

SECTION 01 7000**EXECUTION AND CLOSEOUT REQUIREMENTS****PART 1 - GENERAL****1.01 EXECUTION REQUIREMENTS****A. Cutting and Patching:**

1. Structural Elements: Do not cut existing structural elements unless shown in Contract Documents. When cutting and patching is required of structural elements, notify University's Representative of locations and await directions from University's Representative before proceeding. Shore, brace, and support structural elements during cutting and patching.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.
3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in University's Representative's opinion, reduce the building's aesthetic qualities.

B. Cutting and Patching Submittals:

1. Prior to cutting which may affect structural integrity of facility or Work of another Contractor working in area, submit written notice to University's Representative requesting consent to proceed with required cutting. Request shall, at a minimum, include:
 - a. Identification of project.
 - b. Description of affected Work.
 - c. Necessity for cutting.
 - d. Effect on other Work and/or on structural integrity of facility.
 - e. Description of proposed Work including:
 - 1) Scope of cutting and patching.
 - 2) Trades to execute Work.
 - 3) Products proposed to be used.
 - 4) Extent of refinishing.
 - f. Alternatives to cutting and patching which are available, if any.
 - g. Estimate of cost, if applicable.
 - h. Notification of interruption of services, if involved in cutting/patching Work.
2. If conditions of Work or schedule indicate a change of materials or methods is required, written recommendation shall be submitted to University's Representative to include:

- a. Conditions indicating change.
 - b. Recommendations for alternative materials or methods.
 - c. Submittals as required for substitutions.
3. No cutting or excavation shall be done without prior approval of University's Representative.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment. Comply with requirements and recommendations published by manufacturer of materials involved unless otherwise noted in Specifications. When neither Contract Specifications nor material manufacturers address installation methods, industry standards may be used.
- D. Powder-Actuated Fasteners:
 1. Gas or "power" actuate tools are not applicable to this paragraph.
 2. Door frames shall only be fastened with two-piece expansion anchors.
 3. For existing concrete, use two-piece cinch anchors, epoxied anchors or wedge anchors appropriate for conditions and function, except as allowed below.
 4. Prohibited: Hand driven concrete nails for use inside a campus building are prohibited.
 5. Prohibited: Use of fasteners in hard or brittle materials is prohibited by Cal/OSHA. .
 6. Use of low velocity explosive powder-activated tools is permitted only at construction sites that has very low occupancy during non-working hours and facilities without a vivarium.
 7. Low velocity tools shall use a piston in the chamber to drive the fastener (indirect acting).
 8. Low velocity tools may be used for the conditions described below:
 - a. Anchoring metal track for interior non-load bearing walls.
 - b. Fastening of furring strips to concrete walls.
 - c. Temporary fastening and concrete forming.
 - d. Installation of straps and wires used to suspend the following:
 - 1) Metal duct work 10 inches diameter or 10 x 10 inches square or smaller;
 - 2) Piping NPS 1 and smaller;
 - 3) Electrical conduit 2 inch trade size or smaller.
 - e. Fastening of plaster accessories, flashing and similar items with negligible loading.
 9. Requirements for Low Velocity Powder Actuated Fasteners.
 - a. Comply with Cal/OSHA Title 8, Division 1, Chapter 4, Subchapter 4, Article 27, "Powder-Actuated Tools" and meet or exceed the requirements of ANSI/ASSE A10.3, latest edition.
 - b. Tool operator shall be trained by a Powder Actuated Tool Manufacturers Institute (PATMI) qualified instructor and carry a valid operator's card. Submit copy of card to University's Representative for any person who will use the tool.

- c. Where designated by University's Representative, anchors, fasteners and ties installed utilizing low velocity powder-actuated tools will be tested by an independent testing laboratory to resist two times the design load. Any such anchor, fastener, or tie which fails such a test shall be replaced at no additional cost to University.
 - d. Buildings that contain post-tensioned elements require specific additional restrictions imposed by the University's Structural Engineer. Do not proceed until receiving the restrictions.
10. Procedures for use of low velocity powder actuated tools (PAT):
- a. Containers for PAT shall be lockable and bear the label *POWDER-ACTUATED TOOL* on the outside. The container shall be kept locked.
 - b. The following shall be provided with each tool:
 - 1) Operating and service manuals.
 - 2) Power load chart.
 - 3) Inspection-Service record.
 - 4) Repair and servicing tools.
 - c. Provide required personal safety protection gear for Operators and assistants.
 - d. PAT shall be inspected prior to use. Defective tools shall not be used.
 - e. PAT shall not be left unattended.
 - f. PAT shall not be loaded until ready for use.
 - g. PAT shall be unloaded if work is interrupted.
 - h. On misfire, the PAT shall be held in place for 30 seconds.
 - i. Misfires shall be placed in a can of water.
 - j. Different powder loads shall be kept in separate compartments.
 - k. Warning signs, minimum 8 x 10-inches, with 1-in. letters, shall be posted bearing the words: "*POWDER-ACTUATED TOOLS IN USE*" within radius of 50 feet of the point of use.
 - l. PAT are prohibited to be used in an explosive or flammable atmosphere.
 - m. Fasteners shall be driven a minimum of 1-inch away from the edge of steel and 3-inches from the unsupported edge of masonry materials.
 - n. Concrete thickness shall be at least three times the fastener shank penetration.
 - o. Fasteners are prohibited to be driven into spalled concrete areas or material that would allow the fastener to pass through.
 - p. Fasteners are prohibited to be driven through existing holes unless a specific guide means, as recommended and supplied by the tool manufacture, is used to assure positive alignment.
 - q. PAT shall be held perpendicular to the work surface when fastening into any material, except for specific applications recommended by the tool manufacturer.

E. Hazardous Materials Procedures:

- 1. Except as otherwise specified, in the event Contractor encounters on the Project site material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), or other hazardous materials which have not been rendered harmless, Contractor shall

- immediately stop Work in the area affected and report the condition to University and University's Representative in writing.
2. The Work in the affected area shall not thereafter be resumed except by written agreement of University and Contractor if in fact the material is asbestos, PCB, or other hazardous materials and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos, PCB, or other hazardous materials, or when such materials have been rendered harmless.

1.02 CLOSEOUT SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Certified List of Incomplete Items: Final submittal at Final Completion.
- C. Operation and Maintenance Data: Submit two copies of manual.
- D. PDF Electronic File: Assemble manual into a composite electronically indexed file. Submit on digital media.
- E. Record Drawings: Submit one set(s) of marked-up record Contract Documents.
- F. Record Product Data: Submit one paper copy or annotated PDF electronic files and directories of each submittal.

1.03 SUBSTANTIAL COMPLETION PROCEDURES

- A. 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.
- B. Submittals Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:
 1. Obtain and submit releases from University's Representative permitting University unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other sections, including project record documents, operation and maintenance manuals, similar final record information, warranties (guarantees), workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 3. Submit maintenance material submittals specified in other sections, including tools, spare parts, extra materials, manufacturer, model, and similar items, and deliver to location designated by University's Representative.
 4. Submit testing adjusting and balancing (TAB) report.
 5. Submit changeover information related to University's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:
 1. Advise University of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to University.

3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used.
 5. Advise University of changeover in any utilities.
 6. Remove temporary facilities, construction tools, and controls.
 7. Complete final cleaning requirements, including touchup painting.
 8. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects. Replace defective materials or equipment.
- D. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, University's Representative will proceed with inspection or advise Contractor of unfulfilled requirements. University's Representative will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

1.04 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting inspection for determining final completion, complete the following:
1. Submit a final Application for Payment.
 2. Submit certified copy of University's Representative's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by University's Representative. Certified copy of the list shall state that each item has been completed or otherwise resolved.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, University's Representative will either proceed with inspection or notify Contractor of unfulfilled requirements. University's Representative will prepare final Certificate for Payment after inspection or will advise Contractor of items 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.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible or will provide a match with acceptable visual and functional performance of in-place materials.
- B. 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.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

2.02 OPERATION AND MAINTENANCE DOCUMENTATION

- A. Directory: Prepare a single, comprehensive directory of emergency instructions, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: Unless otherwise indicated, organize manual into separate sections for each system, and separate sections for each piece of equipment not part of a system.
- C. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Include the following:
 1. Final marked NET or MCN submittal or record version.
 2. Photos or typed reproduction of new or existing equipment nameplate data for any installed equipment. Photo(s) must clearly depict the complete data shown on nameplate.
 3. Manufacturer's operation and maintenance documentation.
 4. Maintenance and service schedules.
 5. Maintenance service contracts. Include name and telephone number of service agent.
 6. Emergency instructions.
 7. Spare parts list and local sources of maintenance materials.
 8. Wiring diagrams.
 9. Copies of warranties and extended warranties. Include procedures to follow and required notifications for warranty claims

2.03 SYSTEMS AND EQUIPMENT OPERATION AND MAINTENANCE MANUAL

- A. Manual shall be provided in the following volumes to match the department. Some information shall be provided in more than one volume. Final contents shall be as directed by the University's Representative. The following list may not include all equipment on the project.
 1. Volumes shall be:

No.	Department	Description of contents
1	BUILDING ENGINEER	Air handling Units Fan coil units Hydronic specialties Steam specialties and equipment Pumps (hydronic, fire & domestic booster) Vacuum Pumps Air Compressors Soft Water, D.I., R.O. systems Heat Exchanger DHW Generators Filters Emergency Generators Boilers Site chilled water system Site high temperature or heating water system
2	BUILDING MAINTENANCE	Lab equipment Fume Hoods Bio Safety Cabinets Toilet partition Toilet accessories Finishes manual Light fixtures Through-penetration firestop systems and engineering judgments
3	BUILDING SYSTEMS	Fire Alarm Security Systems Fire Suppression sprinkler system (do not include NFPA standards)
4	EH&S (Biosafety Officer)	HEPA Filters Fume Hoods (ASHRAE 110 Test) Biological Safety Cabinets Sterilizers (auto claves) w/ seismic calculation Hood and/or BSC certification (TAB Report) Demand control ventilation system
5	ELECTRIC Shop	Emergency Generators Switchgear Panel boards & updated directory card Transformers Motion controls Dimming panels and systems Light fixtures and advanced lighting controls Site electrical power and lighting
6	ELEVATOR (Contract Manager)	Elevators
7	GROUNDS	Irrigation system Planting materials Site reclaimed water

No.	Department	Description of contents
8	HVAC Shop	Exhaust Fans Building Management Controls Direct Expansion (DX) AC units or heat pumps Refrigeration (cold & warm rooms, freezers) Fume Hoods and Bio Safety Cabinets Demand Control Ventilation system
9	LOCK Shop	Door hardware
10	PLUMBING Shop	Water heater gas/electric DHW recirculating – Pump Sump pumps Plumbing fixtures Electric water cooler and drinking fountains Safety Shower/Eye wash Laboratory outlets Backflow Preventers Sterilizer Glass Washer Tunnel Washer Fire Suppression Sprinkler System Fire Hydrants Fire pump Domestic water booster pumps Site potable water, storm, sanitary, natural gas, and compressed air systems.

- B. Content: For each system and piece of equipment not part of a system, include operation data, source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below. In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. Operating standards.
2. Operating procedures.
3. Operating startup and testing logs.
4. Wiring diagrams.
5. Control diagrams.
6. Piped system diagrams.
7. Precautions against improper use.
8. License requirements including inspection and renewal dates.
9. Copy of submittal.

- C. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component or a photo that clearly shows the nameplate data.
4. Equipment function.

5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves and/or multi-rating table.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- D. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- F. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification. Include valve numbering chart.
- G. Source Information: List each system, and piece of equipment included in manual identified by product name and arranged to match manual's table of contents. 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 in Project Manual and drawing or schedule designation or identifier where applicable.
1. Equipment typed specification sheet to include equipment mark, location, model number, serial number and complete nameplate data.
 2. Approved submittals with fan and pump curves.
 3. Engineering calculations e.g. seismic or thermal stress analysis.
- H. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard printed maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
 5. Cross out or delete any non-applicable information.
- I. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.

3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
- J. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- K. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- L. Maintenance Service Contracts, if applicable: Include copies of maintenance agreements with name and telephone number of service agent.
- M. 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.

2.04 RECORD DRAWINGS

- A. Record Prints: Maintain a set of prints of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued. Mark to show actual installation where installation varies from that shown originally. Accurately record information in an acceptable drawing technique.
1. Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with University's Representative. When authorized, prepare a full set of corrected digital data files of the Contract Drawings.
1. Format: Annotated PDF electronic file.
 2. Enable bookmarking of individual documents. Name document files to correspond to system and equipment names used in manual directory and table of contents for each major section or type of equipment.
 3. Pages shall be arranged correctly and for ease of reading.
 4. Eliminate blank pages.

PART 3 - EXECUTION**3.01 EXAMINATION AND PREPARATION**

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning Work, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affected by the Work.
- B. Before proceeding with each component of the Work, examine surfaces, substrates, areas, and conditions, examine new and existing equipment, for compliance with requirements for installation tolerances and other conditions affecting performance and manufacturer's written instruction and recommendations for installing products..
 - 1. Verify compatibility with and suitability of substrates.
 - 2. Examine roughing-in for mechanical and electrical systems.
 - 3. Examine walls, floors, and roofs for suitable conditions.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of conditions.
- D. Take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.
- E. Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- F. Surface and Substrate Preparation: Comply with manufacturer's written recommendations for preparation of substrates to receive subsequent work.

3.02 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations.
- C. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- D. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.

- E. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by University's Representative.
 - 2. Allow for building movement, including thermal expansion and contraction.
- F. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- G. Use products, cleaners, and installation materials that are not considered hazardous.

3.03 CUTTING AND PATCHING

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching requirements with University's Representative.
- E. Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- F. Cutting: Cut in-place construction using methods and appropriate tools least likely to damage elements retained or adjoining construction.
 - 1. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine.
- G. Patching: Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
 - 1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - 2. Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance.
 - 3. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final

paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

3.04 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection shall be removed when no longer required.

3.05 CLEANING

- A. Clean Project site and work areas weekly if not daily, except when working in occupied areas or occupied common areas shall be cleaned daily. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste.
 - 2. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally
 - 3. Remove liquid spills promptly.
 - 4. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
 - 5. Wet mop floors to eliminate tracking dirt and wipe down walls and doors
 - 6. At no time allow water to pond or puddle.
 - 7. Remove debris from concealed spaces before enclosing the space.
- B. Clean installed Work surfaces in accordance with written instructions of manufacturer or fabricator of product installed, using recommended cleaning materials.
- C. Site: Maintain Project site free of waste materials and debris.
- D. Complete the following cleaning operations as applicable to the Work before requesting inspection for certification of Substantial Completion or for each Work Phase:
 - 1. Clean Project site, yard, and grounds, in areas disturbed by construction activities. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - 2. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.
 - 3. Remove labels that are not permanent.
 - 4. Clean transparent materials, including mirrors and glass in doors and windows. Remove excess glazing compounds.
 - 5. Clean exposed finishes to a dust-free condition, free of stains, films, fingerprints, and foreign substances. Sweep concrete floors broom clean.
 - 6. Use HEPA filtered vacuum on carpeted surfaces and wax resilient flooring.
 - 7. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and foreign substances. Clean plumbing fixtures. Clean light fixtures, globes, and reflectors.
 - 8. If air conditioning units were operated during construction, filters shall be replaced and ducts, blowers, and fans cleaned.
 - 9. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

- E. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.06 OPERATION AND MAINTENANCE MANUAL PREPARATION

- A. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, and piece of equipment not part of a system.
- B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are unavailable and where the information is necessary for proper operation and maintenance of equipment or systems.
- C. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams.

3.07 STARTING AND ADJUSTING

- A. Confirm equipment is in accordance with manufacturer's installation instructions.
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust operating components for proper operation without binding.
- D. Test each piece of new or existing equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.08 DEMONSTRATION AND TRAINING

- A. Engage qualified instructors to instruct University's personnel to adjust, operate, and maintain systems, and equipment not part of a system. Include a detailed review of the following:
 - 1. Include instruction for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

END OF SECTION