

TG 01770 v1408
Summary of Changes

1. To modify As-builts, Warranty, and O&M Manual submittals to require electronic submittal of these documents. New process has already been started in the Construction Management Branch.

Closeout Procedures
TECHNICAL GUIDE

TG 01770

1. COORDINATION ISSUES:

1.1 The information contained in and required by this section has serious contract implications. Ensure there are no errors in the final specification section.

2. DESIGN ISSUES:

2.1 For all projects we are requiring the Contractor to assemble Operation and Maintenance (O&M) Manual(s).

2.2 The need and type of information for the O&M manual should be evaluated and tailored for each project (Air conditioning, fire alarm, program bell, etc.). The premise for the O&M concept is:

2.2.1 It promotes early consideration of facility reliability and maintainability during the acquisition process by requiring the designer, State and builder to identify the requirements for safe and effective operation, maintenance and repair of the facility.

2.2.2 It provides a framework and mechanism for capturing key information produced during the design, construction and final acceptance phases of a project. This is critical to the life cycle support of the facility. Complex systems are identified and given special treatment to ensure their safe and effective operation.

2.2.3 It ensures that our users receive a complete and accurate package of record documents and support information at project completion. This package is in hard copy and electronic format.

2.3 Operation and Maintenance (O&M) Manual are normally organized into 3 parts:

2.3.1 O&M Part I, Facility Information: This portion contains the basic information needed on a daily basis by the user.

2.3.1.1 Examples include general facility and system descriptions; utility connection and cut-off plans; safety hazards; warranty information; and HVAC filters.

2.3.2 OM Part II, Primary Systems Information: This portion provides detailed operation, preventive maintenance, repair and manufacturer's O&M data for selected systems.

2.3.2.1 Examples include normal and emergency operating procedures, flow diagrams, preventive maintenance requirements, spare parts, troubleshooting, repair procedures and warranty provisions.

2.3.2.2 Consultant shall make realistic recommendations as to preventive maintenance frequency and priority.

2.3.2.3 Consultant shall list systems to be included in the O&M manual. Complex facilities such as medical facilities or laboratory/research facilities may include fifteen or more systems while less complex facilities such as administrative buildings may include only two or three systems.

2.3.2.4 The following system list is not inclusive; rather it represents a sample of project systems that may be included in Part II of the O&M Manual. Some systems may have one or more subsystems, which can be listed separately in Part II. When individual subsystems are inter-related, the O&M Manual may be consolidated. For example, Heating, Ventilation and Air Conditioning, Direct Digital Controls, Laboratory Ventilation and Filtration, Cooling Tower Water Treatment, Space Temperature Control, and Control Monitor and Alarm may be combined. Typically included systems are:

- (a) Heating, Ventilation and Air Conditioning (HVAC), [*chillers, pumps, AHU's, air supply and distribution system, Space Temperature Control, Central plant, Cooling Tower Water Treatment*]
- (b) Direct Digital Controls (DDC), [*central control data system, energy management control system, and central control monitoring system*]
- (c) Fire Protection [*Fire Alarm, Fire Suppression (Wet/Dry Pipe), Carbon Dioxide (CO2), Underfloor Fire Suppression*]
- (d) Hospital or Laboratory Utilities [*Laboratory Ventilation and Filtration, Medical Gas, Medical Pure Water*]
- (e) Control Monitor and Alarm, [*Public Address System Intrusion Detection, Emissions Monitoring, Nurse Call*]
- (f) Clean Rooms
- (g) Emergency Power [*Diesel Electric Generator Uninterruptible Power Special Electrical Power*]
- (h) Switchgear and Wiring
- (i) Emergency Lighting
- (j) Compressed Air/Vacuum
- (k) Water Treatment
- (l) Special Conveyors/Hoists
- (m) Cathodic Protection
- (n) Scoreboard (Sporting events)
- (o) Special Flooring (Gym, Stage)
- (p) Field/Lawn Sprinklers
- (q) Special Track/Field

2.3.2.5 For the Users, faster repairs, reduced down time, and more effective preventive maintenance will result from using information in this part of the manual.

2.3.3 O&M Part III, Product Data: This portion provides the RECORD (as-built) DOCUMENTS including products, materials and equipment used in the facility.

2.3.3.1 Examples include manufacturer's product data submittals as required by Divisions 8 through 16 of the construction specifications; architectural items such as ceiling tile, carpeting, lavatory accessories and lighting fixtures; manufacturer's catalog data, data sheets, test reports and warranty sheets; and any shop drawings relevant to the facility's systems.

2.3.3.2 The information in Part III is organized by the divisions and sections of the construction specifications, and provides a quick method to locate the exact product installed.

3. DRAWING NOTES: (Not Used)

4. STANDARD DRAWINGS: (Not Used)

5. SPECIFICATION NOTES:

5.1 Confirm provisions of the attached Guide Specification for this project. Make sure to include only those appropriate elements of the O&M Manual. Edit accordingly.

- 5.2 Elements of the Operation and Maintenance (O&M) Manual: A comprehensive O&M package may include the following elements.
- 5.2.1 Staffing and Budgeting: Manpower requirements for O&M trade classification. Estimated costs to operate and maintain the facility. Normally the design professional will establish the parameters. Contractor will provide costing.
 - 5.2.2 Supply Support: Requirements for critical spare parts, repair parts, fuels and lubricants, which reflect special consideration of facility use and location. List any parts and supplies that have an unusually long procurement lead-time.
 - 5.2.3 Operating Procedures: Step-by-step instructions to bring systems from static to operational configurations and from operating to shutdown status. These instructions include both normal and emergency operating conditions. Posted instruction shall be framed, protected and shall use non-fading media. Identify the separate systems (specified under separate specification sections and installed by different Contractors) that become part of the inter-related system.
 - 5.2.4 Basis Data for Operation and Maintenance Contracts and Performance Work Statement: Basic information needed to prepare a Performance Work Statement for any operation or maintenance requirement that will be accomplished by contract rather than by user workers. Normally the design professional will establish the parameters.
 - 5.2.5 Troubleshooting Guides and Diagnostic Techniques: Troubleshooting procedures to promptly isolate the cause of typical system malfunctions. Documentation of specialized test equipment needed to diagnose malfunctions and techniques for use of the equipment.
 - 5.2.6 Extended Warranty Information: Table of equipment and components that have extended warranties and the associated manufacturer's name, address, phone and email address. Contractor shall provide labels identifying Project Name and Title, DAGS Job No., applicable contract end date, Contractor's Warranty service contact and phone number. Mount labels on equipment near faceplates.
 - 5.2.7 Maintenance Planning Documentation: Lubrication schedules, maintenance requirements, special tools, and safety precautions.
 - 5.2.8 Work Control Documentation: Procedures and formats for scheduling, monitoring, controlling and documenting both preventive and corrective maintenance actions.
 - 5.2.9 Technical Data: Design loads, design calculations, reserve capacities, one-line diagrams, logic diagrams, critical tolerances, base-line performance data, vibration signatures, etc.
 - 5.2.10 Repair Procedures: Repair instructions to restore equipment and systems to proper operating condition. Where necessary, remove and replace instructions.
 - 5.2.11 Manufacturer's Product Data: Drawings, illustrations, catalog cuts, equipment listings and product technical data furnished by the manufacturer.
 - 5.2.12 Documentation: Compilation of specialized information such as: total building commissioning plan, sustainable design features, reliability centered maintenance features, and environmental considerations. Also, include information on either the useful life and replacement date of a newly constructed facility or adjusted useful life and replacement date if major renovation or repair work is performed on an existing facility.

6. GUIDE SPECIFICATION:

DESIGN CONSULTANT CRITERIA

V143.084
TG 01770 - 3

6.1 SECTION 01770 - CLOSEOUT PROCEDURES is attached: Add this section to all Projects.

SPECIFIER'S NOTE: For large major projects separate narrow scope sections may be created titled "Project Record Documents" for submitting Record Drawings and "Operation and Maintenance Data" for operation and maintenance manual requirements. Consult with the Project Coordinator, ~~and DAGS Quality Control Branch~~ Technical Services Office, Construction Management Branch, and the User before implementing the narrow scope sections.

SPECIFIER'S NOTE: Blue colored texts are Notes to the Specifier and should be completely deleted from the final text. Where [red colored text in brackets] is shown in this specification section, insert wording, numbers, etc. as appropriate and delete brackets. Where <Red colored text in brackets> is shown, choice is indicated. Make the appropriate choice and delete the brackets. Maintain footer notation in italics with the current version used (e.g. TG 01770 v1~~43.084~~). Verify that section titles cross referenced in this Section correspond to this Project's specifications; Section titles may have changed.

Do not include the Project Name (etc.) line in the footer. Use the following format for the specification footer.

TG 01770 v1~~43.084~~
DAGS Job No. [00-00-0000]

Closeout Procedures
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End Footer Sample

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

SPECIFIER'S NOTE: Modify paragraphs 1.01 A. and 1.01 B. to meet project requirements.

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including the following:
 - 1. Project Record Documents.
 - 2. Operation and Maintenance Manuals.
 - 3. Warranties.
 - 4. Instruction for the State's personnel.
- B. Related documents include the following:
 - 1. SECTION 1322 – WEB BASED CONSTRUCTION MANAGEMENT for use of the StateWebCM for electronic submittals.
 - 2. SECTION 01700 - EXECUTION REQUIREMENTS.

SPECIFIER'S NOTE: Coordinate subparagraph 1.02 A. 5. with Division 8 Door Hardware Sections. Revise if the State makes final changeover or if key-control system manufacturer delivers keys directly to the State. Edit (Add/Delete) paragraphs to meet Project requirements.

1.02 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting a Final Inspection to determine Substantial Completion, complete the following items in addition to requirements of Article 7 of the GENERAL CONDITIONS.
 - 1. Advise the Contracting Officer of pending insurance changeover requirements.
 - 2. Submit specific warranties, final certifications, and similar documents.
 - 3. Obtain and submit occupancy permits, operating certificates, and similar releases and access to services and utilities, unless waived by the Contracting Officer.
 - 4. Arrange to deliver tools, spare parts, extra materials, and similar items to a location designated by the Contracting Officer. Label with manufacturer's name and model number where applicable.
 - 5. Make final changeover of permanent locks and deliver keys to the **<Contracting Officer><User>**. Advise the State's personnel of changeover in security provisions.
 - 6. Complete startup testing of systems.
 - 7. Submit test, adjust, and balance records.

8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Advise the Contracting Officer of changeover in other utilities.
10. Submit changeover information related to the State's occupancy, use, operation, and maintenance.
11. Complete final cleaning requirements, including touch up painting.
12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
13. Submit the O&M Manual(s) for review.

14. [Submit Field-Posted As-Builts electronically per SECTION 1322 – WEB BASED CONSTRUCTION MANAGEMENT](#)

SPECIFIER'S NOTE: Edit as applicable.

1.03 FINAL COMPLETION

- A. Preliminary Procedures: Within 10 days from the Project Acceptance Date, complete the following items in addition to requirements of GENERAL CONDITIONS Article 7 PROSECUTION AND PROGRESS:
 1. Instruct the State's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training media materials.

1.04 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit 2 copies of any updated and action taken list. In addition to requirements of GENERAL CONDITIONS Article 7 PROSECUTION AND PROGRESS, include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project Name and Title.
 - b. DAGS Job No.
 - c. Date and page number.
 - d. Name of Contractor.

1.05 PROJECT RECORD DOCUMENTS AND REQUIREMENTS

- A. General:

1. Definition: "Project Record Documents", including Record Drawings, shall fulfill the requirements of "Field-Posted As-Built Drawings" listed in the GENERAL CONDITIONS.
2. Do not use Project Record Documents for daily construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Contracting Officer's reference during normal working hours and electronically per SECTION 1322 – WEB BASED CONSTRUCTION MANAGEMENT. Maintain these documents as specified in paragraph entitled "Record Drawings" hereinafter.
3. The Designer, under contract with the State, will update the drawings to show all addendum, PCD, and sketch changes. The Contracting Officer will transmit these drawings (mylar or vellum) to the Contractor who will make all "red-line" corrections to these drawings to record the changes depicted on the Contractor's Field Posted Record ("As-Built") by accepted drafting practices as approved by the Contracting Officer.
4. Where the recorded changes depicted on the Contractor's Field Posted Record ("As-Built") are in the form of shop drawings, the Contractor shall provide those shop drawings electronically on mylar or vellum sheets in the same material and the same sheet size as the drawings transmitted to the Contractor. The new drawing sheets shall be titled and numbered to conform to the construction drawings and clearly indicate what information they supercede in the actual construction drawings. For example a new drawing that replaces drawing M-3, could be numbered M3a.
5. The Contractor shall bring to the attention of the Contracting Officer any discrepancy between the changes made by the Designer and those depicted on addendum, PCD, and sketch changes. The Contracting Officer will resolve any conflicts.
6. Submit final Record Documents (Field Posted Record Drawings) within 10 days after before the Final Inspection Date and but no later than the Contract Completion Date, unless the GENERAL CONDITIONS require an earlier submittal date otherwise.
7. The Contractor shall guarantee the accuracy of its final Record Documents. The State will hold the Contractor liable for costs the State incurs as a result of inaccuracies in the Contractor's Record Documents.
8. Prepare and submit [construction photographs and electronic files], damage or settlement surveys, property surveys, and similar final record information as required by the Contracting Officer.
9. Deliver tools, spare parts, extra materials, and similar items to a location designated by the Contracting Officer. Label with manufacturer's name and model number where applicable.
10. Submit pest-control final inspection report and warranty.
11. Submit Final, corrected O&M Manual(s).

SPECIFIER'S NOTE: Insert additional provisions on projects where corrected, reproducible copies of Contract Drawings or Record CAD Drawings are required. Confirm requirements with the Project Coordinator.

B. Record Drawings:

1. Maintain a duplicate full-size set as theef Field Posted Record ("As-Builts") Drawings at the job site. Clearly and accurately record all deviations from alignments, elevations and dimensions, which are stipulated on the drawings and for changes directed by the Contracting Officer that deviate from the drawings.
2. Record changes immediately after they are constructed in place and where applicable, refer to the authorizing document (Field Order, Change Order, or Contract Modification). Use red pencil to record changes. Make Field Posted Record Drawings available to the Contracting Officer at any time so that its clarity and accuracy can be monitored and can be countersigned for validity.
 - a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - d. Mark the contract drawings or the shop drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on contract drawings.
 - e. Mark important additional information that was either shown schematically or omitted from original Drawings.
 - f. Locate concealed building utilities by dimension from bench marks or permanent structures. Locate site utilities by dimensions, azimuth and lengths from bench marks or permanent structures.
 - g. Note field order numbers, Change Order numbers, Contract Modification numbers, Alternate numbers, post-construction drawing numbers (PCD) and similar identification (RFI numbers) where applicable.
 - h. The Contractor shall initial each deviation and each revision marking.
3. Use the final updated Contract Drawing set (including all addenda, PCD, and sketches) plus applicable shop drawings for making the final Field Posted Record Drawings submittal.
4. Certify drawing accuracy and completeness. Label and sign the record drawings or use digital electronic signature as approved by the Contracting Officer.
5. Label the title sheet and on all sheets in the margin space to the right of the sheet number, written from the bottom upward, with the title "FIELD POSTED RECORD DRAWINGS" and certification information as shown below. Provide a signature line and company name line for each subcontractor that will also certify the respective drawing. Adjust size to fit margin space.

FIELD POSTED Certified By: _____ Date: _____
RECORD DRAWINGS [Contractor's Company Name]

6. Revise the Drawing Index and label the set "FIELD POSTED RECORD DRAWINGS". Include the label "A COMPLETE SET CONTAINS [____]"

SHEETS” in the margin at the bottom right corner of each sheet. Quantify the total number of sheets comprising the set.

7. If the Contracting Officer determines a drawing does not accurately record a deviation or omits relevant information, the State will correct any FIELD POSTED RECORD DRAWINGS sheet. Contractor will be charged for the State’s cost to correct the error or omission.
8. Use the final Field Posted Record Drawings sheets ~~and~~ create one electronic version of the set. The set shall be recorded in Adobe Acrobat PDF (Portable Document Format). Create a single indexed, bookmarked PDF file of the entire set of drawings and upload electronically per SECTION 1322 – WEB BASED CONSTRUCTION MANAGEMENT record on the CD. ~~Submit one set of the final Field Posted Record Drawings sheets and the complete electronic CD set(s).~~

1.06 WARRANTIES

- A. Submittal Time: Submit written manufacturer’s warranties at request of the Contracting Officer for designated portions of the Work where commencement of warranties other than Project Acceptance date is indicated.
- B. Partial Occupancy: Submit properly executed manufacturer’s warranties within 45 days of completion of designated portions of the Work that are completed and occupied or used by the State during construction period by separate agreement with Contractor.
- C. Organize manufacturer’s warranty documents into an orderly sequence based on the table of contents of the Specifications.
 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 inch x 11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer and prime contractor.
 3. Identify each binder on the front and spine with the typed or printed title “WARRANTIES”, Project Name and Title, DAGS Job Number, and name of Contractor.
 4. Use the final submittal of the warranties to create an electronic Adobe Acrobat PDF (Portable Document Format) version of the bound warranty documents files. Each sheet shall be separately scanned, at 600 DPI or better into a PDF file, indexed, ~~and recorded on a recordable compact disc (CD)~~ and uploaded electronically per SECTION 1322 – WEB BASED CONSTRUCTION MANAGEMENT.

SPECIFIER’S NOTE: Require 2 sets warranties be submitted as part of standard closing documents. Confirm with Project Coordinator if additional sets or other information is required.

~~—D. Provide [2] sets of manufacturer's warranties that exceed one year and one CD as part of the closing document submittals. Provide additional copies of each warranty to include in operation and maintenance manuals.~~

SPECIFIER'S NOTE: Oahu projects require 2 Pre-Final sets printed, 1 Final set printed and 6 Final CDs of the Operation and Maintenance manuals (Owner-1, plan or jobsite-1, maintenance-2 and contractor-2) and Kauai, Maui and Hawaii DAGS District Offices require 2 Pre-Final sets printed, 6 Final set printed and 6 Final CDs of the Operation and Maintenance manuals (Owner-1, plan or jobsite-1, maintenance-2 and contractor-2) be submitted. Modify the quantity as required for project location.

1.07 OPERATION AND MAINTENANCE MANUALS

- A. Assemble complete sets of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:
1. Operation Data:
 - a. Emergency instructions and procedures.
 - b. System, subsystem, and equipment descriptions, including operating standards.
 - c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
 - d. Description of controls and sequence of operations.
 - e. Piping diagrams.
 2. Maintenance Data:
 - a. Manufacturer's information, Material Safety Data Sheets, and a list of spare parts.
 - b. Name, address, and telephone number of installer or supplier.
 - c. Maintenance procedures.
 - d. Maintenance and service schedules for preventive and routine maintenance.
 - e. Maintenance record forms.
 - f. Sources of spare parts and maintenance materials.
 - g. Copies of maintenance service agreements.
 - h. Copies of warranties and bonds.
- B. Use the following 3 paragraph headings, "Notes, Cautions and Warnings", to emphasize important and critical instructions and procedures. Place the words "Notes", "Cautions", or "Warnings" immediately before the applicable instructions or procedures. Notes, Cautions and Warnings are defined as follows:
1. Note: highlights an essential operating or maintenance procedure, condition or statement.
 2. Caution: highlights an operating or maintenance procedure, practice, condition or statement which if not strictly observed, could result in damage to or destruction of equipment, loss of designed effectiveness, or health hazards to personnel.
 3. Warning: highlights an operating or maintenance procedure, practice, condition, or statement that if not strictly observed, could result in injury to or death of personnel.

C. Organize the Operation and Maintenance Manuals into suitable sets of manageable size. Bind and index data in heavy-duty, "D" type 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Binder color shall be maroon, or if not available red. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL", Project Name and Title include building number when appropriate, DAGS Job Number, Prepared For: [User Agency], Prepared By: [Contractor] and Volume Number. Each binder is a single volume.

D. Electronic Format

1. Provide all information (narratives, drawings and manual) in electronic PDF format and upload per SECTION 1322 – WEB BASED CONSTRUCTION MANAGEMENT. Provide on a Compact Disc (CD) or DVD if files are too large. Provide drawings and plans prepared for the O&M Manuals drawn electronically and saved as a PDF file. Name and index the files for ease of identification and updates.
2. Provide the complete O&M Manual using Adobe Acrobat PDF (Portable Document Format) files. Each sheet shall be separately scanned into a PDF file, indexed, bookmarked, hyperlinked to the table of contents and recorded on a compact disc (CD) uploaded per SECTION 1322 – WEB BASED CONSTRUCTION MANAGEMENT. Scanned documents shall be scanned at 600 DPI or better. Indexes and bookmarks may be highlighted or colored text. The final submittal shall include written instructions for installing, accessing and retrieving information from the compact disc.

E. Pre-Final Submittal: Submit 12 printed sets of Pre-Final Operation and Maintenance Manuals, for review by the Contracting Officer, at least 5 days prior to scheduled final inspection. Manuals shall be marked as Pre-Final.

1. Make any correction noted before submitting the final Operation and Maintenance Manuals.

1. ~~The user and the Department will each keep one copy of the Pre-Final submittal to operate and maintain the facility from the Project Acceptance Date through submission of the final submittal. Therefore, the submittal shall contain all the required information that is available at the time of submission.~~

2. ~~One~~The set will be returned with comments. Additional review comments may include problems discovered during the O&M Manual's review, site validation, and facility start up and will be provided to the Contractor after facility Project Acceptance Date.

SPECIFIER'S NOTE: Select 6 copies of the printed Final Sets for Kauai, Maui and Hawaii District Offices or 1 copy for Oahu.

F. Final Submittal: Use the final submittal of the manuals to create the electronic PDF file version of the bound Operation and Maintenance Manuals documents. Include the Submittal (100 percent) review comments along with a response to each item. Upload Final Submittal per SECTION 1322 – WEB BASED CONSTRUCTION MANAGEMENT. Provide [1] [6] Final sets of the printed manuals and 6 Final compact discs, (CDs) as part of the closing document submittal. Final printed manual and any disks shall be marked as Final and sent to the Contracting Officer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

SPECIFIER'S NOTES: If specific instructors, such as the installer or a factory authorized service representative, are required for demonstration, indicate the requirement in the individual Specification Sections. Edit to suit project or delete.

3.01 DEMONSTRATION AND TRAINING

- A. Instruction: Instruct the State's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Provide instructors experienced in operation and maintenance procedures.
 - 2. Provide instruction at mutually accepted times.
 - 3. Schedule training with the State's users, through the Contracting Officer with at least 7 days advanced notice.
 - 4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.
- B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. For each training module, develop a learning objective and teaching outline. Include instruction for the following:
 - 1. System design and operational philosophy.
 - 2. Review of documentation.
 - 3. Operations.
 - 4. Adjustments.
 - 5. Troubleshooting.
 - 6. Maintenance.
 - 7. Repair.

SPECIFIER'S NOTE: Edit accordingly if phased construction.

3.02 FINAL [PROGRESSIVE] CLEANING

- A. General: Provide <progressive> final cleaning <for each phase of work prior to starting the next phase>. In addition to requirements of Article 7 of the GENERAL CONDITIONS conduct cleaning and waste-removal operations to

comply with local laws and ordinances and federal and local environmental and antipollution regulations.

SPECIFIER'S NOTE: Revise subparagraphs 3.02 B. 1. thru 3.02 B. 19. to suit Project. Check for conflict or duplication with provisions in other Sections, particularly Divisions 15 and 16. Subparagraph 3.02 B. 16. below is a major work item that may be disruptive to closeout procedures.

- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturers written instructions unless noted otherwise. Complete the following cleaning operations before requesting final inspection for entire Project or for a portion of Project:
1. 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.
 2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits resulting from construction activities.
 3. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 4. Remove tools, construction equipment, machinery, and surplus material from Project site.
 5. 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.
 6. Remove debris and surface dust from limited access spaces, including: roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 7. Sweep concrete floors broom clean in unoccupied spaces.
 8. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 9. 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 surfaces, taking care not to scratch surfaces.

SPECIFIER'S NOTE: The following floor cleaning and waxing paragraph is for existing projects where resilient floor covering is not part of the work and the work will be of the type that the existing floors need to be stripped and waxed. If not applicable, delete. If new flooring requires finishing, provide finishing in the application section and not here.

10. Floor Cleaning and Waxing: Prepare the floor tiles and remove wax finish. Apply 2 coats of sealer and 4 coats of wax to the floor and polish to smooth

shiny finish per floor sealer and wax manufacturer's requirements. Use one of these 3 sealer products; Betco Floor Sealer, Hillyard Seal 341 Sealer, or SC Johnsons Over and Under Sealer and any one of these 3 wax products; Betco Hybrid 25, Hillyard North Star, or SC Johnsons Vectra. Contractor shall submit its proposed sealer and wax products for review and approval.

- a. Schedule preparation and waxing operations not more than one week prior to final inspection. Limit floor traffic on waxed floors until acceptance.
11. Remove labels that are not permanent.
 12. 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.
 - a. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 13. Wipe surfaces of mechanical and electrical equipment, *[elevator equipment,]* and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 14. Replace parts subject to unusual operating conditions.
 15. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 16. Replace disposable air filters and clean permanent air filters. Clean the exposed surfaces of diffusers, registers, and grills.
 17. Clean ducts, blowers, and coils if units were operated without filters during construction.
 18. 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.
 19. Leave Project clean and ready for occupancy.

SPECIFIER'S NOTE: For new buildings, provide pest control services. Otherwise, confirm with Project Coordinator whether pest control is required. Also coordinate with SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS when used as part of site clearing, demolition, etc.

- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the State's property. Do not discharge volatile, harmful, or dangerous materials into drainage and sewer systems or onto State property. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION