PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for Work Order closeout including, but not limited to:

1. Work Order Record
2. Operation and Maintenance Manuals
3. Warranties and Bonds Manual
4. Operating Instructions and Training
5. Cleaning
6. Owner's Final Inspection
7. Substantial Completion
8. Final Completion, and
9. Final Acceptance

B. For additional specific construction Work, closeout requirements are described in Divisions 02 thru 49 of the Specifications.

1.2 WORK ORDER RECORD

A. General: Work Order Record documents include the Contractor's as-built Drawings, as-built Specifications, and as-built Shop Drawings required by the Contract Documents. Work Order Record documents must be protected from deterioration and stored in a secure fire-resistant location.

B. As-built Drawings: Maintain black line prints of the bid set Contract Drawings and approved Shop Drawings. Mark the drawings in red to show new information that was not shown on the bid set Drawings, and on the approved Shop Drawings, including the actual installation where the installation varies substantively from the work as originally shown. Mark drawings to show conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Organize as-built Drawings in manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on the cover of each set.

2. Mark with reproducible pencil and distinguish between variations in separate categories of the Work. Text size is to be 1/8" minimum. Good basic drafting practice must be applied.

3. Show bid addenda items, Change Orders, and Request for Information (RFI) responses by their number, and date the revisions with a "cloud" around the revision.

4. Keep accurate measurements of below-grade site work, including permanent shoring, in accordance with Section 01 71 23 "Field Engineering."

5. Show mechanical dampers, valves, reheat boxes, cleanouts, and other equipment and items that require maintenance.

6. Show location of construction-concealed mechanical, electrical and plumbing (MEP) riser installations including, but not limited to, piping, ductwork, and conduits referenced to visible and accessible features.
7. Show field changes of dimensions and details.

8. X-out conditions not constructed and appropriately annotate "not constructed" to convey the actual as constructed condition.

C. As-built Specifications: Maintain one (1) copy of the Notice to Proceed (NTP) Contract Documents showing all addenda, substitutions, Change Orders, and RFIs. Give particular attention to the selection of options, changes in product data, and information on elements engineered by the Contractor and note related as-built Drawing information, as appropriate. Clear, legible documentation must be applied.

D. As-built Shop Drawings: The Contractor shall comply with the following CAD (Computer-Aided Drafting) standards and requirements when preparing as-built record Shop Drawings required by the Contract Documents.

1. Cover sheets shall contain a complete index of all sheets.

2. Symbols shown must be symbols used in the Contract Documents.

3. Standard drafting practice shall be:

a. Title block

(1) All sheets shall have a title block.
(2) Title block information is to be on the right side of the sheet.
(3) Title blocks shall include the following information:

(a) Date
(b) University Work Order Name
(c) University Work Order Number
(d) University Facility Number (FACNUM)
(e) Sheet name
(f) Sheet number
(g) Contractor or Subcontractor company name
(h) A/E's Seal (whoever prepared the document)
(i) A Key Plan

b. Layering format: Use Army Corps of Engineers A/E/C CAD standard found at: https://cadbim.usace.army.mil/CAD

c. Scale and Units:

(1) All objects are to be drawn at full scale for the assigned unit of measure.
(2) All drawings are to have a unit of measure assigned and not set to "unitless."

d. External references usage in CAD Documents: External references are not allowed for submittals. All external references are to be bound using the "bind" option, instead of the "insert" option.

e. Area of Work: CAD drawings shall include a boundary that defines the area of work, showing only the area where work is performed.

4. CAD Compliance Submittal Review Requirements: CAD Shop Drawings shall be electronically submitted for Owner's CAD compliance review and approval prior to submitting as-built record Shop Drawings. The Contractor may request a compliance review at any time during the work prior to Substantial Completion.

5. Work Order submittal: Provide all record as-built Shop Drawings required by the Contract Documents in CAD and PDF format (per the requirements of Section 01 33 00 "Submittal Procedures").

a. CAD files shall be submitted in latest release of AutoCAD .dwg format.

(1) Custom menus or arx applications are not allowed if they create a requirement for the drawing to be used. No menus, custom user interface files or arx applications are to be submitted.

(2) Each CAD drawing shall represent a single printed sheet where the file name conspicuously identifies the sheet number (e.g. sheet A2.1 CAD file name might be A2-1.dwg).

(3) For all disciplines in a submittal, the CAD drawings shall be in a single folder. All supporting files (font files, line types, plot configurations, plot style tables, etc.) are to be in a subfolder.

1.3 OPERATIONS AND MAINTENANCE (O&M) MANUALS

A. Unless otherwise agreed upon by Owner, separate manuals shall be provided by the Mechanical and Electrical (M&E) Subcontractors titled MECHANICAL or ELECTRICAL and an additional manual provided by the General Contractor titled ARCHITECTURAL for all other information. The preliminary manuals shall be labeled "Preliminary" and comply with all requirements.

B The O&M Manuals shall contain all the information needed to operate, maintain and repair all systems, equipment, and product finishes provided in the Work Order. They shall be presented and arranged logically for efficient use by Owner's operation personnel. As a

minimum, the information provided shall include, but not be limited to, the following: (see Architectural, Mechanical and Electrical Divisions for additional requirements)

1. Product description including, but not limited to, manufacturer, product name or equipment make and model number (and other nameplate data), size and dimensions, color, Material Safety Data Sheets (and related product information), and other pertinent information

2. Supplier's name, address, e-mail address, phone, and reference order numbers

3. Product finishes maintenance and cleaning instructions

4. Performance and calibration data for specific product provided (extraneous catalog data must be eliminated)

5. Descriptions and diagrams of system assembly and configuration (including components and interrelations)

6. Manufacturer’s recommended equipment operating and maintenance instructions, including routine lubrication and servicing data, start-up and shutdown procedures, and any seasonal or emergency procedures
7. Manufacturer’s checklists and methods for troubleshooting

8. Complete parts list with parts numbers indicating common replacement parts and anticipated useful life

9. Copies of: digitally signed warranties; any certificates from respective manufacturers, suppliers, and Subcontractors; permits and/or licenses, and; equipment maintenance and service contracts.

C. The O&M Manuals shall contain the following information for specified items, when the item is specified elsewhere in the Contract Documents:

1. As-built door hardware schedule and submittal documentation

2. Elevator systems documentation

   a. Wiring/equipment locations diagrams

3. Refrigeration controls schematics/sequence of operation documentation

4. Motors data and variable frequency drives (VFDs) documentation

   a. Final settings programmed into the VFDs

5. Fan and pump curves documentation

6. HVAC filters schedule

7. Environmental controls systems (ECS) documentation including hardware and software manuals

8. Electrical--Short Circuit Coordination and Arc Flash Study Report

9. Pull calculations documentation for MV wire, cable, and terminations

10. Electrical transformer factory test reports documentation

D. Drawings included in the manual shall not exceed 11” x 17.”

E. If required by Owner, hard copy manuals shall be bound in a slant-D, 3-ring, view binder with a clear overlay insert on the front cover and spine. Otherwise O&M Manuals shall be submitted onto the Owner’s Construction Management System (CMS) or on CD/DVD, if requested by owner.

1. Provide a cover slip sheet and a spine sheet typed with ARCHITECTURAL, MECHANICAL, and (or) ELECTRICAL OPERATIONS AND MAINTENANCE MANUAL, University Work Order name, University Work Order number, University Facility number, A/E name, and Contractor name. Label manuals consecutively (ex., Mechanical 1 of 3).

2. Each manual shall have a typed index and tabbed dividers between specification divisions and sections or, when presented in a logical format by Contractor and approved by Owner, between systems/equipment categories.

3. Contents of the manual shall be printed on 8-1/2” x 11” acid free, recycled copy paper.

F. ARCHITECTURAL, MECHANICAL, and ELECTRICAL manuals may be combined into one manual, with approval of Owner.

1.4 WARRANTIES AND BONDS MANUAL

A. Assemble executed warranties and bonds, and any certificates from the respective manufacturers, suppliers, and Subcontractors. Provide preliminary review copies of all warranties and bonds and a final manual will the original documents, titles “Warranties and Bonds Manual.” Manuals shall be assembled in the same format as the O&M Manuals and include a table of contents in complete and orderly sequence. If approved by Owner, Warranty and Bond Manual may be combined with the O&M Manual.

1.5 OPERATING INSTRUCTIONS AND TRAINING

A. The Contractor shall provide on-site instruction and training for Owner's personnel in all aspects of the philosophy, operation and maintenance of equipment and systems. Instruction and training shall be provided by a qualified trainer from the Contractor or Subcontractor who supplied and installed the equipment and systems and/or a manufacturer's training representative who is familiar with all aspects of the design, operation, maintenance, and

troubleshooting of the specified equipment and systems. Training shall be conducted in a classroom setting with appropriate schematics, handouts, and audio/visual aids. All training shall also be digitally recorded in video, cataloged, and provided to Owner in a DVD/container labeled with session identification and date. Attendance shall be recorded. For work requiring commissioning, see Section 01 91 00 "General Commissioning Requirements" for further training session agenda requirements.

1. Prepare and submit a training plan for Owner's information and coordination. For each training session, the training plan shall include the following:

    a. Dates, start and finish times, and locations
    b. Outline of the information to be presented
    c. Names and qualifications of the presenters
    d. List of texts and other materials required to support training

1.6 CLEANING

A. Contractor clean up during construction is specified in the Contract Documents.

1. If Contractor fails to clean as specified in the Contract Documents, and after reasonable notification from Owner, Owner may do so and the cost thereof shall be charged to the Contractor.

2. For work in medical centers, reference housekeeping in Section 01 35 33 "Infection Control."

3. Contractor shall employ continuous housekeeping cleaning during construction to minimize interior construction dust and particulates during the Work.

B. Preliminary Cleaning: Perform the following preliminary cleaning operations as a prerequisite for Owner's Final Inspection. The following are examples, without limitation, of minimum cleaning requirements:

1. Remove labels that are not permanent.

2. Remove temporary protective coatings and wrappings from all products.

3. Remove glazing compounds and other vision obscuring substances from transparent and reflective materials provided by the Contractor including, but not limited to, mirrors, glass in doors and interior construction, glass canopies and skylights, and windows inside and out.

4. Clean all exposed building interior surfaces, including cabinet interiors, and new exterior surfaces to be free of foreign substances including, but not limited to, stains and films.

5. Leave floors broom-clean. Vacuum carpeted surfaces and clean consistent with manufacturer's recommendations for installation.

6. Remove and clean all construction debris and refuse from:

    a. Roofs, mechanical and electrical rooms, tunnels and equipment vaults
    b. Limited access spaces, including above ceiling areas and shafts
    c. Physically inaccessible components of the Work including wall and chase cavities, gutters and downspouts, floor drains and other drainage systems

7. Wipe surfaces of M&E equipment, including elevator equipment and similar Architectural equipment. Remove excess lubrication and other substances.

8. Clean the Project site of construction waste, rubbish, and litter. Sweep paved areas broom clean and remove stains, spills, and other foreign deposits.

C. Final Cleaning: Prior to Substantial Completion, employ experienced workers or professional cleaners for final cleaning of the Work. Clean to a condition expected of a normal commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Leave entire Project clean and ready for occupancy. All new interior, including cabinet interiors, and exterior building surfaces, fixtures and equipment shall be turned over to the Owner in a new condition, free of all damage, dust, dirt, spots, stains, encrustations, and other blemishes.

2. Clean transparent materials including mirrors, glass in doors and interior construction, glass canopies and skylights, and windows inside and out.

3. Clean plumbing fixtures to a sanitary condition.

4. Clean light fixtures and lamps.

5. Apply floor finishes, except at UWMC and within Housing and Food Services buildings.

D. Compliance: The Contractor shall:

1. Use non-toxic Green Seal Certified cleaning products, or products with low-volatile organic compounds (VOC), and cleaning paper with a post-consumer recycled content;

2. Employ equipment with high efficiency particulate filtration and sweep compound to keep dust down; and

3. Comply with current regulations and standards of authorities having jurisdiction and the safety standards for cleaning specified in the manufacturer’s instructions.

1.7 OWNER'S FINAL INSPECTION

A. Prior to Final Inspection: The Contractor shall satisfactorily complete the following actions prior to the Owner's final inspection of the Project.

1. Submit written notice that the Project is ready for final inspection. Include a copy of the Contractor's final punch list report (see Section 01 45 00 "Contractor Quality Control") and list all incomplete work items that have been reviewed with the Owner, and which the Owner has agreed are not necessary prior to Substantial Completion.

    a. Include: a written plan/schedule outlining all actions necessary to achieve Substantial Completion, without requiring extra ordinary participation by Owner and A/E.

2. Complete preliminary cleaning operations.

3. Submit a list of all equipment and systems requiring instruction and training with a proposed schedule of times and locations for the instruction, for Owner's review and comment.

4. Replace all ventilation systems air filters specified for construction with final filters.

5. Complete start up and functional performance testing of all systems required by the Contract Documents and AHJ including, but not limited to: electrical testing; environmental control systems point-to-point testing; emergency eyewash and safety shower testing; fume hood face velocity testing; and HVAC air balancing (if included in the scope of the Work).

6. Submit one (1) hard copy each of the current air balancing report and the M&E Commissioning Binders labeled "Preliminary," listing all deficiencies, for Owner's review and comment.

7. Submit the final mechanical pressure test and flushing forms, signed-off by Owner's Representative.

8. Submit the final copper and fiber optic communications cabling test results in PDF format, on Owner's CMS.

9. Submit the final audio/visual equipment documentation including, but not limited to, manufacturer/model information and an itemized summary list with equipment serial numbers in PDF format, on Owner's CMS.

B. Owner's Final Inspection: Upon satisfactory completion of the actions in 1.7A, Owner will determine if the Work is complete and ready for final inspection and, at Owner's sole discretion, commence final inspection, or provide a written deficiency list of items to the Contractor of work that must be completed to the satisfaction of the Owner prior to the Owner's final inspection. Final inspection is performed by the A/E and Owner's representatives.

1. After the Owner has issued the final inspection list of corrective work items, the Contractor shall make the required corrections and/or identify items that the Contractor feels are not required by the Contract Documents, and resolve these items with the Owner.

C. Re-inspection: Contractor shall request, in writing, re-inspection after completing the Owner's final inspection list of corrective work items and providing the Owner the final inspection report notated with a signed-off approval for each of the corrected items. Those items whose completion is delayed due to circumstances acceptable to the Owner will be exceptions. The Owner's Representative will back check the items or have the A/E perform a re-inspection.

1. If the A/E is required to perform more than one re-inspection, the costs for additional inspections may be borne by the Contractor, at the Owner's sole discretion.

1.8 SUBSTANTIAL COMPLETION

A. Substantial Completion: Substantial Completion (for either the entire Work or portions thereof) shall be achieved when all Work, other than incidental corrective or punch list work, is complete including, but not limited to, the following actions:

1. Complete final cleaning operations.

2. Submit the "Draft" Operations and Maintenance Manual for Owner's review and comment in PDF format, on Owner's CMS, within five (5) working days following substantial completion.

3. Submit all sign-offs, releases, jurisdictional settlements, judgments, and other records from AHJ allowing the Owner's full and unrestricted use and benefit of the facilities including, but not limited to, a temporary or permanent certificate of occupancy permit, operating permits and/or licenses for the use of building equipment such as elevators, boilers, paint booths, etc. and similar necessary certificates and releases.

   a. Provide a list of any outstanding work required by AHJ.

4. Submit the current Work Order Record as-built Drawings and Specifications identified "Preliminary" Work Order Record (marked with the date of submission) in PDF format, on Owner's CMS.

5. Submit the Work Order Record as-built Shop Drawings required by the Contract Documents in accordance with this Section 1.2D.5, on Owner's CMS.

6. Remove all construction tools and temporary facilities not required for Final Completion work from the Project site including, but not limited to, storage sheds, samples and mock-ups, Project identification signage, site fences, crane and hoist base foundation construction, temporary enclosures, and construction electrical power and service.

7. Complete Owner's personnel operating instructions and training and submit training DVD's.

8. Deliver specified maintenance equipment and tools to Owner, with itemized summary list.

9. Complete final change-over of locks, transmit new keys to Owner, and return Owner's loaned construction keys.

10. Complete all air balancing, testing and commissioning work required by the Contract Documents, allowing the Owner to fully occupy the Work for the use for which it is intended. Incidental Work, that is not life safety or occupational safety commissioning work, whose completion is delayed due to circumstances excused by the Owner, will be the exception.

    a. Submit one (1) hard copy each of the current air balancing report and M&E Commissioning Binders (marked with the date of submission) noting the corrections for deficiencies listed in the "Preliminary" report and binders and indicating any incomplete Work.

    b. Submit one (1) hard copy each of the current environmental control systems point-to-point testing documentation and (when specified as work of the Contractor) the current Testing, Adjusting and Balancing (TAB) report (marked with the date of submission).

11. Submit all controls systems software files required by the Contract Documents including, but not limited to, lighting and environmental controls.

12. Submit one (1) hard copy of the current Build It LEED Toolkit ® with all LEED documentation labeled "Preliminary," for Owner's review and comment.

13. Submit completed SustainAbility Scorecard.

B. Substantial Completion: Upon a satisfactory completion of the actions in 1.8A above and the General Conditions requirements for Substantial Completion, the Owner will prepare a letter of Substantial Completion and forward to Contractor. The letter will identify the date of Substantial Completion and include the final punch list report and the commissioning deficiencies list, listing all remaining incomplete work. Contract warranties will begin as of the date of Substantial Completion, as specified in Section 01 78 36 "Warranties," or as otherwise indicated in the Contract Documents.

    1. Substantial Completion and the start of warranties for incomplete items will be established in writing by the Owner when the item is determined complete.

1.9 FINAL COMPLETION

A. Prior to Final Completion: Final Completion shall be achieved when the Work is fully and finally complete, to the Owner's satisfaction in accordance with the Contract Documents including, but not limited to, the following:

1. All Work, including incidental corrective or punch list work, and air balancing and commissioning work (if included in the scope of the Work) is complete and correct to the satisfaction of the Owner.

2. All remaining temporary facilities are removed from the Project site and the site (including landscape) is restored to original conditions or Contract Documents requirements.

3. All final permits, originally issued as temporary permits, have been submitted.

4. The final marked-up Work Order Record as-built Drawings and Specifications identified Final Work Order Record (marked with the date of submission) have been submitted in hard copy, if required; and in PDF format, on Owner's CMS.

5. The complete Operations and Maintenance Manual and Warranties and Bonds Manuals have been submitted in PDF format, on Owner's CMS, and a hard copy of the Warranties and Bonds Manual with original documents has been submitted if required.

6. The Contractor's final 3-ring binder of all MSDS used for construction, marked with the date of submission, has been submitted in PDF format, on Owner's CMS.

7. The Contractor's final cumulative Construction Waste Management Report (marked with the date of submission) has been submitted in PDF format, on Owner's CMS.

8. All Change Orders are approved and signed by both parties.

9. A draft of the Final Application for Payment has been submitted to Owner for review and approval.

10. The final Schedule of Values and the Building Componentization Report in hard and electronic copies (see Section 01 29 76 "Progress Payment Procedures") have been submitted.

11. The final air balancing report and the final M&E Commissioning Binders (marked with the date of submission) have been submitted in PDF format, on Owner's CMS.

    a. For Projects with a Test Engineer, the as-built information updating the A/E commissioning basis-of-design has been submitted with the Commissioning Binders.

12. The final environmental control systems point-to-point testing documentation and (when specified as work of the Contractor) the final air balancing report marked with the date of submission, has been submitted in PDF format, on Owner's CMS.

13. The software file used to calculate the power systems studies (Power Tools – SKM®) has been submitted.

14. Specified spare parts, extra stock of materials, and extra materials of value to the Owner, with itemized summary list, have been submitted.

15. The "Regulated Materials – Waste Manifests" (marked with date of submission) have been submitted in PDF format, on Owner's CMS.

16. For Projects at the UW Warren G. Magnuson Health Sciences Center, UW Medical Center, and Harborview Medical Center; all personnel identification badges have been returned.

17. All required USGBC LEED certification on-line forms are submitted and the final Build It LEED Toolkit® with all final LEED documentation including the LEED estimated construction costs have been submitted in PDF format, on Owner's CMS.

18. Waste Management Report: See 01 74 00. Provide waste management report as applicable.

B. Final Completion: Upon satisfactory completion of the requirements in 1.9A above to achieve Final Completion, the Owner will approve and process the final Application for Payment and establish the date of Final Completion thereon.

1.10 FINAL ACCEPTANCE

A. Final Application for Payment has been approved by Owner and payment made to the Contractor.

B. The Owner will establish the date of Final Acceptance and issue the letter of Final Acceptance after the Contractor has completed the requirements of the Contract Documents.

1. The Contractor shall follow the requirements outlined in the General Conditions and Section 01 29 76 "Progress Payment Procedures" for release of retainage.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION