USC Close-Out
Standard Guidelines
USC CLOSE-OUT GUIDELINES

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USC Close-out Guidelines
Revised 5/7/12
1. PROJECT RECORD DOCUMENTS

1.1. SUBMITTALS

1.1.1. Project Record Documents

1.1.1.1. Per the contract requirements, deliver record documents to Owner. Accompany submittal with transmittal letter, in duplicate, containing date, project title and number, Contractor’s name and address, title and number of each record document, certification that each document as submitted is complete and accurate, and signature of Contractor, or its authorized representative. Record Documents include:

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1.1.2. Review and Approval

1.1.2.1. All submittals shall be reviewed and approved by the A/E team and Commissioning Authority prior to submittal to the Owner.
1.2. FORMAT

1.2.1. As-Built and Record Drawings (CAD Deliverables)

1.2.1.1. The Contractor shall provide (1) hard copy set and one (1) digital set on CD of the sub-contractor’s “As-Built Drawings” to the Architect for development of Record Drawings. Contractor shall organize into sets and bind and label sets for the Owner’s continued use. Bind each set with durable paper cover sheets. Include appropriate identification, including titles, dates, and other information on the cover sheets. Scanning of the red-lined hard copy originals is permitted.

1.2.1.2. The Contractor shall also provide (1) hard copy set and one (1) digital set on CD of the sub-contractor’s “As-Built Drawings” to the Owner for record.

1.2.1.3. The Architect and design team will update the electronic contract drawing files with the information contained in the original hard copy red-lined as-built sets. These files will be considered “Record Drawings”.

1.2.1.4. For design-build subcontractor’s, the Architect will review as-built documents and once approved, attach them to their Record Drawings.

1.2.1.5. The Architect shall provide two (2) sets of hard copy Record Drawings to Owner and one (1) digital set on CD in the latest version of AutoCAD, or other digital data software in which the original contract drawings were created. Scanning of the marked up hard copy originals is not permitted.

1.2.1.6. All parties creating and submitting CAD files should restrict themselves to the guidelines outlined in the USC CAD Standards (included in the contract).

1.2.2. As-Built and Record Models (BIM Deliverables)

1.2.2.1. For projects being completed in a BIM delivery model, refer to the latest version of USC Building Information Modeling (BIM) Guidelines for complete requirements related to projects being delivered in BIM.

1.2.2.2. The Contractor shall submit sub-contractor’s as-built native format models to the Architect. These are considered “As-Built Models”.

1.2.2.3. The Architect and design team will update the design models with the information contained in the sub-contractor’s as-built models. These files will be considered “Record Models”.

1.2.2.4. For design-build subcontractor’s, the Architect will review as-built models and once approved, consider them a supplement to their Record Models.
1.2.2.5. The Architect shall provide (1) digital set on CD of the Record Model in the latest version of the software in which it was created. Architect shall include a narrative describing the software used to create the BIMs including the software publisher, software name, and version number.

1.2.2.6. The Architect shall also provide two (2) sets of hard copy Record Drawings developed from the Record Model and one (1) digital set on CD in the latest version of PDF to the Owner.

1.2.2.7. The required CoBie standard worksheets shall be extracted from the as-built record models and provided as a supplement to the requirements of the Operations and Maintenance Manuals required by the project contract. Refer to the latest version of USC Building Information Modeling (BIM) Guidelines for detailed requirements of the CoBie standard worksheets.

1.2.3. Record Survey Data

1.2.3.1. The Contractor shall submit record survey data to the Owner. Contractor shall organize into sets and bind and label sets for the Owner’s continued use. Bind each set with durable paper cover sheets. Include appropriate identification, including titles, dates, and other information on the cover sheets.

1.2.3.2. The Contractor shall provide two (2) sets of hard copy as-built record drawings to Owner and one (1) digital set on CD in the latest version of AutoCAD, or other digital data software in which the original contract drawings were created. Scanning of the marked up hard copy originals is not permitted.

1.2.4. Record Specifications

1.2.4.1. The Contractor shall mark specifications to indicate actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications and provide (1) hard copy of the “As-Built” Specifications to the Architect for development of “Record Specifications”.

1.2.4.2. The Architect will update the electronic file from information contained in the Contractor’s red-lined original hard copy as-built set. The Contractor will include notations in the table of contents to allow easy identification of sections that have been amended.

1.2.4.3. The Architect shall provide one (1) set of hard copy Record Specifications to Owner and one (1) digital set. Digital set shall be an annotated PDF electronic file, including addenda and contract modifications. Scanning of the marked up hard copy originals is not acceptable.
1.2.5. **Record Test Certificates**

1.2.5.1. Contractor shall bind, in a separate binder, record test certificates and identify each, ready for continued use and reference. Contractor shall submit one (1) hard copy and one (1) electronic copy to the Owner. Digital set shall be an annotated PDF electronic file. Scanning of the hard copy originals is acceptable.

1.2.6. **Permit and Inspection Records**

1.2.6.1. Contractor shall bind, in a separate binder, permit and inspection records and identify each, ready for continued use and reference. Submit one (1) hard copy and one (1) electronic copy to the Owner. Digital set shall be an annotated PDF electronic file. Scanning of the hard copy originals is acceptable.

1.3. **CONTENT**

1.3.1. **As-Built Drawings and Models**

1.3.1.1. Mark record prints to show actual installation where installation varies from that shown originally. Require individual or entity who obtained record data to prepare the marked-up record prints.

1.3.1.2. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

1.3.1.3. Accurately record information in an understandable drawing technique.

1.3.1.4. Do not permanently conceal any work until required information has been recorded.

1.3.1.5. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If shop drawings are marked, show cross-reference on the Contract Drawings.

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

1.3.1.7. Note Construction Work Directive numbers, alternate numbers, Change Order numbers, request for information (RFI) numbers, and similar identification, where applicable.

1.3.1.8. Types of items requiring marking include, but are not limited to, the following:

- Dimensional changes to the drawings
- Revisions to details shown on drawings
- Depths of foundations below first floor. Indicate foundation elevations relative to first floor elevation.
- Horizontal locations and vertical depths of underground utilities and appurtenances, including both site utilities and those under buildings and structures, referenced to permanent surface improvements.
- Horizontal and vertical locations of internal utilities and appurtenances, concealed in construction, referenced to visible, accessible, permanent features of the building or structures.
- Revisions to routing of piping and conduit.
- Revisions to electrical circuitry.
- Actual equipment locations.
- Duct sizing and routing.
- Changes made by Change Order or Construction Chance Directive or Bulletins.
- Changes made following Architect’s written orders and pertinent graphic and written responses to requests for information (RFIs).
- Details not on the original Contract Drawings.
- Field records for variable and concealed conditions.
- Record information on the work that is shown only schematically on the Contract Drawings.

1.3.2. Record Survey Data

1.3.2.1. The approved land surveyor performing work shall record vertical and horizontal record survey locations of the following:
- Underground utilities and structures, including fuel gas; electrical duct banks; manholes; vaults; and pits.
- Building including all major building corners and entrance points.
- Hardscape including walkways, driveways, hardscape at site perimeter, pool decks and fences.

1.3.2.2. Establish accurate horizontal locations based on grid coordinates, and vertical (depth) locations based on fixed datum from a permanent monument or monuments.

1.3.2.3. Maintain a separate set of record survey data. This set shall be separate from other record drawings.
1.3.3. **Record Specifications**

1.3.3.1. Contractor shall mark specifications to indicate actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1.3.3.2. Give particular attention to information on concealed products and installations that would be difficult to identify and record later.

1.3.3.3. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

1.3.3.4. Record the name of the manufacturer, supplier, installer, and other information necessary to provide a record of selections made.

1.3.3.5. Note Construction Work Directive numbers, alternate numbers, Change Order numbers, request for information (RFI) numbers, and similar identification, where applicable.

1.3.4. **Record Test Certificates**

1.3.4.1. Assemble test certificated required for record keeping and submittal in connection with actual performance of the work.

1.3.4.2. Categories of requirements resulting in test certification records include, but are not limited to the following:

- Equipment start-up reports.
- Air and Hydronic Test and Balance reports.
- Pipe Pressure test reports.
- Pipe Cleaning reports.
- Duct Pressure test reports.
- Back Flow Prevention device certifications.
- Domestic Water Chlorination reports.
- Electrical Acceptance test reports.

1.3.5. **Permit and Inspection Records**

1.3.5.1. Prints or other documents used to obtain permits from authorities having jurisdiction. Submit all prints and documents bearing official approval stamp of authorities having jurisdiction.

1.3.5.2. Originals of all permits issued for the work by authorities having jurisdiction.

1.3.5.3. Originals of inspection cards completed by authorities having jurisdiction.

1.3.5.4. Equipment operating permits.
2. OPERATION AND MAINTENANCE DATA

2.1. SUBMITTALS

2.1.1. Manual Submittals

2.1.1.1. Initial Manual Submittal:

2.1.1.1.1. Submit one (1) draft copy of each manual at least thirty (30) days before commencing demonstration and training. Draft copy may be in electronic PDF format. Hard copies may be required upon request.

2.1.1.1.2. Architect and Commissioning Authority will review and comment on general scope, content and completeness of each manual. The Commissioning Authority may be a 3rd Party, hired by the Owner, or a member of the Owner’s Facilities Management staff.

2.1.1.2. Final Manual Submittal

2.1.1.2.1. Correct or revise each manual to comply with the Architect’s and Commissioning Authority’s comments.

2.1.1.2.2. Submit two (2) hard copies and one (1) electronic copy in PDF of each manual in final form to the Architect prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. All submittals shall be reviewed and approved by the Architect and Commissioning Authority.

2.1.1.2.3. Once approved, the final manuals shall be delivered to the Owner.

2.1.1.2.4. Scheduling of Demonstration and Training cannot be done until the Operation and Maintenance data is approved by the Architect and Commissioning Authority.

2.1.2. Attic Stock Submittals

2.1.2.1. Ensure that keys, special tools, replacement parts and attic stock items are delivered to Owner. Such equipment shall be inventoried and Owner will sign a receipt for the equipment upon delivery to Owner. Attic Stock shall be delivered at the time of Substantial Completion.

2.2. FORMAT

2.2.1. GENERAL
2.2.1.1. Where O&M instruction manuals are required to be submitted under any sections of the Specifications, prepare in accordance with the provisions of this section.

2.2.1.2. Bind hard copy documentation in heavy-duty, 3-ring, vinyl-covered, loose leaf binders (sized for 8½”x11” paper), and thickness as necessary to accommodate contents.

2.2.1.3. When necessary, binders shall have pockets inside the covers to hold folded oversized sheets.

2.2.1.4. Provide heavy paper dividers with plastic coated/covered tabs for each separate section. Mark tab to identify the specification section and product/installation.

2.2.1.5. Provide protective plastic sleeves for any diagnostic software disks or computerized electronic equipment.

2.2.1.6. For drawings, attach reinforced, punched binder tabs on drawings and bind with text.

   ▪ If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

   ▪ If drawings are too large to use as foldouts, fold and place drawings in labeled pocket and bind in rear of binder.

2.2.1.7. Identify each binder on the front and spine with printed title, volume number, project name, and name of contractor.

2.2.1.8. Provide a title page for each volume including the following:

   ▪ Subject matter included in the volume
   ▪ Name and address of Project
   ▪ Date of submittal
   ▪ Name and contact information for Contractor
   ▪ Name and contact information for Architect and major consultants to the architect

   ▪ Cross reference to any other volumes, if applicable

2.2.1.9. Provide a typed table of contents for each binder. List each product included in the manual, indexed to the content of the volume, and referenced with the Specification Section number in the Project Manual.

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

2.2.1.11. Assemble electronic files in PDF format with links enabling navigation to each item.
2.2.1.11.1. Use electronic files prepared by manufacturer, where available. Where scanning of paper documents is required, configure the scanned file for minimum readable file size.

2.2.1.11.2. Provide bookmarked table of contents at the beginning of each document.

2.2.1.11.3. Name each indexed file with applicable item name.

2.2.1.11.4. Enable inserted reviewer comments on the draft submittals.

2.2.1.12. Accompany submittals with transmittal letter, in duplicate, containing date, project title and number, Contractor's name and address, title and number of each document, certification that each document as submitted is complete and accurate, and signature of Contractor, or its authorized representative.

2.3. CONTENT

The contents of the Operations and Maintenance Data are separated into three separate packages or binders. The first package contains Facility Information described in section 2.3.1 and is a stand-alone binder or volume of binders. The second package contains the Materials and Finishes Information described in 2.3.2 and is a stand-alone binder or volume of binders. The third package contains the Equipment and Systems Information described in 2.3.3 and is a stand-alone binder or volume of binders.

2.3.1. Facility Information

General information that applies to the entire facility, not specific to any one system or piece of equipment shall be included in this section as follows. Each section shall have its own tab, labeled with the section heading.

2.3.1.1. Contact Directory

Include the contact information for all contractors, subcontractors, vendors, manufacturers, and any other entity that has provided goods or services installed at the facility. Contact information should include name, title, website, address, phone numbers, and technical support phone numbers and email addresses. Include listing of systems provided by each party.

2.3.1.2. Warranty Information

Provide all warranties indexed and tabbed in accordance with the project specifications.

- Each warranty shall include the specification section number, a listing of the subcontractor, supplier, and
manufacturer with name, address, and the telephone number of the responsible principal.

- All warranties shall be properly executed and on the letterhead of the provider.
- The start date of warranty shall be the date of Substantial Completion.
- In addition to the Contractor’s standard (1) year warranty of the total project, provide warranties, guarantees, and bonds as may be required in each individual section of the specification. The contractor will be co-responsible with the manufacturer and/or subcontractor for all extended warranty work identified in the specifications.
- Provide additional copies of each warranty in the Operations and Maintenance Manuals.

2.3.1.3. **Equipment Nameplate Data**

Contractor shall provide as-installed product nameplate data, product numbers, serial numbers, and other information to fully define the asset to the owner. Equipment list shall be submitted in Microsoft Excel format. Data content shall include:

- Construction document designation and owner’s designation, if different.
- Name of installing contractor, vendor, or manufacturer.
- Manufacturer name.
- Model number.
- Serial number.
- Date of manufacture.
- Warranty start date and duration.
- Location.
- Area Served.
- General description or type classification of the system, equipment, component, or device.

2.3.1.4. **Utility Connection and Cutoff Plans**

Provide utility site and floor plans that indicate the exterior and main interior connection and cutoff points for all utilities. Indicate the room number, panel number, circuit breaker, valve number, etc. of each connection and cutoff point, and what that connection or cutoff point controls.
2.3.2. **Materials and Finishes Information**

Organize manual into separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and source, and warranties and bonds, as described below. There shall be a main tab for each specification section. Behind the section number tab there shall be the material or finish sub-tab for each material or finish type. These sub-tabs shall be similar to the specification number tabs but of a different color. Behind each sub-tab shall be the following sections, in the given order, divided by a double weight colored sheet labeled with the title of the section.

2.3.2.1. **Source Information**: List each product, identified by product name. For each product, list name, address, and telephone number of installer or supplier and maintenance service agent, and cross-reference Specification Section number and title.

2.3.2.2. **Product Information**: For all building products, applied materials and finishes, include the following as applicable:

- Product name and model number.
- Manufacturer name.
- Color, pattern, and texture.
- Material and chemical composition.
- Reordering information for specially manufactured products.

2.3.2.3. **Maintenance Procedures**: Include manufacturer’s recommendations for cleaning agents and methods. Include the following:

- Inspection Procedures
- Types of cleaning agents to be used and methods of cleaning.
- List of cleaning agents and methods of cleaning detrimental to product.
- Schedule for routine cleaning and maintenance.
- Repair Instructions.

2.3.2.4. **Repair Materials and Sources**: Include list of materials and local sources of materials and related services.

2.3.2.5. **Warranties and Bonds**: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds. Include procedures to follow and required notifications for warranty claims.
2.3.2.6. **Design Data:** Provide a copy of the design data for materials and finishes. Include a copy of the approved product submittal and finish schedule.

2.3.3. **Equipment and System Information**

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.

2.3.3.1. **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.

2.3.3.2. **System Description.** Provide a detailed discussion of the system composition and operation. Include technical details that are essential for an understanding of the major system.

2.3.3.3. **System Flow Diagrams.** Provide as-installed flow diagrams indicating system operation during normal operations (liquid, air, gas, or electricity). Integrate all system components into the diagram. Note that a compilation of non-integrated flow diagrams for the individual system components is not acceptable.

2.3.3.4. **Submittal and Product Data.** This section shall include all approved submittal data, cut sheets and appropriate shop drawings. If submittal was not required for approval, descriptive product data shall be included.

2.3.3.5. **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:

- **Installation, startup and break-in instructions**
- **All starting, normal shutdown, emergency shutdown, manual operation, seasonal changeover and normal operating procedures and data, including any special limitations.**
- **Start-up and Shutdown Procedures:** Provide step-by-step instructions to bring systems from static to operational configurations and from operating to shutdown status. Installing contactor or vendor/manufacturer shall author this specifically for this project.
• Normal Operating Instructions: Provide a discussion of the normal operation and control of the system. Address operating norms (i.e. temperatures, pressures, and flow rates) expected at each zone or phase of the system. Supplement the discussion with control and wiring diagrams and data. Installing contactor or vendor/manufacturer shall author this specifically for this project.

• Emergency Operating Instructions: Provide emergency operating procedures in the event of equipment malfunctions.

• O&M and installation instructions that were shipped with the unit.

• Preventative maintenance and service procedures and schedules. Where instructions for maintenance are not included in the manufacturer’s literature, provide supplemental data to enable proper maintenance of the equipment installed. Include specific lubrication methods and recommended frequencies along with procedures and precautions for inspection and routine service.

• Troubleshooting procedures. Include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing and checking instructions.

• A parts list, edited to omit reference to items which do not apply to this installation.

• A list of any special tools required to service or maintain the equipment.

• Performance data, ratings and curves.

• Warranty, which clearly lists conditions to be maintained to keep warranty in effect and conditions that would affect the validity of the warranty.

• Any service contracts issued.

2.3.3.6. Control Drawings. Include the control drawings for the piece of equipment and its components, including the sequence of operation. This section will be provided by the controls contractor. The drawings will be repeated in the control contractor’s O&M submittals.

2.3.3.7. Panel Board Circuit Directories: Provide electrical panel board circuit directories for each electrical panel included in the work.
2.3.3.8. **Valve Charts**: Provide charts of valve tag numbers with location and function of each valve clearly keyed to the respective system flow diagram.

2.3.4. **Attic Stock**

2.3.4.1. Contractor shall provide all attic stock, keys, special tools, and extra materials to the owner as required by the contract documents.

2.3.4.2. Ensure that keys, special tools, replacement parts and attic stock items are delivered to Owner. Such equipment shall be inventoried and Owner will sign a receipt for the equipment upon delivery to Owner.

2.3.4.3. Quantities of attic stock shall also apply to accepted substitutions for specified materials as well as to quantities of similar or specified materials affected by Change Order.

2.3.4.4. Label all items with manufacturer’s name and model number.
3. SYSTEMS DEMONSTRATION AND TRAINING

3.1. SUMMARY

3.1.1. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

- Demonstration of operation of systems, subsystems, and equipment.
- Training in operation and maintenance of systems, subsystems, and equipment.
- Demonstration and training videotapes.

3.2. SCHEDULING

3.2.1. Schedule training with Owner with at least 14 days advance notice prior to date of demonstration and training session.

3.2.2. Provide a complete training schedule to the Owner at the time of scheduling. Training schedule shall include all topics in the Instruction Program, dates, times, and locations.

3.2.3. Training must be completed prior to requesting inspection for Substantial Completion.

3.3. INSTRUCTION PROGRAM

3.3.1. Provide the services of competent Contractors' or manufacturers' engineers and qualified maintenance personnel to properly train designated persons.

3.3.2. Develop an Instruction Program that includes individual training modules for each system and each item or equipment which is not part of a system.

3.3.3. Coordinate content of training modules with content of approved emergency, operations, and maintenance manuals. Develop a training outline for each module. For each module, include instruction for the following:

- Basis of system design, operational requirements and criteria.
- Identification of equipment and components. Identify location, access, and safety hazards.
- Review of system documentation including emergency, operations, and maintenance manuals, record documents, test reports, and warranties
- Emergency Operation
- Normal Operation
- Adjustments
- Troubleshooting
- Maintenance
- Repairs and spare parts

3.3.4. Copies of the approved emergency, operations, and maintenance manuals shall be provided during the training sessions for reference.

3.3.5. Submit a copy of the Instruction Program along with the training schedule to the Owner for approval prior to scheduling training.

3.3.6. Time Period of Training: As specified in the various Specification Sections, or longer as required to fully instruct Owner’s designated operation and maintenance personnel in the operation, adjustment and maintenance of all products, equipment and systems.

3.3.7. Contractor shall maintain records of completed training, including sign-in sheets and any training materials and provide a copy to the Owner upon completion.

3.3.8. Videotape Recording: Engage a qualified commercial photographer to videotape the demonstration and training sessions. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids.

- Video Format and quality shall be high quality color videotaped modules in DVD format. Video quality shall be such that instruction is clear, audible, and all equipment components are clearly shown. Capture audience questions and responses.

- Organize DVDs according to the training module topics. Edit unnecessary camera movements/dead time.

- Provide (2) two copies of each DVD to the Owner upon completion.