coverings.
 - 5. Paints and coatings.
 - 6. Insulation.
 - 7. Gypsum board.
 - 8. Acoustical ceilings and panels.
 - 9. Cabinet work.
 - 10. Composite wood and agrifiber products used either alone or as part of another product.
- B. Interior of Building: Anywhere inside the exterior weather barrier.
- C. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- D. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

1.3 REFERENCE STANDARDS

- A. CAL (CHPS LEM)- Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS).
- B. CAL (VOC)- Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers (including Addendum 2004-01); State of California Department of Health Services.
- C. CRI (GLP)- Green Label Plus Carpet Testing Program- Approved Products; Carpet and Rug Institute.
- D. GEI (SCH)- GREENGUARD "Children and Schools" Certified Products; GREENGUARD Environmental Institute.
- E. GreenSeal GS-36 - Commercial Adhesives; GreenSeal, Inc..
- F. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; www.aqmd.gov.
- G. SCS (CPD) - SCS Certified Products; Scientific Certification Systems.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Evidence of Compliance: Submit for each different product in each applicable category.
- C. Product Data: For each VOC-restricted product used in the project, submit product data showing compliance, except when another type of evidence of compliance is required.
- D. Installer Certifications for Accessory Materials: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of his products, or 2) that such products used comply with these requirements.
 - 1. Use the form following this section for installer certifications.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All VOC-Restricted Products: Provide products having VOC content of types and volume not greater than those specified in State of California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small- Scale Environmental Chambers.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current GREENGUARD Children & Schools certification; www.greenguard.org.
 - b. Current Carpet and Rug Institute Green Label Plus certification; www.carpet-rug.org.
 - c. Current SCS Floorscore certification; www.scscertified.com.
 - d. Current SCS Indoor Advantage Gold certification; www.scscertified.com.
 - e. Product listing in the CHPS Low-Emitting Materials Product List at www.chps.net/manuallem_table.htm.
 - f. Current certification by any other agencies acceptable to CHPS.
 - g. Report of laboratory testing performed in accordance with CHPS requirements for getting a product listed in the Low-Emitting Materials Product List; report must include laboratory's statement that the product meets the specified criteria.
 - 2. Product data submittals showing VOC content are NOT acceptable forms of evidence.
- B. Adhesives and Joint Sealants: Provide only products having volatile organic compound (VOC) content not greater than required by South Coast Air Quality Management District Rule No.1168.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed in accordance with requirements.
 - b. Published product data showing compliance with requirements.
 - c. Certification by manufacturer that product complies with requirements.

- C. Aerosol Adhesives: Provide only products having volatile organic compound (VOC) content not greater than required by GreenSeal GS-36.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current GreenSeal Certification.
 - b. Report of laboratory testing performed in accordance with GreenSeal GS-36 requirements.
 - c. Published product data showing compliance with requirements.

- D. Paints and Coatings:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. USGBC LEED Rating System, edition as stated in Section 013515; for interior wall and ceiling finish (all coats), anti-corrosive paints on interior ferrous metal, clear wood stains and finishes, sanding sealers, other sealers, shellac, and floor coatings.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
 - 3. Evidence of Compliance: Acceptable types of evidence are:
 - a. Report of laboratory testing performed in accordance with requirements.
 - b. Published product data showing compliance with requirements.
 - c. Certification by manufacturer that product complies with requirements.

- E. Carpet and Adhesive: Provide products having VOC content not greater than that required for CRI Green Label Plus certification.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current Green Label Plus Certification.
 - b. Report of laboratory testing performed in accordance with requirements.

- F. Carpet Tile and Adhesive: Provide products having VOC content not greater than that required for CRI Green Label Plus certification.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Current Green Label Plus Certification.
 - b. Report of laboratory testing performed in accordance with requirements.

- G. Carpet Tile and Adhesive: Provide products having VOC content as specified in Section 09 68 13.

- H. Composite Wood and Agrifiber Products and Adhesives Used for Laminating Them: Provide products having no added urea-formaldehyde resins.
 - 1. Evidence of Compliance: Acceptable types of evidence are:
 - a. Published product data showing compliance with requirements.
 - b. Certification by manufacturer that product complies with requirements.

PART 3 EXECUTION- NOT USED

3.1 FIELD QUALITY CONTROL

- A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

- G. All additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION

**SECTION 01 61 16.01 - ACCESSORY MATERIAL VOC CONTENT
CERTIFICATION FORM**

1.1 FORM

A. Identification:

1. Project Name: _____
2. Project No.: _____
3. Architect: _____

B. Use of This Form:

1. Because installers are allowed and directed to choose accessory materials suitable for the applicable installation, there is a possibility that such accessory materials might contain VOC content in excess of that permitted, especially where such materials have not been explicitly specified.
2. Contractor is required to obtain and submit this form from each installer of work on this project.
3. For each product category listed, circle the correct words in brackets: either [HAS] or [HAS NOT].
5. If any of these accessory materials has been used, attach to this form product data and MSDS sheet for each such product.

C. VOC content restrictions are specified in Section 01 61 16.

2.1 PRODUCT CERTIFICATION

A. I certify that the installation work of my firm on this project:

1. [HAS] [HAS NOT] required the use of any ADHESIVES.
2. [HAS] [HAS NOT] required the use of any JOINT SEALANTS.
3. [HAS] [HAS NOT] required the use of any PAINTS OR COATINGS.
4. [HAS] [HAS NOT] required the use of any COMPOSITE WOOD or AGRIFIBER PRODUCTS.

B. Product data and MSDS sheets are attached.

3.1 CERTIFIED BY: (Installer/Manufacturer/Supplier Firm)

A. Firm Name:

B. Print Name:

C. Signature:

D. Title: _____(officer of company)

E. Date:

END OF SECTION

SECTION 01 70 00 -EXECUTION AND CLEANING REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.

1.2 SUBMITTALS

- A. See Section 01 30 00- Administrative Requirements, for submittal procedures.
- B. Survey work: An NRI is approved for the project, but the G.C. should field verify the documents before using. M-NCPPC does not guarantee the accuracy of thereport.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.
 - 6. Include in request:
 - a. Identification of Project.
 - b. Location and description of affected work.
 - c. Necessity for cutting or alteration.
 - d. Description of proposed work and products to be used.
 - e. Alternatives to cutting and patching.
 - f. Effect on work of Owner or separate Contractor.
 - g. Written permission of affected separate Contractor.
 - h. Date and time work will be executed.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.3 QUALIFICATIONS

- A. Not applicable, the Commission has an approved NRI, see 1.02, B, above.

1.4 PROJECT CONDITIONS

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

- C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- E. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- F. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- G. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- H. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

PART 2 PRODUCTS

2.1 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 PRE-INSTALLATION MEETINGS

- A. When required in individual specification sections, convene a pre-installation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
 - 3. Review conflicts and compatibility issues.
 - 4. Review environmental limitations and protection.
 - 5. Examine substrates.
 - 6. Review requirements of the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related Change Orders.
 - d. Submittals.
 - e. Mockups.
 - f. Testing and inspection.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.4 LAYING OUT THE WORK

- A. Verify the limit of Construction prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
 2. Grid or axis for structures.
 3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

3.5 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.6 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Perform whatever cutting and patching is necessary to:
 1. Complete the work.
 2. Fit products together to integrate with other work.
 3. Provide openings for penetration of mechanical, electrical, and other services.
 4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-conforming work.
- C. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.
 - J. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.
 - K. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - L. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.
- 3.7 PROGRESS CLEANING
- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
 - B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
 - C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
 - D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.
- 3.8 PROTECTION OF INSTALLED WORK
- A. Protect installed work from damage by construction operations.
 - B. Provide special protection where specified in individual specification sections.
 - C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
 - D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
 - E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
 - F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
 - G. Prohibit traffic from landscaped areas.
 - H. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.
- 3.9 SYSTEM STARTUP
- A. Coordinate schedule for start-up of various equipment and systems.

- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.11 FINAL CLEANING

- A. Employ experienced workers or professional cleaners for final cleaning; clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program.
- B. Use cleaning materials that are nonhazardous.
- C. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
- D. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
- E. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
- F. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
- G. Remove tools, construction equipment, machinery, and surplus material from Project site.
- H. Remove snow and ice to provide safe access to building.
- I. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- J. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- K. Sweep concrete floors broom clean in unoccupied spaces.
- L. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- M. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

- N. Remove labels that are not permanent.
- O. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - 2. Revise seven subparagraphs below to suit Project. Check for conflict or duplication with provisions in other Sections, particularly Divisions 20 through 29.
- P. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- Q. Replace parts subject to unusual operating conditions.
- R. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- S. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- T. First subparagraph below describes a major work item that may be disruptive to closeout procedures.
- U. Clean ducts, blowers, and coils if units were operated without filters during construction.
- V. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- W. Leave Project clean and ready for occupancy.

END OF SECTION

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART I-GENERAL

1.1 SUMMARY

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

1.2 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 2. Advise Owner of pending insurance changeover requirements.
 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, certificates of final inspections, Final Use and Occupancy permits, and similar documents.
 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 5. Prepare and submit project record documents (as-builts), operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 8. Complete startup testing of systems.
 9. Submit test/adjust/balance records.
 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 11. Advise Owner of changeover in heat and other utilities.
 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 13. Complete final cleaning requirements, including touchup painting.
 14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
 15. The Health Department must have inspected the facility and any corrections completed to their satisfaction.
 16. Two week flush out to be conducted immediately prior to building occupancy, to the satisfaction of the owner, owner's representative, and the owner's separate commissioning agent.

17. Completion of all commissioning Functional Performance Tests and submission of signed documentation to the satisfaction of the Commissioning Agent.

- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures".
 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report and warranty.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
 6. Submit Construction Pricing Breakdown on Owner's Form, located in the Front End document, section 7.

- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete

items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use form agreed upon by all parties.

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

PART 2 -PRODUCTS -NOT USED PART 3 -

EXECUTION- NOT USED

END OF SECTION 01 77 00

SECTION 01 78 00 – CLOSE OUT SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

1.2 RELATED REQUIREMENTS

- A. Section 01 30 00 -Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Individual Product Sections: Specific requirements for operation and maintenance data.
- C. Individual Product Sections: Warranties required for specific products or Work.

1.3 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection as well as electronic version in PDF format.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS -NOT USED

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.

3. Addenda.
 4. Change Orders and other modifications to the Contract.
 5. Reviewed shop drawings, product data, and samples.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Field changes of dimension and detail.
 2. Details not on original Contract drawings.

3.2 OPERATION AND MAINTENANCE DATA

- A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.3 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

3.4 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
1. Description of unit or system, and component parts.
 2. Identify function, normal operating characteristics, and limiting conditions.
 3. Include performance curves, with engineering data and tests.
 4. Complete nomenclature and model number of replaceable parts.
- B. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and

emergency instructions. Include summer, winter, and any special operating instructions.

- C. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- D. Provide servicing and lubrication schedule, and list of lubricants required.
- E. Include manufacturer's printed operation and maintenance instructions.
- F. Include sequence of operation by controls manufacturer.
- G. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- H. Provide control diagrams by controls manufacturer as installed.
- I. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- J. Additional Requirements: As specified in individual product specification sections.

3.5 OPERATION AND MAINTENANCE MANUALS

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.
- C. Binders: Commercial quality, 8-112 by 11 inch three **D** side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- I. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.

- c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
- a. Shop drawings and product data.
- J. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.
- K. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.6 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 01 79 00 -DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.1 SUMMARY

- A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
 - 1. All software-operated systems.
 - 2. HVAC systems and equipment.
 - 3. Plumbing equipment.
 - 4. Electrical systems and equipment.
 - 5. Security and audio visual systems.
 - 6. Conveying systems.
 - 7. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - 1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
 - 2. Finishes, including flooring, wall finishes, ceiling finishes.
 - 3. Fixtures and fittings.
 - 4. Items specified in individual product Sections.

1.2 SUBMITTALS

- A. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
 - 1. Format: DVD Disc.
 - 2. Label each disc and container with session identification and date.

1.3 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
 - 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
 - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS- NOT USED

PART 3 EXECUTION

3.1 DEMONSTRATION- GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.
- C. Demonstration may be combined with Owner personnel training if applicable.
- D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and

troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.

1. Perform demonstrations not less than two weeks prior to Substantial Completion.
 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
1. Perform demonstrations not less than two weeks prior to Substantial Completion.

END OF SECTION

SECTION 019100 – COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Commissioning: Commissioning is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meet defined objectives and criteria. This project Commissioning process begins at Construction Administration (during Submittal phase) and continues through the life of the facility. The commissioning process includes specific tasks to be conducted during each phase in order to verify that design, construction, and training meets the owner's project requirements.
- B. Commissioning Team: The members of the commissioning team consist of the contracted commissioning agent (CxA), the owner's representative/Construction Project Manager (CPM), the general contractor (GC), the architect and design engineers, the mechanical contractor (MC), the electrical contractor (EC), the testing and balancing (TAB) contractor, the control contractor (CC), the facility operating staff, and any other installing subcontractors or suppliers of equipment. The contracted commissioning agent is hired by the owner directly. The CxA directs and coordinates the project commissioning activities and the reports to the owner/ CPM. All team members work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.

Commissioning shall:

- 1) Verify that applicable equipment and systems are installed according to the contract documents, manufacturer's recommendations, and industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
 - 2) Verify and document proper performance of equipment and systems.
 - 3) Verify that O&M documentation provided to the end user is complete.
 - 4) Verify that the owner's operating personnel are adequately trained.
 - 5) Establish a baseline of system performance.
 - 6) Review the DB project schedule to ensure that adequate time for startup and commissioning has been allotted and that proper logic is provided.
- C. 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.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 1 specification sections, apply to this section.
- B. Owner's Project Requirements and Basis of Design.
- C. ASHRAE Guideline 0-2005

1.3 SUMMARY

- A. The CxA is a direct hire to the client for this project to provide a basic commissioning services. The CxA will work in harmony with the design/builder and prepare a commissioning plan to reflect the Owner Project Requirements (OPR) and Basis of Design (BOD). The commissioning plan will be updated accordingly to reflect any changes in the basis of design that may occur.
- B. The design/builder shall support the basic commissioning effort, by providing documentation, inspection services, personnel dedicated to substantiate systems functions and integrations, and provide baseline measurements during commissioning process.
- C. As part of the basic commissioning, operations and maintenance manuals will be reviewed by the CxA. The design/builder shall provide O & M manuals for review and acceptance. Hard copies and electronic copies shall be provided to the CxA.
- D. The CxA will monitor the training for the Owner and determine that adequate training has been provided.

1.4 DEFINITIONS

Acceptance - A formal action, taken by a person with appropriate provider (which may or may not be contractually defined) to declare that some aspect of the project meets defined requirements, thus permitting subsequent activities to proceed.

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.

Basis of Design - A document that records the concepts, calculations, decisions, and product selections used to meet the owner's project requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

Checklists - Verification checklists that are developed and used during all phases of the commissioning process to verify that the owner's project requirements are being achieved. This includes checklists for general verification, plus testing, training, and other specific requirements.

Commissioning Authority (CxA) - The entity identified by the owner who leads, plans, schedules, and coordinates the commissioning team to implement the commissioning process.

Commissioning Plan - An overall plan developed by the commissioning agent that provides the structure, schedule and coordination planning for the commissioning process.

Commissioning Process - A quality-focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the owner's project requirements.

Commissioning Process Activities - Components of the commissioning process.

Commissioning Process Progress Report - A written document that details activities completed as part of the commissioning process and significant findings from those activities that is continuously updated during the course of a project. Usually it is incorporated into the commissioning plan as an ongoing appendix.

Commissioning Team - The individuals who through coordinated actions are responsible for implementing the commissioning process.

Construction Checklist - A form used by the contractor to verify that appropriate components are on-site, ready for installation, correctly installed, and functional. Also see **Checklists**.

Construction Documents - This includes a wide range of documents, which will vary from project to project, with the owner's needs and with regulations, laws, and countries. Construction documents usually include the project manual (specifications), plans (drawings) and general terms and conditions of the contract.

Continuous Commissioning Process - A continuation of the commissioning process well into the occupancy and operations phase to verify that a project continues to meet current and evolving owner's project requirements. Continuous commissioning process activities are on-going for the life of the facility. Also see **On-Going Commissioning Process**.

Contract Documents - This includes a wide range of documents, which will vary from project to project, with the owner's needs and with regulations, laws, and countries. Contract documents frequently include price agreements, construction management process, sub-contractor agreements or requirements, requirements and procedures for submittals, changes, and other construction requirements, timeline for completion, and the construction documents.

Coordination Drawings - Drawings showing the work of all trades to illustrate that equipment can be installed in the space allocated without compromising equipment function or access for maintenance and replacement. These drawings graphically illustrate and dimension manufacturers' recommended maintenance clearances.

Control system - A component of environmental, HVAC, security, and fire systems for reporting/ monitoring and issuing of commands to/from field devices.

Data logging -The monitoring and recording of flows, currents, status, pressures, etc., of equipment using stand-alone data recorders separate from the control system or the trending capabilities of control systems.

Deferred Performance Tests (DPTs) - Performance tests that are performed, at the discretion of the CxA, after substantial completion, due to partial occupancy,

equipment, seasonal requirements, design, or other site conditions that disallow the test from being performed.

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.

Factory Testing - Testing of equipment on-site or at the factory, by factory personnel, with or without an owner's representative present.

Issues Log - A formal and ongoing record of problems or concerns – and their resolution – that have been raised by members of the commissioning team during the course of the commissioning process.

Nominal Group Technique - A formal, structured brainstorming process used to obtain the maximum possible ranked input from a variety of viewpoints in a short period of time. The typical approach is a workshop session where a question is presented, the attendees each record their responses on a piece of paper, the individual responses are recorded on a flip chart without discussion in a round robin fashion, all of the responses are discussed, and the participants rank their top five responses.

Non-Compliance - See **Deficiency**.

Non-Conformance - See **Deficiency**.

On-Going Commissioning Process - A continuation of the commissioning process well into the occupancy and operations phase to verify that a project continues to meet current and evolving owner's project requirements. On-going commissioning process activities occur throughout the life of the facility. Some of these will be close to continuous in implementation, and others will be either scheduled or unscheduled (as needed). Also see **Continuous Commissioning Process**.

Owner's Project Requirements - A written document that details the functional requirements of a project and the expectations of how it will be used and operated. This includes project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. (The term "Project Intent" is used by some owners for their commissioning process owner's project requirements or design.)

Over-ridden Value -Riding over a sensor value in the equipment's controls to observe the response of the equipment's operation. Also see **Simulated Signal**.

Phased Commissioning - Commissioning that is completed in phases as required by the phasing plan as approved for the project and other scheduling issues.

Quality Based Sampling - A process for evaluating a sub-set (sample) of the total population. The sample is based upon a known or estimated probability distribution of expected values; an assumed statistical distribution based upon data from a similar product, assembly, or system; or a random sampling that has scientific statistical basis.

Re-Commissioning - An application of the commissioning process requirements to a project that

Seasonal Performance Tests - Performance tests that are deferred until the system(s) will experience conditions closer to their design conditions based on weather conditions.

Simulated Condition - Condition that is created for the purpose of testing the response of a system (e.g., raising/lowering the setpoint of a thermostat to see the response in a VAV box).

Simulated Signal - Disconnecting a sensor and using a signal generator to simulate a sensor value for the purpose of testing a full range of conditions.

Startup - The initial starting or activating of dynamic equipment, including completing construction checklists.

Systems Manual - A system-focused composite document that includes the operation manual, maintenance manual, and additional information of use to the owner during the occupancy and operations phase.

Test Procedure - A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems. The test procedures are specified in the Technical Specifications sections of the contract documents. Performance testing covers the dynamic functions and operations of equipment and systems using manual or monitoring methods. Performance testing is the dynamic testing of systems under full operation. Systems are tested under various modes, such as during low cooling 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 respond as the sequences state.

Training Plan - A written document that details the expectations, schedule, budget, and deliverables of commissioning process activities related to training of project operating and maintenance personnel, users, and occupants.

Verification - The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.

Trending - The monitoring, by a building management system or other electronic data gathering equipment, and analyzing of the data gathered over a period of time.

Vendor - Supplier of equipment.

Warranty Period - Refer to Section 01740.

1.5 COORDINATION

- A. Project Commissioning Team - The members of the project commissioning team will consist of the commissioning authority and any support personnel, the Construction Project Manager, the owner's facility staff (FS) or designee, and the design builder (inclusive of general contractor, subcontractors and/or vendors as required, and the architect/ engineer (A/E)).
- B. Management - The CxA coordinates the commissioning activities through the Construction Project Manager. All members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents. Refer to Paragraph 1.06 for additional management details.
- D. Scheduling - The CxA, through the owner or C.P.M., will provide sufficient notice to the design/builder for scheduling commissioning activities with respect to the owner's participation. The contractor will integrate all commissioning activities into the overall project schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

1.6 COMMISSIONING PLAN

- A. The CxA will develop the commissioning plan which shall be included in the project schedule when approved by the owner or C.P.M.. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.
 - 1) Commissioning during construction begins with an initial commissioning meeting conducted by the CxA where the commissioning process is reviewed with the project commissioning team members.
 - 2) Additional meetings will be required throughout construction, scheduled by the CxA, through the owner or C.P.M., with necessary parties attending to plan, scope, coordinate, schedule future activities and resolve problems.
 - 3) Equipment documentation is submitted to the CxA, through the owner or C.P.M., during normal submittals, including detailed startup procedures.
 - 4) The construction checklists shall be completed by the contractor (or its subcontractors), before and during the startup process.
 - 5) Submission of the construction checklists, TAB and startup shall be completed before functional testing.
 - 6) Items of non-compliance in material, installation, or setup shall be corrected at no expense to the owner.
 - 7) The contractor ensures that the subcontractors' construction checklists are executed and documented and that startup and initial checkout are performed. The CxA verifies that the TAB, construction checklists and startup were completed according to the approved plans. This includes the CxA approving TAB, checklists and startup plans. This also

includes witnessing startup of selected equipment. Any testing failure is to be corrected at no additional cost to the owner, and a re-test is to be performed, observed, and documented.

- 8) The CxA develops and implements equipment and system performance test procedures. The forms and procedures are approved by the owner, C.P.M. and A/E.
- 9) The performance tests are executed by the contractor under the direction of the CxA with the assistance of the facility staff. All documentation is by the CxA.
- 10) The CxA reviews the O&M documentation for completeness and provides the commissioning record for the O&M manuals.
- 11) Commissioning should be completed before substantial completion.
- 12) The CxA develops procedures, reviews, pre-approves, coordinates, and implements the training provided by the contractor.
- 13) Deferred testing is conducted as specified or required.

1.7 COMMISSIONING TEAM

- A. Members appointed by contractor(s): Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to, representatives of each contractor, including project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- B. Members appointed by owner:
 1. CxA - An entity identified by the owner who leads, plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
 2. Representatives of the facility user and operation and maintenance personnel.
 3. Architect and engineering design professionals.

1.8 RELATED REQUIREMENTS

- | | |
|------------------|------------------------------|
| A. Section 01XXX | Coordination |
| B. Section 01300 | Submittals |
| C. Section 01320 | Project Schedules |
| D. Section 01XXX | Contract Closeout Procedures |

E. Section 01XX Project Record Documents

F. Section 01XX Warranties and Guarantees

1.9 RESPONSIBILITIES

A. The general responsibilities of various parties in the commissioning process are provided in this sub-section. The specific responsibilities are in the Technical Specifications.

B. All Parties

1. Follow the commissioning plan.
2. Attend initial commissioning meeting and additional meetings as necessary.

C. Architect (of A/E)

Construction Phase

1. Attend the commissioning scoping meeting and selected commissioning team meetings.
2. Perform normal submittal review, construction observation, as-built drawing preparation, O&M manual preparation, etc., as contracted.
3. Provide any design narrative documentation requested by the CxA.
4. Coordinate resolution of system deficiencies identified during commissioning, according to the contract documents.
5. Prepare and submit final as-built design intent documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.

D. Mechanical and Electrical Designers/Engineers (of the A/E)

Construction and Phase

1. Perform normal submittal review, construction observation, as-built drawing preparation, etc., as contracted. One site observation should be completed just prior to system startup.
2. Provide any design narrative and sequences documentation requested by the CxA. The designers shall assist (along with the contractors) 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.
3. Attend commissioning scoping meetings and other selected commissioning team meetings.
4. Participate in the resolution of system deficiencies identified during commissioning, according to the contract documents.
5. Prepare and submit the final as-built design intent and operating parameters documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.
6. From the contractor's red-line drawings, edit and update one-line diagrams developed as part of the design narrative documentation and those 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 emergency power system.
7. Provide a presentation at one of the training sessions for the owner's personnel.

8. Review and approve the construction checklists for major pieces of equipment for sufficiency prior to their use.
9. Review and approve the performance test procedure forms for major pieces of equipment for sufficiency prior to their use.
10. Witness testing of selected pieces of equipment and systems

Occupancy and Operations Phase

1. Participate in the resolution of non-compliance, non-conformance and design deficiencies identified during commissioning during warranty-period commissioning.
2. Attend lessons learned session

E. Commissioning Authority (CxA)

The CxA will verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, CxA will report the failure in the "Issues Log."

Construction Phase

1. Coordinates and directs 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.
2. Coordinate the commissioning work and, with the GC and owner/C.P.M., help integrate commissioning activities into the master schedule.
3. Revise the Construction Phase Commissioning Plan as necessary.
4. Plan and conduct a commissioning scoping meeting and other commissioning meetings.
5. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor startup and checkout procedures.
6. 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.
7. Review and approve normal contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the A/E reviews.
8. Write and distribute construction checklists. Prepare and maintain completed construction checklist log.
9. Develop an enhanced startup and initial systems checkout plan with subcontractors.
10. 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.

11. Witness all or part of the HVAC piping test and flushing procedure, sufficient to be confident that proper procedures were followed. Document this testing and include the documentation in O&M manuals. Notify owner/C.P.M. of any deficiencies in results or procedures.
12. Witness all or part of any ductwork testing and cleaning procedures, sufficient to be confident that proper procedures were followed. Document this testing and include the documentation in O&M manuals. Notify owner's project manager of any deficiencies in results or procedures.
13. Approve construction checklist completion by selected site observation and spot checking.
14. Recommend approval of systems startup by reviewing startup reports and by selected site observation.
15. Review TAB execution plan.
16. Oversee sufficient testing of the control system and approve it to be used for TAB, before TAB is executed.
17. Recommend approval of air and water systems balancing by spot testing, by reviewing completed reports and by selected site observation.
18. With necessary assistance and review from installing contractors, write the performance test procedures for equipment and systems, including energy management control system trending, stand-alone data logger monitoring or manual performance testing. Submit to C.P.M. for review, and for approval if required.
19. Analyze any performance trend logs and monitoring data to verify performance.
20. Coordinate, witness, and recommend approval of manual performance tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved
21. Maintain a master Issues Log and a separate testing record. Provide the owner/ C.P.M. with written progress reports and test results with recommended actions.
22. Witness performance testing of smoke control systems by Fire Marshall Division and all other owner contracted tests or tests by manufacturer's personnel over which the CxA may not have direct control. Document these tests and include this documentation in Commissioning Record in O&M manuals.
23. Review equipment warranties to ensure that the owner's responsibilities are clearly defined.
24. Oversee and approve the training of the owner's operating personnel.
25. Compile and maintain a commissioning record and building systems book(s).
26. Review and approve the preparation of the O&M manuals.
27. Provide a final commissioning report (as described in this section).
28. Coordinate the development of a systems manual
29. Prepare a standard trend logging package of primary parameters that will provide the operations staff clear indications of system function in order to identify proper system operation and trouble shoot problems. The CxA shall also provide any needed information on interpreting the trends.

Occupancy and Operations Phase

1. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
2. Return to the site at 10 months into the 12 month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal commissioning. Also 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.

3. Assist in the development of a preventative maintenance plan, a detailed operating plan or an energy and resource management plan or as-built documentation.
4. Attend lessons learned session

F. Owner or Owner's Representative (C.P.M.)

Construction and Acceptance Phase

1. Facilitate the coordination of the commissioning work by the CxA, and, with the GC and CxA, ensure that commissioning activities are being scheduled into the master schedule.
2. Review and approve the final *Commissioning Plan—Construction Phase*.
3. Attend a commissioning scoping meeting and other commissioning team meetings.
4. Perform the normal review of contractor submittals.
5. Furnish a copy of all construction documents, addenda, change orders and approved submittals and shop drawings related to commissioned equipment to the CxA.
6. Review and approve the performance test procedures submitted by the CxA, prior to testing.
7. When necessary, observe and witness startup and performance testing of selected equipment.
8. Review commissioning progress and deficiency reports.
9. Coordinate the resolution of non-compliance and design deficiencies identified in all phases of commissioning.
10. Sign-off (final approval) on individual commissioning tests as completed and passing. Recommend completion of the commissioning process to the Project Manager.
11. Assist the GC in coordinating the training of owner personnel.
12. Provide the OPR documentation to the CxA and **[each] contractor** for information and use.
13. Provide the BoD documents, prepared by Architect and approved by owner, to the CxA and **[each]** contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.
14. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.

Occupancy and Operations Phase

1. Assist the CxA as necessary in the seasonal or deferred testing and deficiency corrections required by the specifications.
2. Attend lessons learned session

G. Owner's Project Manager (PM)

Construction Phase

1. Manage the contract of the A/E and of the GC.

2. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions.
3. Provide final approval for the completion of the commissioning work.

Occupancy and Operations Phase

1. Ensure that any seasonal or deferred testing and any deficiency issues are addressed.
2. Attend lessons learned session

- H. Design/Builder. Design/Builder and their subcontractors and vendors shall assign representatives with competency, expertise and authority to act on their behalf and schedule them to participate in and perform commissioning process activities including, but not limited to, the following:

Construction Phase

1. Facilitate the coordination of the commissioning and incorporate commissioning activities (the Commissioning Plan) into the Overall Project Schedule (OPS).
2. Provide detailed startup procedures.
3. Include the cost of commissioning support in the total contract price.
4. Provide commissioning support to demonstrate that all systems function in accordance to the owner project requirements, basis of design, and sequence of operations. Support shall include mechanical and electrical technicians, manufacturer service representatives, and control systems engineers and integrators.
5. Ensure that all subcontractors and vendors execute their commissioning responsibilities according to the contract documents.
6. Provide copies of all submittals as required in Section 01300 including all changes thereto.
Attend and participate in commissioning team meetings held monthly once rough-in commences. Meetings shall occur every two weeks during equipment startup.
7. No later than 60 days prior to startup of the first piece of major equipment, meet with the CxA, C.P.M., A/E, and PM and owner to finalize the detailed commissioning procedures/ schedule.
8. Provide the training of owner personnel, inclusive of training materials.
9. Review and accept construction checklists provided by the commissioning authority.
10. Complete construction checklists as work is completed and provide to the CxA once checklists have been completed. Include manufacturers startup reports, alignments, mechanical systems hydro test reports and electrical cable load tests.
11. Evaluate performance deficiencies and make corrective action.
12. Cooperate with the CxA for resolution of issues recorded in the "Issues Log".
13. Prepare O&M manuals, according to the contract documents, including clarifying and updating the original sequences of operation to as-built/as-tested conditions. O & M manuals shall be submitted prior to equipment startup.

Occupancy and Operations Phase

1. Ensure that subcontractors provide assistance for seasonal or deferred performance testing, performed by the CxA, according to the specifications.
2. Ensure that subcontractors correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.
3. Perform all guarantee work for materials furnished under the contract for the time specified in the contract, including all warranties and curing all latent defects within the time period provided in the contract.

I. Vendors/Subcontractors

1. Provide all requested submittal data, including detailed startup procedures and specific responsibilities of the owner to keep warranties in force.
2. Assist in equipment testing per agreements with subcontractors and/or contractor.
3. Include cost of all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing, operating, and maintaining equipment according to these contract documents in the base bid price to the contractor.
4. Analyze specified products and verify that the A/E has specified the newest, most current equipment reasonable for this project's scope and budget.
5. Provide requested information regarding equipment sequence of operation and testing procedures.
6. Review construction checklists and test procedures for equipment installed by factory representatives.
7. The contractors will provide all tools or the use of tools to start, check-out and test equipment and systems, except for specified testing with portable data-loggers, which shall be supplied and installed by the CxA.

1.10 EQUIPMENT/SYSTEMS TO BE COMMISSIONED

- A. The following equipment/systems will be commissioned in this project:
1. Boilers and related equipment
 2. Chilled water system and pumps
 3. Heating water system and pumps
 4. Air Handling Units (with supply, return and outside air duct, variable air volume boxes and units, air distribution equipment, fan coil units, unit heaters, etc., and temperature control system)
 5. Exhaust air systems (including fans, ductwork and interconnection with air handling/supply systems)
 6. Supply or make-up air systems (including fans, ductwork and interconnection with air handling and/or exhaust systems)
 7. Specialty air removal/ventilation systems (including fans, ductwork and interconnection with air handling/supply systems)

8. Smoke control systems (including fans, ductwork and interconnection with air handling/supply systems -in conjunction with Fire Department)
9. Equipment vibration monitoring systems (including sensors, transmitters and software)
10. Potable water system (including backflow preventers, fixtures, Piping, cleaning and flushing, hot water generators, and booster pumps)
11. Sanitary drainage/sewer system
12. Storm drainage system
13. Fire protection system
14. Fire alarm/detection system
15. Emergency power system (including emergency generator, automatic transfer switch and fuel oil system)
16. Lighting systems (interior and exterior)
17. Daylight controls
18. Switchgear, transformers, panelboards and/or motor control centers
19. Lightning protection and/or surge suppression system
20. Public address, data, clock, closed circuit TV, and telephone systems
21. Doors security system
22. Motion sensors

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup and initial checkout and required performance testing shall be provided by the contractor for the equipment being tested. This includes, but is not limited to, two-way radios, meters, and data recorders.
- B. Special equipment, tools, and instruments required for testing equipment according to these contract documents shall be included in the contractor's base bid price and shall be turned over to the owner at Project close-out.
- C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance within the tolerances specified in the specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration to NIST traceable standards within the past year to an accuracy of 0.5 degree F and a resolution of + or - 0.1 degree F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 MEETINGS

- A. Initial Meeting. The C.P.M. shall coordinate the first Commissioning meeting with the CxM. The contractor and its responsible parties are required to attend.

- B. Miscellaneous Meetings. Other meetings will be planned and conducted by the CxA as construction progresses. These meetings will cover coordination, deficiency resolution, and planning issues. These meetings will be held at least monthly, until the final 3 months of construction, when they may be held as frequently as one per week.

3.2 STARTUP, CONSTRUCTION CHECKLISTS, AND INITIAL CHECKOUT

- A. The following procedures apply to all equipment/systems to be commissioned, according to Paragraph 1.10 Equipment/Systems to be commissioned.
- B. General. Construction checklists are important to verify that the equipment and systems are fully connected and operational. It ensures that performance testing (in-depth system checkout) may proceed without unnecessary delays. The construction checklists for a given system must be successfully completed and approved prior to startup and formal performance testing of equipment or subsystems of the given system.
- C. Startup and Checkout Plan. The CxA will assist the project commissioning team members responsible for startup of any equipment. The primary role of the CxA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures has been completed. The CxA shall provide construction checklists and startup shall be identified in the commissioning scoping meeting and on the checklist forms
 1. The construction checklists are provided in Specification Section 01800. These checklists indicate required procedures to be executed as part of startup and initial checkout of the systems and the party responsible for their execution.
 2. The contractor shall determine which trade is responsible for executing and documenting each of the line item tasks and transmit the checklists to the responsible subcontractors. Each form may have more than one trade responsible for its execution.
 3. The contractor/subcontractor with assistance from the CxA responsible for the purchase of the equipment shall develop the full startup plan by combining the manufacturer's detailed startup and checkout procedures and the construction checklists.
 4. The contractor/subcontractor shall submit the full startup plan to the CxA for review and approval.
 5. The CxA will review and approve the procedures and the documentation format for reporting. The CxA will return the procedures and the documentation format to the contractor, through the C.P.M..
 6. The contractor will transmit the full startup plan to the subcontractors for their review and use.
- D. Sensor and Actuator Calibration. All field-installed temperature, relative humidity,

CO, CO₂, refrigerant, O₂, and/or pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated. Verify that all locations are appropriate and away from causes of erratic operation. Submit to the CxA through the C.P.M. the calibration methods and results. All test instruments shall have had a certified calibration within the last 6 months to NIST traceable standards, and comply with all local, state and/or federal requirements/certifications, as required. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated. Provide bench testing as required at the direction of the CxA.

Sensor Calibration Methods

All Sensors-- Verify that all sensor locations are appropriate and away from causes of erratic operation. Verify that sensors with shielded cable are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.2°F of each other for temperature and within a tolerance equal to 2% of the reading, of each other, for pressure. Tolerances for critical applications may be tighter.

Sensors Without Transmitters-- Standard Application. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS)) is within the tolerances in the table below of the instrument-measured value. If not, install offset in BAS, calibrate or replace sensor.

Sensors With Transmitters-- Standard Application. Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and BAS control panel. Using manufacturer’s resistance-temperature data simulate minimum desired temperature. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the BAS. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction. Reconnect sensor. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS)) is within the tolerances in the table below of the instrument-measured value. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.

Critical Applications-- For critical applications (process, manufacturing, etc.) more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

Tolerances, Standard Applications

<u>Sensor</u>	<u>Required Tolerance (+/-)</u>	<u>Sensor</u>	<u>Required Tolerance (+/-)</u>
Cooling coil, chilled and condenser water temps	0.4F	Flow rates, water	4% of design
AHU wet bulb or dew point	2.0F	Relative humidity	4% of design
		Combustion flue temps	5.0F

Hot water coil and boiler water temp	1.5F	Oxygen or CO ₂ monitor	0.1 % pts
Outside air, space air, duct air temps	0.4F	CO monitor	0.01 % pts
Watt-hour, voltage & amperage	1% of design	Natural gas and oil flow rate	1% of design rate
Pressures, air, water and gas	3% of design	Steam flow rate	3% of design
Flow rates, air	10% of design	Barometric pressure	0.1 in. of Hg

Valve and Damper Stroke Setup and Check EMS Readout-- For all valve and damper actuator positions checked; verify the actual position against the BAS readout. Set pumps or fans to normal operating mode. Command valve or damper closed, visually verify that valve or damper is closed and adjust output zero signal as required. Command valve or damper open, verify position is full open and adjust output signal as required. Command valve or damper to a few intermediate positions. If actual valve or damper position doesn't reasonably correspond, replace actuator or add pilot positioner (for pneumatics).

Closure for heating coil valves (NO)-- Set heating setpoint 20°F above room temperature. Observe valve open. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set heating setpoint to 20°F below room temperature. Observe the valve close. For pneumatics, by override in the EMS, increase pressure to valve by 3 psi (do not exceed actuator pressure rating) and verify valve stem and actuator position does not change. Restore to normal.

Closure for cooling coil valves (NC)-- Set cooling setpoint 20°F above room temperature. Observe the valve close. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set cooling setpoint to 20°F below room temperature. Observe valve open. For pneumatics, by override in the EMS, increase pressure to valve by 3 psi (do not exceed actuator pressure rating) and verify valve stem and actuator position does not change. Restore to normal.

E. Execution of Construction Checklists and Startup.

1. Four weeks prior to the scheduled startup, the contractor shall coordinate startup and checkout with the C.P.M., A/E, and CxA. The execution and approval of the construction checklists, startup, and checkout shall be directed and performed by the contractor, subcontractor or vendor. Signatures are required of the applicable subcontractors for verification of completion of their work.
2. The owner/C.P.M., and A/E as necessary, shall observe, at minimum, the procedures for each piece of primary equipment, unless there are multiple units, in which case a sampling strategy may be used. The CxA will observe all testing.
3. For lower-level components of equipment, (e.g., sensors, controllers), the CxA shall observe a sampling of the startup procedures.
4. The subcontractors and vendors shall execute startup and provide the CxA and A/E, through the owner/C.P.M., with a signed and dated copy of the completed startup and construction checklists.
5. Only individuals of the contractor (technicians, engineers, tradesmen, vendors, etc.) who have direct knowledge and witnessed that a line item task on the construction checklist

was actually performed shall check off that item. It is not acceptable for witnessing supervisors to fill out these forms.

F. Deficiencies, Non-Conformance, and Approval in Checklists and Startup (Master Issues Log).

1. The contractor shall ensure that the subcontractors clearly list any outstanding items of the initial startup and construction checklist procedures that were not completed successfully, on an attached sheet. The form and any outstanding deficiencies shall be provided, through the owner/C.P.M., to the CxA within two days of test completion.
2. The CxA will review the report and issue either a non-compliance report or an approval form, through the C.P.M., to the contractor. The installing subcontractors or vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, shall notify the owner/C.P.M. as soon as outstanding items have been corrected, and resubmit an updated startup report with a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CxA will recommend approval of the execution of the checklists and startup of each system.
3. Items left incomplete, which later cause deficiencies or delays during performance may result in back charges to the contractor. Refer to Paragraph 3.05, herein, for details.

3.3 SUBMITTALS

- A. The CxA will provide appropriate contractors with a specific request for the type of submittal documentation the CxA requires facilitating the commissioning work. These requests will be integrated into the normal submittal process and protocol of the construction team. At minimum, the request will include the manufacturer and model number, the manufacturer's printed installation and detailed startup procedures, full sequences of operation, O&M data, performance data, any performance test procedures, control drawings and details of owner contracted tests. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the commissioning authority. All documentation requested by the CxA will be included by the subcontractors in their O&M manual contributions.
- B. The CxA will review and approve submittals related to the commissioned equipment for conformance to the contract documents as it relates to the commissioning process, to the performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of performance procedures and only secondarily to verify compliance with equipment specifications. The commissioning authority will notify the owner/C.P.M., PM or A/E as requested, of items missing or areas that are not in conformance with contract documents and which requires resubmission.
- C. The CxA may request additional design narrative from the A/E and controls contractor, depending on the completeness of the OPR documentation and sequences provided with the specifications.
- E. These submittals to the CxA do not constitute compliance for O&M manual documentation. The O&M manuals are the responsibility of the contractor, though the CxA will review and approve them.

3.4 PHASED COMMISSIONING

- A. The project requires TAB, startup and performance testing to be executed in phases. Phasing shall be coordinated with the owner/C.P.M., CxA, and A/E and be reflected in the overall project schedule and commissioning schedule by the contractor. Final performance testing of all systems will be as required by the phasing plan. The performance testing of the “systems as a whole” will be performed before final turnover of the entire project.

3.5 PERFORMANCE TESTING

- A. Requirements. The performance testing shall demonstrate that each system is operating according to the documented design intent and contract documents. Performance testing facilitates bringing the systems from a state of individual substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.
- B. Coordination and Scheduling. The contractor shall provide sufficient notice, regarding their completion schedule for the construction checklists and startup of all equipment and systems to allow the performance testing to be scheduled. The commissioning team shall oversee, witness, and document the performance all equipment and systems. The CxA in association with the contractor/subcontractors and facility staff shall execute the tests. Performance testing shall be conducted after the construction checklists, and startup has been satisfactorily completed. The control system shall be sufficiently tested and approved by the CxA before it is used, to verify performance of other components or systems. The air balancing and water balancing shall be completed before performance testing of air or water-related equipment or systems. Testing proceeds from components to sub-systems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems shall be checked.
- C. Development of Test Procedures. Before test procedures are finalized, the contractor shall provide to the A/E and the CxA all requested documentation and a current list of changes affecting equipment or systems, including an updated points list, program code, control sequences, and testing parameters. Using the testing parameters and requirements in the technical specifications, the CxA shall update/develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each contractor/subcontractor or vendor, as appropriate, shall provide assistance to the CxA in developing the final procedures. Prior to finalization, the A/E shall review and concur with the test procedure.
- D. Test Methods.
 - 1. Performance testing and verification may be achieved by manual testing or by monitoring the performance and analyzing the results using the control system’s trend log capabilities or by stand-alone data loggers. The CxA may substitute specified methods or require an additional

method to be executed other than what was specified, with the approval of the A/E and owner/C.P.M.. The CxA will determine which method is most appropriate for tests that do not have a specified method.

2. Simulated Conditions. Simulating conditions shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.
3. Overridden Values. Overriding sensor values to simulate a condition, such as overriding the outside air temperature reading in a control system to be something other than it really is, is acceptable.
4. Simulated Signals. Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overridden values.
5. Altering Setpoints. Rather than overriding sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable.
6. 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 test parameters, that the indirect readings through the control system represent actual conditions and responses.
7. Setup. Each performance test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The contractor/subcontractor(s) assisting the CxA in executing the test shall provide all necessary materials, system modifications, etc., to produce the necessary flows, pressures, temperatures, etc., necessary to execute the test according to the specified conditions. At completion of the test, the contractor/subcontractor(s) shall return all affected equipment and systems to their approved operating settings.

E. Test Equipment. Refer to Part 2 for test equipment requirements.

F. Problem Solving. The burden of responsibility to solve, correct, and retest malfunctions/failures is with the contractor, with A/E approval as required.

3.5 DOCUMENTATION, NON-CONFORMANCE, AND APPROVAL OF TESTS

A. Documentation. The CxA shall witness and verify/pre-approve the documentation of the results of all performance tests. The CxA shall complete all documentation for performance testing.

B. Non-Conformance.

1. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form or on an attached sheet.
2. As tests progress and a deficiency is identified, the CxA shall discuss the issue with the commissioning team and the contractor.
 - a. When there is no dispute on the deficiency and the contractor accepts responsibility to correct it:

- 1) The CxA will document the deficiency and the contractor's response and intentions. After the day's work, the CxA will submit the non-compliance reports to the C.P.M.. The contractor corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be retested and sends it back to the CxA.
- 2) The contractor shall reschedule the test; and the test repeated.
- b. If there is a dispute about a deficiency, regarding whether or not it is a deficiency:
 - 1) The dispute shall be documented on the non-compliance form with the contractor's response.
 - 2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the Construction Project Manager.
 - 3) The CxA documents the resolution process.
 - 4) Once the interpretation and resolution have been decided, the contractor corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CxA, through the C.P.M.. The contractor shall reschedule the test and the test repeated until satisfactory performance is achieved.
3. Cost of retesting a performance test hall is the contractor's.
4. The contractor shall submit in writing to the C.P.M. at least as often as commissioning meetings are being scheduled, the status of each outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreement and proposals for their resolutions.
 - a. The CxA retains the original non-conformance forms until the end of the project.
 - b. Retesting shall not be considered a justified reason for a claim of delay or for a time extension by the contractor.

C. Failure Due to Manufacturer Defect.

If 10% (or three, whichever is greater) of identical pieces of equipment fail to perform to the contract documents (mechanically or substantively) due to a manufacturing defect, not allowing it to meet its submitted performance specification, all identical units may be considered unacceptable by the A/E or CxA. In such case, the contractor shall provide the owner with the following:

- a. Within one week of notification from the owner/C.P.M., the contractor or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided to the C.P.M. within two weeks of the original notice.
- b. Within two weeks of the original notification, the contractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc., and all proposed solutions. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
- c. The A/E will determine whether a replacement of all identical units or a repair is acceptable.

- d. Two examples, where applicable, of the proposed solution shall be installed by the contractor and the A/E shall be allowed to test the installations for up to one week, upon which the A/E will decide whether to accept the solution.
- e. Upon acceptance, the contractor and/or manufacturer shall replace or repair all identical items, at their expense. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

D. Approval.

The CxA notes each satisfactorily demonstrated function on the test form. Final approval of the performance test by the owner is made after review by the CxA and C.P.M., following recommendations by the A/E.

3.6 DEFERRED TESTING

- A. Unforeseen Deferred Tests. If any check or test cannot be performed due to the project completion level, required occupancy condition or other deficiency, execution of checklists and performance testing may be delayed upon approval of the CxA and C.P.M.. These tests will be conducted in the same manner as the seasonal tests as soon as possible.
- B. Seasonal Testing. During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this contract. The CxA shall coordinate this activity through the owner/C.P.M.. Tests will be executed, documented by the CxA and deficiencies should be corrected by the appropriate contractor/ subcontractors with the CxA witnessing. Any final adjustments to the O&M manuals and as-builts due to the testing shall be made by the contractor.

3.7 TRAINING OF OWNER PERSONNEL

- A. The contractor shall provide training coordination, scheduling of subcontractors, and ensure that training is completed. All training shall be coordinated, through the C.P.M., with the CxA.
- B. The contractor shall ensure that each subcontractor and vendor (mechanical, plumbing, fire, electrical, specialty, etc.) shall have the following responsibilities:
 - 1. Provide, to the CxA through the C.P.M., a training plan sixty days before the planned training covering the following elements:
 - a. Equipment
 - b. Intended audience
 - c. Location of training
 - d. Objectives
 - e. Subjects covered (description, duration of discussion, special methods, etc.)
 - f. Duration of training on each subject
 - g. Instructor for each subject
 - h. Methods (classroom lecture, manufacturer's quality video, site walk-through, actual operational demonstrations, written handouts, etc.).

2. Provide designated owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of equipment that makes up the system.
 3. Training shall normally start with classroom sessions followed by hands-on demonstration/training on each piece of equipment.
 4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system shall be repaired or adjusted as necessary and the demonstration repeated at another scheduled time, if necessary.
 5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment is required. More than one party may be required to execute the training.
 6. The controls contractor shall attend sessions other than the controls training, as specified, to discuss the interaction of the controls system as it relates to the equipment being discussed.
 7. The training sessions shall follow the outline in the table of contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
 8. Training shall include:
 - a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
 - b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include startup, operation in all modes possible, shutdown, seasonal changeover and any emergency procedures.
 - c. Discussion of relevant health and safety issues and concerns.
 - d. Discussion of warranties and guarantees.
 - e. Common troubleshooting problems and solutions.
 - f. Explanatory information included in the O&M manuals.
 - g. Discussion of any peculiarities of equipment installation or operation.
 - h. Classroom sessions shall include the use of overhead projections, slides, video/audio-taped material as might be appropriate.
 - i. Hands-on training shall include startup, operation in all modes possible, including manual, shut-down, alarms, power failure and any emergency procedures, and preventative maintenance for all pieces of equipment.
 9. The contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls not controlled by the central control system.
- D. At the discretion of the CxA, training may occur before performance testing is complete if required by the facility operators to assist the CxA in the performance testing.
- E. Videotaping of the training sessions will be provided by the contractor and added to the O&M manuals. In addition, factory training videos identifying key troubleshooting, repair, service and/or replacement techniques shall be provided and reviewed with the owner.
- F. The CxA at the beginning of each training session presents the overall system

narrative and the design concept of each equipment section.

3.8 OPERATIONS AND MAINTENANCE MANUALS/DATA

- A. The commissioning process requires detailed O&M documentation as identified in this section and technical specifications.
- B. Contractor shall submit two draft copies of the complete operating and maintenance manual to the C.P.M. for review by the architect/engineer and CxA within 60 calendar days after review of equipment shop drawings. One copy will be returned to the contractor within 30 days after receipt by the C.P.M..
- C. Contractor shall submit corrected final approved manuals prior to substantial completion. Prior to final submittal, the CxA shall review the O&M manuals (in addition to the initial draft O&M manual), and documentation, with redline as-builts, for systems that were commissioned to verify compliance with the specifications. The CxA will communicate, through the C.P.M., deficiencies in the manuals to the contractor or D/B, as requested. Upon a successful review of the corrections, the CxA will recommend approval and acceptance of these sections of the O&M manuals to the C.P.M.. The CxA will also review each equipment warranty and verify that all requirements to keep the warranty valid are clearly stated. This work does not supersede the A/E's review of the O&M manuals according to the A/E's contract.
- D. The contractor shall compile O&M manuals for every piece of equipment and building operating or electrical system being commissioned with the following format:
 1. Quantity: 4 (Unless more are required by the technical specifications). Two electronic CDs in bookmarked format.
 2. Format: 8 1/2 x 11, 3 ring loose-leaf binders, 3-inch maximum, and electronic format that is compatible with owner's system. Each binder shall be clearly labeled on the spine. Use as many binders as required. Do not overload binders. Dividers with permanently marked tabs of card stock shall separate each section and sub section. Tab labels shall not be handwritten. A separate manual or chapter shall be provided for each applicable system as follows:
 - (a) Chillers
 - (b) Boilers
 - (c) Pumps
 - (d) Air Handling Units (include sequence of operation, one line diagram and area served in a plastic pouch for mounting on equipment or in equipment room)
 - (e) Exhaust Fans
 - (f) Supply Air Fans (excluding Air Handling Units)
 - (g) Plumbing and Drainage Systems/Equipment
 - (h) Emergency Generator Systems
 - (i) UPS
 - (j) Fire Protection Systems
 - (k) Fire Alarm System
 - (l) Valves and Pipe Specialties (include valve identification chart)
 - (m) Variable Frequency Drives (VFD)
 - (n) Smoke Control Systems
 - (o) Water Treatment System if applicable

- (p) Lighting Systems and Controls (interior, exterior and airfield)
 - (q) Switchgear, Transformers, Panel boards, Motor Control Centers and Motor Starters
 - (r) Lightning Protection and Surge Suppression Systems
 - (s) Public Address, Closed Circuit TV, Communication and Telephone Systems
 - (t) Security System
 - (u) Building Management/Temperature Control System
 - (v) Fuel System
 - (w) Doors and Hardware.
 - (x) Power monitoring systems
 - (y) HVAC, Testing Adjusting, and Balancing
 - (z) Other systems as detailed in the drawings and technical specifications
3. There shall be a title page and table of contents in the front of each binder for each binder's contents. In each binder, there shall be a main tab for each specification section. Behind the section number tab there shall be the equipment ID tag sub-tab for each piece of major equipment (or group, if small or numerous). These sub-tabs shall be similar to the specification number tabs but of a different color. Behind each equipment name tab shall be the following sections, in the given order, divided by a double weight colored sheet labeled with the title of the section.
- (a) Contractor. The first page behind the equipment tab shall contain the name, address and telephone number of the manufacturer and installing contractor and the 24-hour number for emergency service for all equipment in this section, identified by equipment.
 - (b) Submittal and Product Data. This section shall include all approved submittal data, cut sheets, data base sheets and appropriate shop drawings. If submittal was not required for approval, descriptive product data shall be included.
 - (c) Operation and Maintenance Instructions. These shall be the written manufacturer's data with the model and features of this installation clearly marked and edited to omit reference to products or data not applicable to this installation. This section shall include data on the following:
 - (1) Model number, serial number and nameplate data for each piece of equipment and any subcomponent.
 - (2) Installation, startup and break-in instructions.
 - (3) All starting, normal shutdown, emergency shutdown, manual operation and normal and emergency operating procedures and data, including any special limitations.
 - i. Step-by-step procedure for system startup, including a pre-start checklist. Refer to controls and indicators by nomenclature consistent with that used on panels and in control diagrams.
 - ii. Sequence of operation, with detailed instruction in proper sequence, for each mode of operation (i.e., day-night; staging of equipment).

- iii. Emergency operation: If some functions of the equipment can be operated while other functions are disabled, give instructions for operations under these conditions. Include here only those alternate methods of operations (from normal) which the operator can follow when there is a partial failure or malfunctioning of components, or other unusual condition.
 - iv. Shutdown procedure: Include instructions for stopping and securing the equipment after operation. If a particular sequence is required, give step-by-step instructions in that order.
- (4) O&M and installation instructions that were shipped with the unit.
- (5) Preventative and corrective maintenance, with service procedures and schedules:
- i. Provide a schedule for preventive maintenance in a printed format and an electronic format compatible with owner's system. State, preferably in tabular form, the recommended frequency of performance for each preventive maintenance task, cleaning, inspection and scheduled overhauls.
 - ii. Cleaning: Provide instructions and schedules for all routine cleaning and inspection with recommended lubricants.
 - iii. Inspection: If periodic inspection of equipment is required for operation, cleaning or other reasons, indicate the items to be inspected and give the inspection criteria for: motors; controls; filters and any other maintenance items.
 - iv. Provide instructions for minor repairs or adjustments required for preventive maintenance routines. Identify test points and give values for each. Include sensor calibration requirements and methods by sensor type.
 - v. Corrective maintenance instructions shall be predicated upon a logical effect-to-cause troubleshooting philosophy and a rapid replacement procedure to minimize equipment downtime.
 - vi. Troubleshooting: Troubleshooting tables, charts, or diagrams shall be used to present specified procedures. A guide to this type shall be a three-column chart. The columns shall be titled: malfunction, probable cause and recommended action.
 - vii. Repair and Replacement: Indicate repair and replacement procedures most likely to be required in the maintenance of the equipment.
- (6) Safety Precautions: This subsection shall comprise a listing of safety precautions and instructions to be followed before, during and after making repairs, adjustments or routine maintenance.
- (7) Manufacturers' brochures (including controls): Manufacturers' descriptive literature covering devices and equipment used in the system, together with illustrations, exploded views and renewal parts lists. Manufacturers' standard brochures and parts list shall

- be corrected so that information applying to the actual installed equipment is clearly defined.
- (8) Supply any special tools required to service or maintain the equipment.
 - (9) Performance data, ratings and curves.
 - (10) Warranty and guarantee, which clearly lists conditions to be maintained to keep warranty in effect and conditions that would affect the validity of the warranty.
 - (11) Any service contracts issued.
- (d) Supplemental Data. Prepare written text and/or special drawings to provide necessary information, where manufacturer's standard printed data is not available and information is necessary for a proper understanding and operation and maintenance of equipment or systems, or where it is necessary to provide additional information to supplement data included in the manual or project documents.
 - (e) Control Diagrams/Drawings. Include the as-built control diagrams/drawings for the piece of equipment and its components, including full points list, full print out of all schedules and set points after testing and acceptance of the system, and copies of all checkout tests and calibrations performed by the contractor (not commissioning tests).
 - (f) Specifications. This section is comprised of the component or system specification section copied and inserted complete with all addenda.
 - (g) System Description. This section shall include the individual equipment portion of the overall system Design Basis Narrative.

E. Commissioning Record in O&M Manuals.

1. The CxA is responsible to compile, organize and index the following commissioning data by equipment into labeled, indexed and tabbed, three-ring binders and deliver it to the GC, to be included with the O&M manuals.
 - (a) Commissioning Plan
 - (b) System reports including design narratives and criteria including sequences. Each system shall contain the startup plan and report, approvals, corrections, construction checklists, completed performance tests, trending and analysis, training plan and recommended recommissioning schedule.
 - (c) Final Commissioning Report including 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. 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) performance and efficiency, 4) equipment documentation and design intent, and 5) operator training. 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 performance test, inspection, trend log, etc. where the deficiency is documented. The 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.

END OF SECTION